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Macroeconomics, human development and political stability: evidence from OIC countries

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Abstract: This study aims to examine and analyze the effect of macroeconomic variables on the Human Development Index (HDI) in the Organisation of Islamic Cooperation (OIC) countries with political stability as the moderating variable. The GMM (Generalized Method Moment) dynamic panel and the MRA (Moderated Regression Analysis) will be used for determining the type of moderation needed as analysis techniques. In the first section, the findings state that inflation and unemployment have no effect on HDI, This is due to the fact that inflation and unemployment are very dependent on global economic fluctuation. Meanwhile, trade openness has a significant positive effect on HDI and foreign direct investment has a significant negative effect on HDI. This can add to the evidence that a high level of trade openness can support HDI values in OIC countries. Trade Openness can strengthen the economy, education, and health simultaneously by increasing prosperity through increased demand, supply, and services in numerous sectors. Secondly, the value of the moderator variable (political stability) on the relationship between unemployment and HDI demonstrates that political stability acts as a "Quasi Moderator" which means that political instability can exacerbate the negative influence of unemployment on HDI in OIC countries. This research has implications for the importance of cooperation between OIC countries in various fields, especially in increasing trade, investment, job creation and good governance to support the expansion of human development in OIC nations and to build sustainable prosperity.
Keywords: HDI; Inflation; Unemployment; Trade Openness; Foreign Direct Investment; Political Stability
JEL Classification: E6; I0; J5; P0

Introduction

The economic development paradigm has undergone changes. The country's development program is not only marked by its high level of economic growth, but also includes the quality of its people. The development programs must be favourable in encouraging high earnings while establishing environmental conditions in which humans have the flexibility and choices to live longer, healthier, and more productive lives (Sofilda et al., 2015). According to UNDP (1999) and Todaro and Smith (2011), The Human Development Index (HDI) is a socioeconomic advancement indicator that combines education, health, and real per capita income. The HDI is currently a comprehensive measurement used by the United Nations to assess the level of social and economic development

in various countries throughout the world. Human development programs influence a wide range of elements, including economy, society, politics, law, and security.

Based on the UNDP annual report in the last ten years, the highest levels of human development growth were dominated by European and American countries. The highest ranking position is occupied by Norway with a value of 0.95, then Switzerland with a value of 0.94 and several countries (Ireland, Hong Kong, Iceland, Germany, Sweden, the Netherlands and Denmark) with a value of 0.93. Meanwhile, the majority of OIC countries are ranked much lower than developing and underdeveloped countries. There are only five OIC countries included among the 50 countries with the highest HDI scores. The United Arab Emirates was the highest amongst these five, with an average value 0.87 (UNDP, 2021). Saudi Arabia and Qatar came next with an average score of 0.85, followed by Brunei Darussalam and Qatar with an average score of 0.84. However, these numbers are rather small when compared to the total number of 57 OIC member countries, many of which have large populations as well as natural and human resources (Muharromy & Auwalin, 2021; Supriani & Fianto, 2020).

In the Islamic economic system, human development and economic growth are basically in line with the objectives of Islamic law (*maqāsid sharia*) that have been formulated. Where human welfare does not only focus on the economy or welfare (al-māl), but also in terms of the freedom of each individual in thinking, obtaining education and making choices (al-aql), health and offspring (al-nafs and al-nasab) and of course a strongly defined religion (hifdzuddīn) (Arshad et al., 2015; Mahri et al., 2021). Therefore, it is necessary to analyze the contradiction between theories and realities, as well as the factors that determine human development and economic welfare in OIC countries.

The macroeconomic conditions of a country are external elements which impact its development. (Runtunuwu, 2020; Supriani & Fianto, 2020; Yolanda, 2017). Every society faces two fundamental issues: unpredictable inflation and high unemployment. Both have negative consequences for society, politics, and the economy. The inability of a society to provide basic requirements is a major setback in development efforts in many areas, including the economy, health, and education (Sen, 1999). Furthermore, a country's inflation volatility significantly affects the macroeconomic environment in numerous ways. An increase in inflation will cause real income to continue to decline, reduce people's living standards, and ultimately make everyone poorer, especially the poor (Runtunuwu, 2020; Wau, 2022). Unpredictable inflation will make decision-making difficult for economic actors, having to decide whether to consume, invest or produce, causing a slowdown in economic development (Islam, 2022; Okwu et al., 2020; Yolanda, 2017).

According to Roncaglia de Carvalho et al. (2018), emerging countries have a higher average inflation than developed countries. The study analysed inflation and growth in 65 countries and indicated that the relationship between human capital and inflation was not statistically significant. In line with this, Shah (2016) analyzed his data which discovered the that inflation rate had a negative relationship with HDI in 188 countries worldwide. In line with inflation, the main argument in studies discussing the effect of

unemployment on human development is that unemployment has a negative and insignificant effect on the HDI. According to data from the International Labour Organization (ILO), the number of unemployed people in OIC countries increased by more than 4 million to 49.3 million in 2020. As a result, the unemployment rate soared to 7.1% in the year, up 0.7 percentage point from 6.4% in 2019 (OIC Outlook, 2021). Hassan et al. (2016) uses the Human Development Index (HDI) as the inverse or proxy for multidimensional poverty with the ARDL approach determining short-term and long-term relationships with research objects from global countries to explain that poverty, unemployment, and inflation have short-term and long-term effects on the HDI. This research also shows that unemployment and inflation both cause an increase in poverty and prevent the development process.

