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The Effect of International Aid On Per Capita Income: A Panel Data Analysis

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Abstract

Poverty, a problem that has existed throughout the history of humanity and sought a solution, is a phenomenon that is struggled under the joint responsibility of world states, national and international organizations. As a result of the positive and economic developments after the World War II, with the implementation of social spending programs, a transition to a systematic structure has been achieved in the struggle against poverty. In this study, a panel data set covering the period 2004-2018 for 23 countries was constructed to examine the impact of international aid on per capita income. The study results show a positive relationship between the international aid, population, and human development index and per capita gross domestic product at the 5% significance level, a negative relationship between the unemployment rate and the Gini coefficient and per capita income at the 5% significance level. If the international aid increases by 1%, the per capita income increases by 0.08%, if the population increases by 1%, the per capita income increases by 1.45%, if the value of human development increases by 1%, the per capita income increases by 1.60%. If the unemployment rate increases by 1%, per capita income decreases by 0.15%; if the Gini coefficient increases by 1%, the per capita income decreases by 0.63%.

Key Words: Panel Data Analysis, Granger Causality, Driscoll-Kraay Standart Error Approach, Per Capita Income, International Aid, Human Development

Mathematical Subject Classification: 91B62, 91B82

1. Introduction

International aid, which had been ongoing since antiquity, became visible only when Western powers thought of their colonies and other poor countries in the 19th and early 20th centuries (Kanbur, 2006: 2). The goal of international aid is to accelerate the countries' economic development to the point where they can achieve a satisfactory growth rate on a self-sustaining basis. The role of foreign capital in a development program is to assist recipient countries in transitioning from recession to self-sustaining economic growth rather than directly improving living standards (Rosenstein-Rodan, 1961: 107).

As a result of the positive economic and demographic development in the post-World War II period, social spending programs were introduced. In the years that followed, governments used social expenditure programs as a tool to eliminate income inequality among income groups because they increased social benefits. As a result, taxation redistributes income, which transfers income from high-income groups to low-income ones. Inability to direct human capital and public resources to productive economic activities results from unequally distributed income. For this reason, governments seek to minimize or eliminate the negative consequences of social expenditures and income inequality (Verberi & Yaşar, 2021: 41)

The supply of products, services and monetary assistance to countries in need is known as international aid or foreign aid. These supports are provided by state-owned organizations such as the Red Crescent, AFAD (Disaster and Emergency Management Presidency), TIKA (Turkish Cooperation and Coordination Agency), USAID (U.S. Agency for International Development), and intergovernmental organizations such as the United Nations, the European Union, and the World Bank, as well as independent nongovernmental organizations (NGOs) (Billing, 2010: 5).

International aid comes in the form of state-to-state aid, international official lending institutions and international private sources of credit. Aids coming into the country from abroad can be divided into two main groups. Short-term capital movements are the first, while long-term capital movements are the second. The debts used to balance the country's balance of payments using capital are included in short-term capital movements. Long-term movements of foreign aid, on the other hand, are the capitals used by countries for growth and development. Foreign aid in the form of donations has been a very important source of financing, especially in the first years of development efforts of underdeveloped countries. Aid to be provided in the form of donations cannot easily be replaced by another form of funding. One of the most important instruments for financing development in underdeveloped countries is foreign loans taken out by foreign states or international financial institutions. Medium- and long-term funds raised by borrowing abroad not only help finance investment by contributing to domestic savings but also increase production by importing capital goods (Özmutlu, 2010:86).

Generally, aid provided to meet urgent and short-term humanitarian needs is referred to as humanitarian aid, while long-term aid for structural reform or the development of a country's infrastructure and superstructure is referred to as development aid. Humanitarian aid refers to activities that are carried out to address people's fundamental humanitarian needs and reduce suffering and victimization in times of crisis and many sudden situations. On the other hand, development assistance is the contribution of developed countries to improving the administrative systems of developing and/or underdeveloped countries and supporting their socio-economic development. Humanitarian aid and development aid are controversial and sometimes intertwined issues with similarities and differences (Menteş, 2020: 41-42).