In the last few decades, both developed and developing countries have formed a way of cooperating in economic activities as the result of economic globalization. Trade openness and foreign direct investment are widely considered to be the main factors that can drive economic growth and human development (Chih et al., 2022; Okwu et al., 2020; Tahir & Khan, 2014). The United Nation's Sustainable Development Goals (SDGs) main goals are accelerating human development and reducing poverty in developing countries. Nevertheless, the majority of OIC countries are not on the right track to achieve this goal. Therefore, a sizable capital investment is needed to turn things around. Investment can be the source of funding for economic activities and infrastructure development. In turn, these facilities and infrastructure would be instrumental in supporting community welfare (Intisar et al., 2020).

In the case of developing countries, foreign direct investment acts as a catalyst for economic growth. The contribution of capital can support increased production of host countries, especially developing countries where the unemployment rate is high and local savings are insufficient (Putra & Suyanto, 2019; Hamdi & Hakimi, 2022; Supriani & Fianto, 2020). Foreign investment can contribute to this goal by creating jobs, developing local skills, and driving technological progress (Mbang, 2022). The research analyzing trade openness and FDI on human development is quite limited because of the indirect relationship between these components. Hamdi and Hakimi (2022) concluded that trade openness and foreign direct investment were factors driving human development in MENA countries. His research shows that the coefficients of trade openness, investment, FDI, inflation, and GDP variables are statistically significant in the long run. Meanwhile, in the short term, only FDI, investment and GDP are significant. Research by (Novignon et al., 2018) analyzed whether or not trade openness benefits the health sector. The results of the fixed effect, random effects, and GMM models show that trade has a positive and significant effect on life expectancy. However, it has a negative effect and a significant impact on infant mortality and under-five mortality rates.

In achieving better economic growth and human development, good governance is needed (Davis, 2017; Samarasinghe, 2018). Political instability is one of the most dangerous threats to governance in OIC countries. This is because Muslim countries are entangled in wars, foreign invasions, coups, ethnic rivalries, and sectarian violence (Uddin et al., 2017). The Middle East region has become the most unstable region in the world,

especially after the political upheaval in 2011 resulted in challenges to unity and development. The average level of political stability of OIC nations for 2011-2021 indicates that the majority of OIC countries are on the negative line. The highest average value was 1.14 in Brunei Darussalam, while the lowest was -2.68 in Syria. The countries with low political stability have lost most of their development potential (Worldwide Governance Indicators, 2021). Political instability, which happens on a regular basis, is a hindrance to economic progress and human development in OIC member nations. Sabir & Khan (2018) argue that an uncertain political climate can hinder investment and growth. In a study of 120 developing nations, Uddin et al. (2017) discovered that OIC countries have greater levels of political instability. Political instability has a greater influence on economic growth in poor and middle-income OIC nations since there are fewer robust economic and political institutions. In line with the findings of Alshammari et al. (2015), political stability has a significant effect on human development.

Furthermore, political stability may affect the interaction between macroeconomic indicators and human development. Political instability exacerbates inflation's impact on human development in a country. When the basis of strength and stability is not established, inflation can endure longer, and if it occurs in the long run, it will cause a crisis that will impede progress. According to (Aisen et al., 2005), political instability has a far greater influence on inflation in poor nations than in wealthy countries. According to (Mazhar & Jafri, 2017), the negative association between political stability and inflation holds true only when the scale of the shadow economy is low. (Barugahara, 2021) analyzed whether political instability generated unpredictable inflation in 49 African nations. This study showed that political instability had a considerable beneficial effect on inflation volatility. On the other hand, nations with strong and stable political conditions may better withstand inflationary shocks.

The government plays a role in establishing policies that can decrease the youth unemployment ratio. Therefore, excellent governance can significantly influence unemployment on the HDI. Political engagement and institutional quality are required since unemployment can be a barrier to national growth. According to (Sabir & Khan, 2018) research, governance had a negative and substantial influence on unemployment at a 5% level in South Asia. Good governance will improve wellbeing and lower the unemployment rate. Abé Ndjié et al. (2019) found governance variables that might help minimize young unemployment rates in Africa. Moreover, the influence of trade oppenness and foreign direct investment is moderated by political stability because an economy with greather constitutional and political stability offers stakeholders better security services, favorable conditions, specific market rights and low government intervention. According to research (Asamoah et al., 2019), the impact and influence of various political stability indicators on foreign direct investment inflows can differ between developed and developing countries.

Based on the studies mentioned above, there are various results and analytical techniques that are quite diverse. This study attempts to fill this gap by analyzing four macroeconomic variables (inflation, unemployment, trade openness, and foreign direct investment) on the Human Development Index (HDI) using political stability as a moderating variable,

which is a part of good governance, to see how far their role reaches in influencing the state of economic and social development of OIC countries. Political stability is a crucial factor in realizing economic prosperity and human welfare, especially when Muslim countries have lost many of their growth trajectories. In addition, this study uses dynamic panel data, as well as the generalized method of moments (GMM) model with and without interaction. The model of estimations will show clearly how much political stability and macroeconomic factors have influenced human development growth in OIC countries. This study is quiet important for the OIC countries, particularly in regard to economic growth, health, and post-pandemic political crises.

Research Method

The descriptive-quantitative method is applied in this study. The research population consist of all OIC member countries which have been registered until 2022. However, due to limited data from the entire population, the purposive sampling method samples are used. The sample selections are based on certain criteria that the samples are taken from, and the availability of data is based on the object under study. The countries in this study actively participate in using macroeconomic indicators (inflation, unemployment, trade openness and FDI) as well as show political stability in advancing their human development. The data for these countries is available on the UNDP, WGI and the World Bank websites and was within the last 10 years which ranged from the year 2011-2020.

This study analyzed macroeconomic factors to assess the effect of inflation, unemployment, trade openness, and foreign direct investment on the Human Development Index, with political stability as a mediator between the dependent and independent variables. The human development index (HDI) was utilized as a measure of human development in this study. The HDI consists of three components: health (measured by life expectancy at birth in years), education (measured by the average number of years of schooling for individuals aged 25 and older), expected years of schooling for children of school age (percentage) and living standards measured in terms of GDP per capita ($PPP). The geometric average is used to combine the scores for the three HDI dimension indices into a composite index (UNDP, 1999). Furthermore, human development values are classified into four HDI value levels: a) countries with low HDI have a value less than 60, b) countries with a medium HDI have a value between 60 and 70, c) countries with a high HDI have a value between 70 and 80, and d) countries with a very high HDI have a value greater than 80.

The macroeconomic variables used in this research are inflation, unemployment, trade openness, and foreign direct investment. A country's inflation rate can be determined using various metrics. The GDP deflator (Gross Domestic Product) is the measure used in this research. The GDP deflator calculates price changes throughout the economy and the GDP deflator assesses a wider range of price variations when compared with the CPI (Consumer Price Index) and the WPI (Wholesale Price Index). Inflation is calculated as the annual growth rate of the GDP implicit deflator. That is achieved by calculating the difference between the GDP in the current local currency and the GDP in constant local

currency (The World Bank, n.d.) The inflation calculation using the GDP deflator can be described using the following formula:

GDP deflator = (Nominal GDP / Real GDP) x 100 .... (1)

Inflation rate = [(Deflator PDB_t / Deflator PDB_{t-1}) − 1] x 100% .... (2)

In addition, the labor force approach is used to calculate the unemployment rate, which is calculated in percentage form by dividing the number of people who are not working by the total labor force in an area. The next variable is trade openness, which is computed in this study by calculating the growth rate of total commerce (accumulated exports and imports of goods and services) as a percentage of a country's GDP (The World Bank, n.d.). The quantity of foreign investment obtained from the World Bank by looking at net inflows in the form of American dollars (US $) is the measurement of foreign direct investment (FDI). The measurement of foreign direct investment (FDI) used in this research is the amount of foreign investment obtained from the World Bank by looking at net inflow in the form of American dollars (US $).

The governance component used as a moderator variable in this study is political stability. Political Stability is an indicator that shows the possibility of government instability whether it is overthrown through unconstitutional means or violence such as terrorism and politically motivated violence (Alshammari et al., 2015). The estimation unit used to measure political stability in a region is an aggregate estimate in standard normal distribution units starting from -2.5 to 2.5 (Wibowo, 2020). The explanation of all variables is presented in Table 2.

Table 2 Variables Used In Research

Variabel	Explanation	Unit	Source
y	Human Development Index	Index	UNDP
X1	Inflation Rate	Percentage	World Bank
X2	Unemployment	Percentage	World Bank
X3	Trade Openness	Pencentage	World Bank
X4	Foreign Direct Investment	US dollars	World Bank
Z	Political Stability	Index	WGI

Data Analysis Techniques

Before entering the main analysis test in research, this research will begin with a descriptive statistical test to see the characteristics of each variable. Furthermore, the Generalized Method of Moments (GMM) Model will be used to measure the parameters. Adding additional lag to the dependent variable, which functions as an independent variable, is required for regressions using dynamic panel data. A dynamic panel development model called GMM was used to eliminate variable bias, including unobserved panel heterogeneity and measurement error while controlling for the lagged endogeneity of the dependent variable in the dynamic panel model.

Hansen (1982) was the first to define a GMM, which is used to estimate the data parameters provided by the model. Establishing a unique distribution for the residuals is one way the GMM estimation approach avoids unnecessary or unwanted assumptions (Bond, 1991). Arellano-Bond is the more popular name for the GMM forecasting technique. The difference in the GMM model that produces objective, consistent, and effective estimates is the first model in the Arellano-Bond GMM estimation technique. Following are the estimation results of the GMM Arellano-Bond one step estimator:

$$\frac{\delta}{\beta} = \left[\left(N^{-1} \sum_{i=1}^{N} (\Delta\, y_{it} - 1\, \Delta x_1)' Z_i \right) w \left(N^{-1} \sum_{i=1}^{N} (\Delta\, y_{it} - 1\, \Delta x_1) \right) \right]^{-1} \quad\text{............} \quad (3)$$

$$\left[\left(N^{-1} \sum_{i=1}^{N} (\Delta y_{it} - 1\, \Delta x1)' Zi \right) w \left(N^{-1} \sum_{i=1}^{N} (Z_i\,' 1\, \Delta\, y_i) \right) \right]^{-1} \quad\text{.........................} \quad (4)$$

Where:
Zi: A valid instrument matrix
w: The y estimate is unbiased and consistent for w (LxL) where L is the number of instrument variables. To get the results of the two step estimator by substituting the weight w by:

$$\Delta^{-1} = N^{-1} \sum_{t-1}^{N} Z_i'\, \Delta\, V_i\, \Delta\, V_i\, Z_i \quad\text{...} \quad (5)$$

However, this first model (difference GMM) has several drawbacks, including endogeneity correction by changing all regressors through differencing, eliminating the fixed effect (Manuel & Bover Olympia, 1995). The first difference transformation has a weakness, namely by reducing previous observations from contemporary observations so that it enlarges the gap in the unbalanced panel. Therefore it is refined by using the GMM system.