According to the Global Humanitarian Aid 2018 Report prepared by the United Nations, Turkey is the world's top humanitarian aid provider, with $8.07 billion in aid in 2017. In the ranking, Turkey was followed by the U.S. with $6.68 billion, Germany with $2.99, and the United Kingdom with $2.52 billion, while the European Union institutions ranked fourth with $2.24 billion. While Turkey tops the ranking based on the ratio of humanitarian aid to national income at 0.85 percent, this ratio is only 0.17 percent for its closest followers, Norway and Luxembourg. The U.S., on the other hand, ranked 19th in this ranking with 0.04 percent. According to the report, Syria retained its status as the world's recipient of the most humanitarian aid for the fifth year in a row. The report states that while total humanitarian assistance in the world increased from $18.4 billion in 2013 to $22.1 billion in 2014 and $25.8 billion in 2015, this increasing trend has slowed significantly in the last two years. The total amount of humanitarian assistance in the world increased to $26.4 billion in 2016 and $27.4 billion in 2017. While total humanitarian assistance in the world last year amounted to $27.3 billion, Turkey alone provided about a third of that. The report highlighted that Turkey is the country hosting the most refugees in the world, with 3.5 million Syrians. According to the Global Humanitarian Aid Reports 2013, 2014, and 2015, Turkey is the third country that has provided the most humanitarian aid for three consecutive years and the second country in the last two years (www.euronews.com).

In 2020, official development assistance (ODA) from member countries of the Development Assistance Committee (DAC) totaled $161.2 billion, or 0.32% of their total GNP. COVID -19 spending helped push foreign aid to an all-time high in 2020 (OECD, 2020).

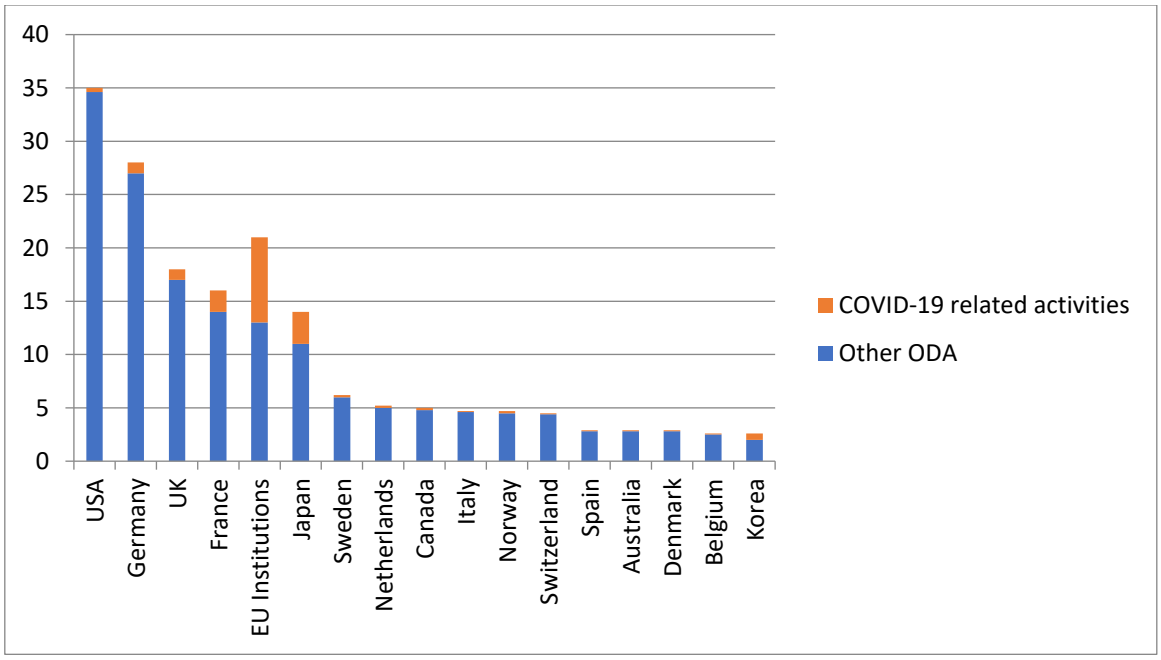

Figure 1. COVID-19 Related ODA Expenditures For Top Donors In USD Billion Source: (ODA, 2020)

When Graph 1 is examined, the 17 countries that donate the most in ODA expenditures related to Covid-19 are listed. When the data set is examined, it is seen that it consists of two groups. Some of the expenditures are other ODA expenditures, while some are covid-19 related expenditures. According to preliminary OECD data, official donor foreign aid increased by 3.5% in real terms in 2019, to an all-time high of $161.2 billion in 2020. Of the total Official Development Assistance (ODA) provided by OECD Development Assistance Committee members in 2020, DAC countries spent $12 billion on COVID -19 related activities, according to initial estimates. Some of these were new expenditures, while others were diverted from current development programs, according to an OECD survey conducted in April and May 2020. Due to the pandemic, all other major income streams for developing countries- trade, foreign direct investment, and remittances – decreased, and domestic resources were under increasing pressure. In 2020, total external private financing for developing countries fell by 13%, while trade volumes fell by 8.5% (OECD, 2020).

Table 1. Top 10 ODA Receipts By Recipient (USD Million, Net Disbursements In 2019)

Syrian Arab Republic	10.129	6%
Ethiopia	4.677	3%
Bangladesh	4.382	3%
Afghanistan	4.140	3%
Yemen	3.759	2%
Nigeria	3.277	2%
Kenya	3.173	2%
Democratic Republic of the Congo	2.810	2%
Jordan	2.690	2%
India	2.551	2%
Other recipients	121.918	75%
Total	163.504	100%

Source: (OECD Report , 2020)

When table 1 is examined, the countries with the highest donations are seen and the Syrian Arab Republic ranks first with 10.129 million dollars.

Although the pursuit of equality in societies corresponds to the ideal, it does not seem possible to achieve absolute equality in the future, as was not the case in the past. The gap between the rich and the poor has expanded day by day since the Industrial Revolution. In the past, income inequality was considered a problem that only existed in underdeveloped countries, but it has now evolved into a global issue that affects all countries equally. Public expenditures are the most frequently used and effective means of eliminating income inequalities and ensuring justice in income distribution. These public expenditures, which are predominantly social in nature, require government intervention, and have an intensive outward impact, are referred to as social expenditures and are named expenditures for education, health, and social protection (İnam, 2019).

The struggle against poverty, the elimination of income inequality, the responsibility of developed countries towards undeveloped or underdeveloped countries - although these are issues that make a lot of noise on national and international platforms, it is apparent that even today, they do not find their full resonance. In this regard, it is critical to continue to support the efforts of politicians, scientists, businesspeople, and many national and international organizations.

Following the introductory part of the study, which evaluates the impact of international aid on per capita income , the second section summarizes the literature on previous studies. The third part presents the estimated model and the method used. The results of the analysis and comments were presented in the fourth part of this study, and a general review and suggestions were presented in the last part.

2. Literature Review

Studies in the related field have been examined in the literature, and considering the increasing international aid all over the world with the Covid-19 epidemic, it is thought that the study will contribute to new studies and literature in the future.

In 2009, 2011, and 2015, when the global impact of the 2008 financial crisis was felt, Verberi and Yaşar (2021: 54) aimed to investigate the link between social expenditures and income inequality in 30 OECD countries. As a result of the analysis, they concluded that increasing social expenditures reduces income inequality. At the same time, they found that trade openness had a negative effect on income inequality, unemployment increased income inequality, and the positive impact of social expenditures on income distribution declined during the crisis years.

Mallik (2008: 259) investigates the impact of foreign aid on economic growth in six of Africa's poorest and most aid-dependent countries, including the Central African Republic, Malawi, Mali, Niger, Sierra Leone, and Togo. A long-term relationship between real GDP per capita, development aid as a percentage of GDP, investment as a percentage of GDP, and openness was determined using cointegration analysis. However, for the majority of these countries, aid has had a negative long-term impact on growth. Levine and Renelt (1992: 959) investigated the empirical relationships between long-term growth rates and a variety of economic, political and institutional indicators. The growth rate and the share of investment in GDP, as well as the investment share and the ratio of international trade to GDP, were found to be positively and strongly correlated.

Gyebi, Owusu, and Etroo (2013: 263-264) examined the efforts and outcomes of Ghanaian governments to attract sustained foreign direct investment (FDI) to increase Gross Domestic Product (GDP) and other economic indicators. While the results indicate that FDI inflows have an impact on GDP growth, it was also noted that other significant macroeconomic variables should be considered.