The GMM system (model 2) is considered more flexible because firstly, endogeneity is corrected by introducing more instruments to dramatically increase efficiency and changing the instruments so that they are not correlated (exogenous) with the fixed effect. Secondly, it is built on a system of two equations, the initial equation and the modified equation. Thirdly, the GMM system uses orthogonal deviance, instead of subtracting previous observations from contemporary observations, reducing the average of all available future observations of the variable. The GMM system can be calculated for all observations, thereby minimizing data loss (Manuel & Bover Olympia, 1995).

GMM estimation is an approach used to show the direct and indirect impact of each independent variable (inflation, unemployment, trade openness, foreign direct investment) and moderating variables (political stability) on the dependent variable (IPM). The model is modified into a dynamic function, as described below:

$$\text{IPM}it = \lambda\text{IPM}it{-}1 + \beta_1\text{INF}_{it} + \beta_2\text{UNEMPLY}_{it} + \beta_3\text{TO}_{it} + \beta_4\text{FDI}_{it} + \beta_5\text{SP}_{it} + \varepsilon_{it} \text{.......} \quad (6)$$

Where HDI is constant HDI for year t, the subscripts i and t represent the number of countries and periods covered in the study. INF, UNEMPLY, TO and FDI are inflation,

unemployment, trade openness and foreign direct investment respectively to HDI, and SP is political stability, and ε is a random variable.

Moreover, the Moderated Regression Analysis (MRA) Model is used to analize the one component of multiple linear regression analysis which is moderated regression analysis. The moderating regression model equation can be used to influence how the independent variable (X) and the dependent variable (Y) interact. These consequences can strengthen, weaken, or have no impact on the relationship between the two parties. X is the predictor variable, and Y is the criterion variable, and M is determined as the moderating variable. The equation model for GMM analysis with interaction is as follows:

$IPM_{it} = β_1 + λIPM_{-1it} + β_2INF_{it} + β_3UNEMPLY_{it} + β_3TO_{it} + β_4FDI_{it} + β_5SP_{it} + β_6SP*INF_{it} + ε$

$IPM_{it} = β_1 + λIPM_{-1it} + β_2INF_{it} + β_3UNEMPLY_{it} + β_3TO_{it} + β_4FDI_{it} + β_5SP_{it} + β_6SP*UNEMPLY_{it} + ε$

$IPM_{it} = β_1 + λIPM_{-1it} + β_2INF_{it} + β_3UNEMPLY_{it} + β_3TO_{it} + β_4FDI_{it} + β_5SP_{it} + β_6SP*TO_{it} + ε$

$IPM_{it} = β_1 + λIPM_{-1it} + β_2INF_{it} + β_3UNEMPLY_{it} + β_3TO_{it} + β_4FDI_{it} + β_5SP_{it} + β_6SP*FDI_{it} + ε$

The notations mean: HDI: Human Development Index, UNEMPL: Unemployment, TO: Trade Openness, FDI: Foreign Direct Investment, SP: Political Stability, ε: Errors, I: Country, and t: Year

Hypothesis Analysis and Testing

Model Specification Test

The model specification test which is known as the Sargan test is used to determine the validity of using instrument variables whose number exceeds the number of parameters suspected (overidentifying restriction conditions). In overcoming the problems of endogeneity and inconsistency of estimators in the GMM Equation, instrumental variables are needed. There are two approaches to the GMM method, namely the differential GMM method (Bond, 1991) and the GMM system method (Manuel & Bover Olympia, 1995).

According to Sargan's test criteria, an instrument variable is considered valid if it is not associated with errors. The mathematical operations of the Sargan test can be described as follows:

$$S = \tilde{v}'Z\left(\sum_{i=1}^{N} Z'\tilde{v}i\ \tilde{v}i'Zi\right)^{n-1} Z'\tilde{v} \sim X^2_{L-(k+1)} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (7)$$

Where:
Z: Instrument variable matrix
ṽ: The error component of the model estimate

The parameters of the Sargan test results are when the p-value is > α 5%. In this study the Sargan test was attached to the results of the GMM test as indicated by the J-Statistics Prob (Nabilah & Setiawan, 2016).

Arellano-Bond test

The Arelano-Bond test is used to test the consistency of the estimates obtained from the GMM process. The criterion of the arellano-bond test is that if the instrument variable does not have autocorrelation at the i-th order first difference, then the instrument variable is declared valid. The following is the mathematical function of the Arelano-Bond test described in the formula below:

$$m(2) = \frac{\Delta\tilde{V}i,t-2 \; \Delta\tilde{V}*}{(\Delta\tilde{V})^{\frac{1}{2}}}$$ .... (8)

Where:
$\Delta\tilde{V}i$,t-2 : Error vector in the 2nd lag with order $q = \sum_{i=1}^{n} T1 - 4$
$\Delta\tilde{V}*$: Error vector cut to fit $\Delta\tilde{V}i$,t-2 with size q x 1

The parameters determined from the test above are; if the AR value is greater than α 5% (> 0.05), the consistency value of the GMM results is described by a statistical value that is not significant at m2.