The long-term causal relationship between foreign direct investment (FDI), domestic investment (DI), and economic growth in Malaysia was investigated by Mohammed, Singh, and Liew (2013: 33). Economic growth and domestic investment (DI) have a long-term dual causality, according to the results. There is no evidence of causality between foreign direct investment and economic growth. The results, on the other hand, reveal a short-term crowding effect between FDI and DI.

With panel data analysis, Eroğlu et al. (2017: 349) studied the influence of social welfare spending on income distribution for 21 OECD countries from 2004 to 2011. The results show that social welfare expenditures positively affect income distribution. When social welfare expenditures increase, income inequality decreases. Furthermore, it has been recognized that unemployment and population growth negatively affect the inequality of income distribution.

Fashina et al. (2018: 114-115) examined the relationship between aid and human capital in promoting economic growth in Nigeria. The results show that government expenditures on education and additional assistance can promote economic growth in Nigeria. However, there are also signs that it may be difficult for this aid-dependent country to achieve economic growth.

Sothan (2018: 178-179) investigated the impact of foreign aid on Cambodia's growth from 1980 to 2014. According to the empirical results, trade openness has a positive influence on growth in both the short and long term. Foreign aid has been proven to contribute positively to growth only in the short term, whereas investment has been found to contribute positively to growth in the long term. On the contrary, it has a negative impact on investment and growth in the long term. In this scenario, it may be claimed that Cambodia's long-term dependence on foreign aid does not contribute positively to investment and growth. It is suggested that policymakers shift from aid dependency to encouraging investments by raising local and foreign capital to achieve sustainable growth and advanced industrialization.

İnam (2019: 148) used panel data analysis to examine the impact of social expenditures on income distribution in 29 European countries, including Turkey. In this research, four models were used. According to the joint results in these models, the variables that most affect the distribution of income in this group of countries were found to be social protection expenditures, per capita income, and the share of the poorest 20%. Brown (2021:53) analyzed the impact of the COVID-19 pandemic on foreign aid using examples from Canadian foreign aid. The Covid-19 pandemic has addressed the process of reallocating resources to crisis management across and within the health sector. However, he stressed that aid aligns with the priorities of donors rather than the needs of the poor and strengthens the justification for self-interest aid.

3. Panel Data Analysis

A collection of cross-sectional observations of individuals, countries, firms, households, etc., over some time is referred to as panel data (Baltagi 2005: 1). Panel data analysis is a method for estimating economic relationships using cross-sectional data with a time dimension (Pazarlıoğlu & Gürler, 2007: 37). The panel data set has two dimensions: cross-section and time (Arı and Zeren, 2011: 41). Using the two dimensions together provides more information usage and an increase in the degrees of freedom. An increase in the number of observations adds more variability to the measured relationship, eliminating the multicollinearity problem (Hsiao, 2006: 7). Cross-sectional studies can only demonstrate differences between units, whereas panel data studies can show changes in both units and a unit over time. Furthermore, the analysis of panel data allows for creating and testing more complex behavioral models than the analysis of cross-sectional data or time series. As a result, omitted variables that produce the significant deviations in estimation results are no longer a problem (Çalışkan, 2009: 124). Since more precise, realistic, and comprehensive estimates can be made for each outcome with panel data analysis, the accuracy of parameter estimates increases and more reliable results can be obtained (Öztürk et al., 2010: 109). Moreover, the greatest and most important contribution is measuring the impact of factors that cannot be expressed numerically, that cannot be observed, and that cannot be measured unambiguously (Çalışkan, 2009: 124). One way to include variability in the model due to differences between units or differences between units and over time, in studies using panel data is to assume that this variability leads to a change in some or all of the regression model's coefficients. "Fixed-Effect Models" are models in which coefficients are assumed to vary by units or units and time. The random effects (RE) model includes individual and temporal differences with error terms (Balestra, 1996: 36). The panel data regression is estimated in various ways depending on the assumptions about the error term, the constant, and the slope coefficient. A general panel data regression model is expressed as follows (Baltagi, 2005: 13).

$$Y_{it} = \alpha_i + \beta_k X_{it} + u_{it} \;\; i = 1,2,\dots,N; \;\; t = 1,2,\dots,T$$