T-test

The t-test aims to partially determine the effect of the independent variables (inflation, unemployment, trade openness, foreign direct investment) and moderating variables (political stability) on the dependent variable (IPM). The hypothesis for the t-test is as follows:

H_0: If the significant value is greater than α 0.05 (> 5%)

H_1: If the significant value is less than α 0.05 (<5%)

Results and Discussion

Descriptive Analysis

The lowest, maximum, average, and standard deviation values of each research variable are displayed or described using descriptive statistics. The broad description given in the descriptive statistical analysis includes all features of the two components because the panel data is a mixture of cross-sectional data and time series data. The following is the result of processing descriptive statistics using the reviews 10.0 program:

Table 3 Descriptive Statistics

	HDI	INF	UNEMPL	TO	FDI	PS
Mean	0.651222	4.565844	7.449566	38.46584	3.998031	-0.528969
Median	0.690500	3.680000	5.982000	36.37500	2.300000	-0.520000
Maximum	0.912000	84.59000	21.97200	859.8200	39.46000	1.260000
Minimum	0.360000	-25.13000	0.100000	-1241.030	-11.20000	-2.810000
Std. Dev.	0.142840	8.925618	4.655698	107.1379	5.530253	0.813759
Skewness	-0.215229	2.628742	0.998001	-3.565731	3.002004	-0.077569
Kurtosis	1.754780	24.18866	3.646903	78.87831	15.37488	2.979106
Jarque-Bera	23.14488	6354.670	58.70007	77445.01	2522.476	0.326722
Probability	0.000009	0.000000	0.000000	0.000000	0.000000	0.849284
Sum	208.3910	1461.070	2383.861	12309.07	1279.370	-169.2700
Sum Sq. Dev.	6.508663	25413.66	6914.494	3661654.	9756.200	211.2432
Observations	320	320	320	320	320	320

The Human development index (IPM) is a dependent variable in this study and the independent variables include inflation, the unemployment rate, trade openness, foreign direct investment, and political stability which are moderating variables. Based on Table 3 it can be seen that the mean HDI is 0.65, the median is 0.69, the maximum value is -0.912, and the minimum value is 0.36. With a standard deviation of 0.14 and a probability of 0.00, it means that most of the character differences in the HDI data have a significant or dissimilar effect.

Furthermore, the first independent variable is inflation. Inflation is obtained by a mean value of 4.56, a median of 3.68, a maximum value of 84.59, and a minimum value of -25.13. With a standard deviation of 8.93 and a probability of 0.00, it means that most of the character differences in the inflation data have a significant or dissimilar effect. Secondly, the unemployment variable has a mean value of 7.45, a median value of 5.99, a maximum value of 21.97, and a minimum value of 0.10. The standard deviation value is 4.66 with a probability value of 0.00 which means that most of the character differences in the unemployment data have a significant or dissimilar effect.

Thirdly, Trade Openness (TO) has a mean value of 38.47, a median value of 36.38, a maximum value of 859.82, a minimum value of -1241.03 with a standard deviation of 107.13 and a probability of 0.00 which indicates that most of the differences in the character of TO data values have a significant or not the same effect. Finally, the Foreign Direct Investment (FDI) data has a mean value of 3.1, a median value of 2.3, a maximum value of 39.46, a minimum value of -11.20 with a standard deviation of 5.53 and a probability of 0.00 which indicates that most differences in the character values of the FDI data have a significant or unequal effect.

As for the political stability variable (PS), which acts as a moderating variable, it shows a mean value of -0.53, median -0.52, maximum value of 1.26, minimum value of -2.81 with a standard deviation of 0.81, while the probability value obtained is 0.85, which means that the large difference in numbers in the political stability data has no significant effect

or is almost the same. In addition, the country's political stability is quite low in terms of maximum and minimum values.

Analysis of Dynamic Panel Data Regression Estimation (GMM Model)

The GMM regression estimation results include two stages of testing. The first is direct testing between the variables of inflation, unemployment, trade openness, foreign direct investment and political stability on the human development index. The second is the interaction between political stability and the variables of inflation, unemployment, trade openness, and foreign direct investment on the human development index in OIC countries.

Table 4 Test Results of Dynamic Panel Regression

Variables	Difference GMM	System GMM
HDI (-1)	0.0000	0.0000
	(0.592122)	(0.598030)
Inflation	0.0000	0.0796
	(-0.000319)	(-0.000290)
Unemployment	0.3837	0.6786
	(0.000725)	(0.000578)
TO	0.0000	0.0000**
	(0.000158)	(0.000123)
FDI	0.0000	0.0000**
	(-0.003485)	(-0.003370)
PS	0.0000	0.0006**
	(0.008217)	(0.013164)
Sargan test	0.350245	0.445425
Arelano bond test	0.0038	-
Observation	320	320
Instrument	32	32

Notes: **significant at α 5%

Table 4 shows the influence of the independent variables and political stability on the dependent variable directly. From the estimated models offered, this study uses dynamic panel regression of two-step GMM differences (method 1) and a two-step system (method 2). Model two is the most accurate estimation model between the two, with J-Statistic probability of 0.445425, which is higher than the J-Statistics probability value of 0.350245 and both have more than α 5% AR value. This shows that there is no evidence of excessive and valid identification restrictions (Widarjono & Anto, 2020).