This function is a classical regression model. Assuming that α_i is the same for all units, the ordinary least squares provide the α and β calculations conveniently and consistently. In this model, there are two main situations. The first is the fixed effects model, in which α_i is considered as a fixed term in the regression that belongs to a group, and the second is the random-effects model, in which it is considered as a mixed group (Baldemir & Keskiner, 2004: 47). Here α is the scalar, β is the kx1 parameter, and Xit is the value of the ith observation at the tth time about the k explanatory variable. The error term is considered to be normally distributed with a mean of zero and a constant

variance in such a model. Moreover, the observations for each cross-sectional unit are uncorrelated, and the errors for unit and time have the same variance (Johnston and Dinardo, 1997: 390).

4. Data Set and Findings

In this study, a panel data set covering the period 2004-2018 for 23 countries, (United States, United Kingdom, Turkey, Switzerland, Sweden, Spain, Portugal, Poland, Norway, Netherlands, Luxembourg, Korea, Italy, Israel, Ireland, Germany, France, Finland, Denmark, Canada, Belgium, Austria, Australia) was constructed to examine the impact of international aid on per capita income. Per capita gross domestic product is the dependent variable, the amount of international aid, the human development index of countries, the unemployment rate, the population, and the Gini coefficient are considered as independent variables in the study. The relationship between these variables was examined using the following regression model.

$$lnPCGDP = \alpha_i + \beta_1 lnIA + \beta_2 lnUNEMPR + \beta_3 lnPOP + \beta_4 lnGINI + \beta_5 lnHDI$$

The variables' natural logarithms were used in the model. Stata 13 was used to perform the necessary tests and estimations for panel data analysis. Table 2 lists the variables considered in the model as well as information about them.

Table 2. Variables Used in the Model

Variables	Explanation	Value	Source
PCGDP	Per Capita Gross Domestic Product	US Dollar	https://data.worldbank.org
IA	International Aid Amount	Million Dollar	https://www.oecd.org/
UNEMPR	Unemployment Rate	% of total labor force	https://data.worldbank.org
POP	Population	Total	https://data.worldbank.org
GINI	Gini Coefficient	%	https://data.worldbank.org
HDI	Human Development Index		https://hdr.undp.org/

The error terms are assumed to be independent of the units, but it turns out that the errors have a simultaneous correlation between the cross-sectional units in panel data models (Bektaş, 2017: 59). The cross-section independence is based on the assumption that the other countries that make up the panel are not affected by a macroeconomic shock that occurs in one of the countries and that all countries are affected by a shock in one of the units that make up the panel. (Koçbulut & Altıntaş, 2016: 152). Since the results of the analyzes will be biased and inconsistent if cross-sectional dependence is not taken into account, it is, therefore, necessary to check whether there is cross-sectional dependence between the series before starting the analysis (Menyah et al., 2014: 389). Furthermore, this situation should be considered when choosing unit root and cointegration tests (Göçer, 2013: 5092). The type of unit root test used is selected based on the presence of cross-sectional dependence to avoid the problem of spurious regression. In the case of cross-sectional dependency, the application of unit root tests that do not take into account cross-sectional dependence can result in the destruction of long-term economic information by taking the difference of series by falsely presenting the finding that actually stationary series are not stationary (Karabıyık & Dilber, 2016: 319). Pesaran's CD, Friedman's FR, and Frees's FRE tests, which assess inter-unit correlation in the fixed effects model, were used to see if there was a correlation between the units in the model and the results are provided in Table 3.

Table 3. Cross - Sectional Dependence Test Results

Tests	Statistical Values	Probability Values
Pesaran (CD)	34.525	0.0000
Friedman (FR)	183.483	0.0000
Frees (FRE)	8.596	alpha = 0.10 : 0.1719
		alpha = 0.05 : 0.2262

	alpha = 0.01 : 0.3351

Examination of Table 3 shows no correlation between the units expressing cross-sectional independence according to all three test results, and the null hypothesis is rejected. Since the probability values in both the Pesaran and Friedman tests are smaller than the 0.05 and 0.01 significance levels, and the test statistic calculated based on the Frees test result is larger than the critical values at the (8.596) 0.05 (0.2262) and 0.01 (0.3351) confidence levels, the H0 hypothesis is rejected. So there is a cross-sectional dependence in the panel units.

Depending on whether the croos-section that make up the panel are independent of each other, unit root tests are classified into two types: first-generation and second-generation panel unit root tests (Koçbulut & Altıntaş, 2016: 154). First-generation unit root tests are based on the assumption that the cross-sectional units that make up the panel are independent and that all cross-sectional units at the same level are affected by a shock to one of the units that make up the panel (Altıntaş & Mercan, 2015: 361). A shock to one of the cross-section units that make up the panel, on the other hand, is a more realistic approach for the units to be affected at different levels. Second-generation unit root tests were developed to address this deficiency that analyzes stationarity by considering the dependence between cross-sectional units (Göçer, 2013: 5094). Since the variables used in this study were found to have cross-sectional dependence among the countries that make up the panel, the stationarity of the series was examined using the CADF test developed by Pesaran (2007), which is one of the second-generation unit root tests that can be used in the case of cross-sectional dependence. CADF can be used to perform the unit root test for each cross-sectional unit (for each country) in the rows that make up the panel. As a result, the series' stationarity may be calculated for the entire panel as well as for each cross-section separately. In cases of N>T and T>N, the CADF test is used, which assumes that each country is influenced differently by temporal effects and considers spatial autocorrelation (Altıntaş & Mercan, 2015: 361). The results of the unit root test are given in Table 4.

Table 4. CADF Unit Root Test Results

	I(0)	**I(1)**
lnPCGDP	p: 0.961	p: 0.000
lnIA	p: 0.806	p: 0.000
lnUNEMPR	p: 1.000	p: 0.003
lnPOP	p: 0.923	p: 0.944
lnGINI	p: 0.310	p: 0.000
lnHDI	p: 0.000	-

Except for the human development index (InHDI) variable in Table 4, the results indicates that other variables are not stationary at the level (contains unit root). As a result of the panel unit root tests, the first differences of the non-stationary variables were taken and the panel unit root test was performed again. When the first difference is taken, it is seen that other variables, except for the population (lnPOP) variable, become stationary, that is, they are I(1). If the series contains a unit root, the existence of a long-term relationship between the series can be investigated by cointegration tests. The variables combined are said to be cointegrated, if there exists a stationary linear combination of nonstationary variables. Westerlund (2007) developed a four-panel cointegration test based on the error correction model. Two of these tests are called panel statistics, and the other two are called mean group statistics. This test is based on the assumption that the series that make up the panel are I(1) stationary, with the same degree and first difference (Westerlund, 2007: 718). The study used a test developed by Westerlund (2007) that consisted of four-panel cointegration tests. These tests check whether the error correction term is negative and significant. There is a cointegration relationship if the results are negative and statistically significant. The weighted average of the short-term coefficients is used in two of the calculated tests (Ga and Gt), while the other two are test statistics based on the panel (Pa and Pt) (Bektaş, 2017: 61). Table 5 shows the results of the cointegration test.

Table 5. The Results of The Westerlund ECM Panel Cointegration Test

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-4.632	-8.427	0.000	0.590
Ga	-0.472	9.781	1.000	0.770
Pt	-8.360	5.021	1.000	0.420
Pa	-0.548	8.045	1.000	0.740

Because the series that make up the panel exhibit cross-sectional dependence, the bootstrap values of the panel statistics should be considered when interpreting the numerical data in the results. The results in Table 5 shows no cointegration relationship between the cross-sectional units that make up the panel. The null hypothesis cannot be rejected according to all statistics, and it is shown that there is no cointegration relationship between all cross-sectional units that make up the panel.

The Granger causality test is used after the cointegration test to assess whether there is a relationship between the variables and, if so, the direction of that relationship. If variable X is the cause of variable Y, the changes in X precede the changes in Y (Kamacı, 2016: 173). Table 6 shows the results of the Granger Causality Test.