In the GMM test without interaction, the variables of trade openness, foreign direct investment, and political stability have a significant effect on HDI with significant values of 0.0000, 0.0000 and 0.0006 (less than 5%), while the inflation variable has a 10% effect on alpha with a significant value of 0.0796. Trade openness has a significant positive effect with a coefficient value of 0.000123, foreign direct investment has a significant negative effect with a coefficient value of 0.003370, and political stability has a significant positive effect with a coefficient value of 0.0013164. The unemployment variable has no significant effect on HDI.

Table 5 Test Results with the Interaction of Political Stability

Variables	System - GMM			
Model	1	2	3	4
Inflation	0.0004	0.0003	0.0219	0.1242
	(-0.000352)	(-0.000655)	(-0.000242)	(-0.000259)
Unemployment	0.4915	0.0932*	0.0690	0.7544
	(0.000684)	(-0.003181)	(0.001907)	(0.000650)
TO	0.0006	0.0000	0.0000	0.0092
	(0.000112)	(0.000148)	(0.000110)	(0.000125)
FDI	0.0000	0.0000	0.0000	0.0000
	(-0.003279)	(-0.002727)	(-0.003060)	(-0.003717)
PS	0.0650	0.0000**	0.0005**	0.0000**
	(0.007807)	(0.083403)	(0.010150)	(0.016880)
PS_Inflation	0.9633			
	(-4.90E-06)			
PS_ Unemployment		0.0000**		
		(-0.009481)		
PS_TO			0.1774	
			(-5.41E-05)	
PS_FDI				0.3070
				(-0.001071)
Sargan Test	0.450214	0.693765	0.324146	0.390518
Arelano Bond	-	-	-	-

Notes: **significant at α 5%

Table 5 describes the results of GMM testing with interactions in the four models, the influence of political stability on the inflation relationship, trade openness and foreign direct investment on HDI. The GMM system is the selected model based on the Sargan and Arellano bond test values. Based on the MRA test described in the previous chapter, political stability moderates the effect of unemployment on HDI.

Model Feasibility Test

Consistency Test (Arellano Bond)

Table 6 Arellano Bond Test

Test order	m-Statistic	rho	SE(rho)	Prob.
AR (1)	-2.896027	-0.082402	0.028453	0.0038
AR (2)	-2.499561	-0.025558	0.010225	0.0124

Based on Table 6, it can be seen that the probability value (AR1) is 0.0038 and (AR2) is 0.0124, both of which are less than α 0.05. This shows the existence of autocorrelation in errors. Thus the researcher uses the alternative described by Manuel & Bover Olympia (1995) which is the model that can be used to estimate the influence between variables which is the GMM system which combines the first different regression and the regression at the level.

Model Specifications Test (Sargan Test)

Table 7 Sargan Test Results

Cross-section fixed (orthogonal deviations)			
J-statistic	16.97387	Total Instrument	32
Prob(J-statistic)	0.764802		

Based on the result of the estimated method of moments (GMM) dual system (model 2), the orthogonal model or GMM system in Table 7 has a Sargan value (probability J-statistic) of 0.764802 with a p-value greater than α 5% (> 0.05). Therefore, the instruments used to estimate the model are reliable or valid.

T-test

The effect of each independent variable on the dependent variable is shown by the t-test. As a representation of the influence of the independent variables (inflation, unemployment rate, trade openness, and foreign direct investment) and the moderating variable (political stability) on the dependent variable (human development index).

With the conditions given earlier, the results of the t-test (without interaction) can be seen in Table 4. Independent and moderating fators can affect the dependent variable if the probability value is lower than 5% (0.05). According to the t-test, inflation and unemployment have an insignificant effect on HDI, with probability values of 0.6786 and 0.0796, respectively, and coefficient values of -0.000290 and -0.000578. While this is going on, the probability values for the variables of trade openness and foreign direct investment are 0.0000 and 0.0000, respectively, which is less than 5% (0.05). Trade openness has a coefficient value of 0.000123, which indicates that it significantly improves HDI, whereas FDI has a coefficient value of -0.003370, which indicates a significant negative effect on HDI.

As for the second stage of testing in the Table 5, the interaction between the moderating variables on the independent and dependent variables shows that only the political stability variable shows a significant interaction with the relationship between unemployment and HDI. The political stability variable does not show a significant interaction with the relationship between inflation, trade openness and foreign direct investment on the HDI.

Moderated Regression Analysis (MRA) Model

This section will specifically describe the results of model testing, in particular the impact of political stability on the relationship between the independent variables (inflation, unemployment rate, trade openness and foreign direct investment) and the dependent variable, based on the MRA model equations and qualifications. Following are the results of testing the MRA model as shown in Table 5:

Moderation Function of Political Stability Variable on Inflation Variable (X) and Human Development Index (Y)

Based on the probability values of political stability variables and variations of the "political stability*inflation" model with values of 0.0650 and 0.9633 respectively, the type of moderation chosen is the "Homologizer Moderator" (Potential Moderation), where the effect of political stability on HDI is not significant either in estimation of or the interaction with inflation in the second estimate. This variable does not have a substantial relationship with the dependent variable nor does it interact with the moderating predictor variable, because in the variation of the model equation, political stability cannot moderate the effect of inflation on the HDI.