Table 6. Granger Causality Test Results

Null Hypothesis	Zbar Statistic	Significance Value (P)
lnIA is not the Granger cause of lnGDPP	5.9916	0.0000
lnUNEMPR is not the Granger cause of lnPCGDP	2.1145	0.0345
lnPOP, is not the Granger cause of lnPCGDP	-0.6870	0.4921
lnGINI, is not the Granger cause of lnPCGDP	3.3537	0.0008
lnHDI, is not the Granger cause of lnPCGDP	1.4365	0.1509

The results of the Granger causality test in Table 6 shows that while the amount of international aid (lnIA), the unemployment rate (lnUNEMPR), and the Gini coefficient (lnGINI) are Granger causes of per capita GDP (lnPCGDP), population (lnPOP) and the human development index (lnHDI) are not Granger causes of per capita GDP (lnPCGDP).

The likelihood ratio (LR) test was used to find the appropriate model in panel data models, which tests the pooled model to the random-effects model. According to this approach, the null hypothesis stating that "the standard errors of the unit effects are equal to zero" was rejected according to the chi-square test with 1 degree of freedom at the 5% significance level (chibar2(01)=345.66; sample > =chibar2=0.000), and it was concluded that the pooled model was not fit. Furthermore, the standard error of the residual error is tested to be equal to zero with the Score test, which tests the pooled model to the random effects model but has a better small sample property. According to the results (chi2(1)=57629.69; Probe>=chi2=0.000), the H0 hypothesis was rejected, and it was assumed that the pooled model was not fit. As a result of these tests, it was found that there are unit effects in the model. In a second step, it was investigated whether these effects are fixed or random. When using panel data, it is necessary to decide which of these two models is more appropriate after analyzing the fixed and random-effects models. A suitable model selection can be made with the tests of Breusch-Pagan (1980) and Hausman (1978). The Hausman test was used to determine which of the panel data approaches was appropriate. The Hausman test examines whether the error components are related to the independent variables in the model (Gujarati and Porter, 2009: 602-603; Maddala, 2001: 578-579). It is decided that if the H0 hypothesis of no correlation between the unit effect and the independent

variables, the fixed effects model is the appropriate model. (Xi) is rejected, and if it cannot be rejected, the random-effects model is the appropriate model (Türedi, 2013: 310).

The H0 hypothesis that "the random effect model is more efficient than the fixed-effect model" is rejected by the Hausman test results (chi2(5) = 36.08; Probe>chi2=0.0000) for the model at the 5% significance level. The results concluded that the appropriate model for the data set is the fixed effects model.

The fixed-effects model was found to be valid by the Hausman test. Because the regression estimates would not show the real values if the model had autocorrelation and heteroscedasticity problems, autocorrelation and heteroscedasticity tests were used to determine its conformity with the econometric assumptions. For autocorrelation, the Durbin-Watson test developed by Bhargava, Franzini, and Narendranathan (1982) and the LBI test developed by Baltagi and Wu (1999) were used. In these tests, the probability value is not calculated, and if the statistical results of the test are less than 2, autocorrelation is inferred. As a result of the related tests used to determine whether or not the model has an autocorrelation problem, it was found that the model has an autocorrelation problem because of the test statistics (modified Bhargava et al. Durbin-Watson=0.63137569; Baltagi-Wu LBI=0.84410783) were less than 2. The presence of the heteroscedasticity problem associated with the model was examined using the modified Wald test. Examination of the modified Wald test for group heteroscedasticity in the fixed-effects regression model (chi2(23) =324.98; Probe > chi2 =0.0000) showed that the probability value was significant, and in this case, the hypothesis H0, which was posited as no heteroscedasticity, was rejected, i.e., there was heteroscedasticity in the model.

Thus, it was found that cross-sectional dependence, autocorrelation, and heteroscedasticity are present in the model examined in this study, and the Driscoll-Kraay Fixed Effects estimator with Standard Errors was used, which provides appropriate robust estimators for this situation (Driscoll and Kraay, 1998). Driscoll and Kraay (1998) proposed a nonparametric covariance matrix estimator that produces heteroskedasticity- and autocorrelation-consistent standard errors that are robust to general forms of spatial and temporal dependence (Hoechle, 2007: 282). The Driscoll and Kraay standard errors of parameter estimates are obtained with the help of the square roots of the diagonal elements of the asymptotic (robust) covariance matrix (Dücan & Akal, 2017: 72). With this approach, which is based on cross-sectional means, the adjusted standard error estimates ensure the consistency of the covariance matrix estimators regardless of the cross-section size (Dilber & Işık, 2022: 275). The Driscoll-Kraay test results are shown in Table 7.

Table 7. Fixed Effects Model Estimation with Driscoll-Kraay Standart Error

	Coef.	**Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
lnIA	0.0819823	0.0154031	5.32	0.000	0.0489458	0.1150187
lnUNEMPR	-0.151679	0.0356524	-4.25	0.001	-0.2281457	-0.0752123
lnPOP	1.450461	0.3521622	4.12	0.001	0.6951481	2.205774
lnGINI	-0.6362117	0.1863613	-3.41	0.004	-1.035917	-0.2365065
lnHDI	1.607562	0.7227805	2.22	0.043	0.0573517	3.157772
_cons	-14.44168	5.698455	-2.53	0.024	-26.66365	-2.219711

The results in Table 7 indicates that there is a positive relationship at the 5% significance level between the amount of international aid (lnIA), population(lnPOP) and human development index (lnHDI), and per capita gross domestic product (lnPCGDP), and a negative relationship between the unemployment rate (lnUNEMPR) and the Gini coefficient (lnGINI) and per capita gross domestic product (lnGDP). If the amount of international aid increases by 1%, lnPCGDP increases by 0.08%, if the population increases by 1%, lnPCGDP increases by 1.45%, and if the value of human development increases by 1%, lnPCGDP increases by 1.60%. If the unemployment rate increases by 1%, lnPCGDP decreases by 0.15%; if the Gini coefficient increases by 1%, i.e., lnPCGDP decreases by 0.63% if income inequality increases. In accordance with the findings obtained, the model in the study is given as follows.

$$lnPCGDP = -14.441 + 0.081lnIA - 0.151lnUNEMPR + 1.45lnPOP - 0.636lnGINI + 1.607lnHD$$

5. Results

Poverty is a problem that has always existed in the history of humankind and has been looking for a solution. The fact that poverty is not only an economic problem but also proves to be a complex problem with social and moral dimensions means that efforts to eliminate or at least reduce poverty take different forms over time. The reason why poverty is still a serious problem in our world, whose level of prosperity has increased in recent years, is the unequal distribution of the gains of growth between societies. Income inequality is one of the leading causes of poverty, to put it simply. While this inequality generally refers to differences among citizens of a country, it can also refer to differences on a global or regional dimension.

This study used panel data analysis to examine the impact of international aid on per capita income between 2004 and 2018, 2018 obtaining panel data set for 23 countries. In the study, per capita income is the dependent variable, the amount of international aid, the human development index of countries, the unemployment rate, the population, and the Gini coefficient are considered as independent variables. The study results show a positive relationship between the amount of international aid, population, and human development index and lnPCGDP at the 5% significance level, and a negative relationship between the unemployment rate and the Gini coefficient and lnPCGDP at the 5% significance level. If the amount of international aid increases by 1%, lnPCGDP increases by 0.08%, if the population increases by 1%, lnPCGDP increases by 1.45%, and if the value of human development increases by 1%, the per capita gross domestic product increases by 1.60%. If the unemployment rate increases by 1%, lnPCGDP decreases by 0.15%; if the Gini coefficient increases by 1%, i.e., if income inequality increases, lnPCGDP decreases by 0.63%. In other words, despite the quantity of international aid and the human development index increased along with lnPCGDP, it was concluded that lnPCGDP declined as the unemployment rate and Gini rates increased.

Policies aimed at improving income distribution and combating poverty should not only address monetary poverty, which can be alleviated by giving a specific level of income, but also protect the right to a humane life in terms of access to fundamental services such as education and health. Increasing employment is one of the most important steps to prevent income inequality and poverty. International aid from developed countries to undeveloped or underdeveloped countries, as well as national and international organizations' efforts in this regard, are critical to reducing income inequality. But even more important is the elimination of situations that can lead to injustice when this aid goes to the countries that receive it. Social and humanitarian crises will be inevitable if the countries that survive on international aid cannot reach that aid. Therefore, as important as the importance of international aid is that it fully reaches those who really need it and that at this point, the necessary controls are carried out. In the light of this information, the steps and precautions to be taken by states, policy makers and social aid organizations are of great importance.

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