Moderation Function of Political Stability Variable on Unemployment Variable (X) and Human Development Index (Y)

Based on the estimation results in Table 5, the probability values of the political stability variable and the interaction of the "political stability*unemployment" model are 0.0000 and 0.0000 respectively and the coefficient values are 0.083403 and -0.009481 respectively, so the type of moderation in this model variation is "Quasi Moderator" or pseudo moderation. Where the variables of political stability and the model of interaction between political stability and unemployment both have an effect on HDI. In a variation of this model equation, political stability can be a moderator as it can have an effect on unemployment with the HDI.

Moderation Function of Political Stability Variable on Trade Openness Variable (X) and Human Development Index (Y)

Based on the probability values of political stability variables and variations of the "political stability*trade openness" model, which are 0.0005 and 0.1774, respectively, the type of moderation in this model variation can be categorized as a "Moderator Predictor" in which in this variation of the model equation, political stability is expected to have a predictive effect.

Moderation Function of Political Stability Variable on Foreign Direct Investment Variable (X) and Human Development Index (Y)

Based on the probability values of the political stability variable and the variation of the model "political stability * foreign direct investment" of 0.0000 and 0.3070 respectively, the type of moderation in this model variation can be categorized as a "Moderator Predictor", where in the variation of this model equation, political stability is anticipated to have a predictive effect.

Discussion

This section consists of an explanation of the results of data testing and the relevance of the test results to theory and previous research. If the results obtained are not in line with

the hypotheses that have been developed, arguments will be added to explain these things.

GMM Test Result without Interaction

The Effect of Inflation on the Human Development Index

Based on the statistical test results in Table 4, it is known that the inflation variable has no effect on HDI, with a probability value of 0.0796 (>0.05) and a coefficient value of -0.000290. This means that the high and low levels of inflation in OIC countries have no effect on the HDI value. These results cannot support the theory and hypothesis formulated previously that inflation has a significant negative effect on HDI. Where, unstable increases and decreases in prices cause uncertainty and reduce living standards and people's welfare (Runtunuwu, 2020).

These result are not in line with research by Hassan et al. (2016) which states that there is a long-term relationship between poverty, inflation and unemployment. Research by (Okwu et al., 2020; Pangesti & Susanto, 2018; Runtunuwu, 2020; Shah, 2016) also found that inflation had a negative effect on human development. This research is supported by Arisman (2018); Roncaglia de Carvalho et al., (2018); and Wibowo (2019) who stated that the inflation rate has no effect on economic growth and HDI.

The inflation rate of OIC countries is certainly influenced by the global economy, particularly from the economic crisis during and after the COVID-19 pandemic. Thus, the absence of a more pronounced influence within the timeframe determined by our data sample is the reason why inflation has had no impact on the HDI level of OIC nations in the past ten years.

The Effect of Unemployment Rate on Human Development Index

The unemployment variable has a probability value of 0.6786 which is more than 5% (0.05) and a coefficient value of -0.00578, according to the statistical data in Table 4. These findings indicate that the HDI is not significantly affected by the unemployment rate in OIC countries. The initial theories and hypotheses which state that the unemployment rate has a negative impact on HDI are not supported by this data, especially the impact of unemployment through cycles of poverty and high income inequality which impede welfare and life satisfaction (Ningrum et al., 2020; Sayifullah & Gandasari, 2016). The results of this test are in line with the research by Arisman (2018); Hasbi and Wibowo (2022) which state that unemployment has no effect on HDI. This means that HDI cannot be influenced by high or low unemployment levels in OIC countries.

In oppositions to statements made by Hassan et al. (2016) that unemployment, inflation, and poverty are all correlated throughout the long and short terms, Intisar et al. (2020) states that labor force participation has a negative effect on economic growth in South Asia, but has a positive impact in the case of West Asia. The positive effect of unemployment is also found in research by Okwu et al. (2020) which analyzes the effects

of FDI and several macroeconomic variables on economic growth in the L30 global economy. The high unemployment rate is the cause of the decline in people's welfare and individual incomes which is the dominant factor in increasing the value of the HDI.The Effect of Trade Openness on the Human Development Index.

Based on the statistical value of the trade openness variable, it has a probability value of 0.0000, less than 5% (<0.05) with a coefficient value of 0.000123. These results indicate that trade openness has a significant positive effect on HDI. This is consistent with the theory and initial hypothesis of this study which states that trade openness has a positive and significant effect on the HDI of OIC member countries.

The results of this test supports Hamdi and Hakimi's research (2022) which states that trade openness is a driving factor for human development in the Middle East and North Africa (MENA) region in the short and long term. Research by Novignon et al. (2018) shows that trade has a positive and significant effect on life expectancy and a negative and significant impact on infant mortality rates and mortality rates under five. Research by Huchet-Bourdon et al. (2018), Intisar et al. (2020), Keho (2017), Muharromy and Auwalin (2021) and Okwu et al. (2020) also states that trade openness has a significant positive effect on economic growth and human development.

Cooperation in the trade, investment and financial sectors can support sustainable development programs and improve the socio-economic welfare of people in OIC member countries. The OIC-2025 program of action states that if the level of trade cooperation can reach the desired level, significant benefits will be created. Good cooperation will create quality production, consumption and distribution will improve people's lives in general (OIC, 2016).

The Effect of Foreign Direct Investment on the Human Development Index

Based on the statistical test results in Table 4, the foreign direct investment variable has a significant negative effect on HDI with a probability value of 0.0000, less than 5% (<0.05) and a coefficient value of -0.003370. This result means that the higher the foreign direct investment of OIC countries, the lower the HDI value of these countries. This is not in accordance with the theory and initial hypothesis which states that foreign direct investment has a significant positive effect on HDI. Where investment is the strength of the economy, foreign direct investment can facilitate economic development through creating employment opportunities, increasing capital inflow, and enhancing managerial and management skills.

This research is in accordance with the research of Mbang (2022) which states that there is a negative relationship in the short term however in the long term there is a positive effect, whereas in the study of Intisar et al. (2020) FDI has a negative effect in West Asia and positive effect in Central Asia. This negative effect of foreign direct investment may occur because sharp fluctuations in FDI inflow occur in many OIC countries, and because they struggle to attract investment (OIC Outlook, 2021).

The results of this study are different from the results of research by Okwu et al. (2020) which state that FDI has a positive and significant effect on economic growth. Research by Chih et al. (2022) stated that FDI had a significant positive effect after 2000 and had no effect before 2000.

The Effect of Political Stability on the Human Development Index

Based on the statistical test results in Table 4, the political stability variable has a significant positive effect on HDI with a probability value of 0.0006, less than 5% (<0.05) and a coefficient value of 0.013164. This result means that as political stability of OIC countries improves, the HDI value of these OIC countries also increases.

These results support the initial hypothesis and the theory which states that political stability has a significant positive effect on HDI. The higher the value of political stability, the higher the HDI value. In accordance with research by Alshammari et al. (2015) which states that Government Effectiveness, Political Stability, Corruption Control, and Regulatory Quality are governance variables that have a significant effect on human development and research. Uddin et al. (2017) also found that political instability was recorded to be higher in OIC countries and became an obstacle to economic growth.

A country's political stability can support the achievement of development and growth programs in various fields by creating a safe and comfortable environment away from various political tensions and divisions. However, data recorded in OIC countries show otherwise; that most members do not have high political stability values, therefore political instability in low and middle-income OIC countries seems to affect economic growth even more adversely due to the absence of strong governance (Uddin et al., 2017).

GMM Test Results with Interaction

The Effect of Unemployment on the Human Development Index with Political Stability as a Moderating Variable

Based on the GMM system test (orthogonal) in column 2 (Table 5) the probability value of the political stability variable is 0.0000 and the probability value of the variation of the model "political stability * unemployment" is 0.0000. Thus, the type of moderation in this variation of the model is "Quasi Moderator" which means that political stability can moderate the effect of unemployment on the HDI in OIC countries.

A country with high political stability creates a stable economic atmosphere, so that the absorption of labor becomes optimal which in turn can minimize the number of unemployed. These results are in line with Abé Ndjié et al. (2019) whose research states that good governance can reduce unemployment and the most relevant governance indicators applied in 46 African countries are corruption control and political stability. Germain (2021) research finds a positive relationship between youth unemployment rates and political instability in Côte d'Ivoire.

Conclusion

This paper examines and analyzes the effect of macroeconomic variables on the Human Development Index (HDI) in OIC countries from 2011 to 2020, with political stability as the moderating variable. This research is different from other research because it uses political stability as a moderating variable between the influence of the four macroeconomic variables and HDI, therefore the research is divided into two main parts: before moderation and after moderation. Overall, in the first part, it was found that trade openness had a significant positive effect on HDI in OIC countries, hence this study strengthens the evidence that the higher the level of trade openness might support an increase in HDI values of OIC countries. Trade openness can boost the economy, education, and health sectors all at the same time by expanding wealth, demand, supply, and services in numerous sectors. Furthermore, in the second part, the value of the moderator variable (political stability) between unemployment and HDI shows that political stability acts as a "Quasi Moderator", implying that political instability in OIC nations can compound the negative impact of unemployment on HDI.

This research adds to the literature and readers' insights regarding the influence of macroeconomic variables and HDI in OIC countries as well as the existence of political stability variables as a moderator between the two. Researchers may be able to obtain additional information from new discoveries using various models and methodologies when the objects and findings differ from previous investigations. In addition, some of the findings of this study are consistent with a number of current macroeconomic theories. In the field of practice and policy, This study can serve as a resource for investors, governments, and stakeholders interested in the macroeconomic performance of OIC states in order to foster effective collaboration across sectors, accelerate growth, and promote sustainable development. In particular, trade openness has a positive effect on and significantly improves the HDI in OIC countries.

The governments of OIC countries should be able to see an overview of the extent of the role of inflation, unemployment, trade openness and foreign direct investment as an effort to develop the value of their country's development. The political stabilty variable in this study has the potential to be a moderating variable as well as a predictor variable. As a moderating variable, political stability can strengthen the relationship between unemployment and the HDI. Therefore, the governments of OIC countries should further strengthen and improve the quality of their governance, especially the level of their political stability.

It is acknowledged that there are many limitations and deficiencies in this study. Some of the limitations in the research are due to the availability of partial data (10 years), and only 32 countries out of 57 OIC members were analyzed between 2011 and 2020, and also the paucity of human development variables that could obtained for this study. There are many other macroeconomic variables that can be used as control variables such as currency values (exchange rates), remittances and so on. These could be analyzed using a variety of different methods and other statistical tools in various countries and time periods.

Conflicts of Interest

All authors declare that they have no conflicts of interest.

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