

Is Trade Openness a Supportive Instrument for Human Development: A New Look on Newly Industrialized Economies

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Abstract

Formulating policies to enhance human well-being requires an urgent need to understand the drivers of human well-being. Therefore, the current study has proposed the socio-economic factors to investigate the main and moderate role of trade openness on Human Development for newly industrialized economies over 1990-2021. The current study shows the association between gross national income, urbanization, trade openness, labor force participation, foreign direct investment, and financial development. This study employs the fully modified and dynamic ordinary least squares for the reliable outcome. Empirical findings show that gross national income, urbanization, financial development, and labor force participation increase human development. Likewise, the long-term association of FDI has an insignificant impact on human development. Moreover, the main effect of trade openness significantly contributes to human development. In contrast, the moderate effect of openness with financial development and labor force shows a significant improvement in human development. Similarly, the moderate effect of FDI shows an insignificant contribution to human development. This study proposes the imperative policy implications for the NIC economies to boost human development.

Keywords: Social Well-being, Trade openness, Urbanization, FDI, LFP, and financial development

JEL Classification: O15, F43, F21

INTRODUCTION

In the growing world, the level of development is being assessed by human development (Arisman, 2018). The opportunities concerning education, health, and jobs are directly linked to human development. Therefore, equal opportunities and fair choices for urbanized people are major contributors to human development. Likewise, in the 20th century, the human development index (HDI) by the United Nations Development Program (UNDP) was introduced to assess human

development. Moreover, HDI is an aggregated indicator and consists of three roots, i.e. life expectancy rate at birth, the average year of schooling, and living standard measures by education level. It is argued that HDI is unable to capture all aspects of human development, like gender inequality (Sanusi, 2008). Since the last three decades, it has been widely used as a substitute for gross domestic product to measure the progress of economies (Ouedraogo, 2013).

Undoubtedly, health, education, and growth rate are the most critical priorities of each society. Therefore, the government and policymakers have tried to improve these three components to improve their citizens' well-being. In the last three decades, the studies relevant to income per capita (GDP/C) and economic growth have attained keen focus by researchers. Trade openness (TO) and foreign direct investment (FDI) are widely considered the main driving forces for growth. Therefore, the trade sector can play well in creating jobs and causing high wage levels, growth, and poverty reduction. With globalization, there may be a chance of new market opportunities for local firms that increase their productivity and improve their innovation process.

FDI is recognized as a crucial factor that promotes GDPC through industry structure and performance, technological spillovers, and human capital development (Alvarez and Molero, 2005). Similarly, the role of financial development (FD) cannot be neglected in the progress of economies. Therefore, various studies have tried their best to estimate the linkage of FD with economic growth. But they have different opinions. Some researchers pointed out that financial development contributes to economic growth, while some, in contrast (Singh 2008). Moreover, well-developed financial institutions have better performance to boost the economic growth via progress in intermediation efficiency and monitoring the costs (Zaman, et al., 2012).

Moreover, labor force participation (LFP) is considered another important factor for economic growth. In this association, structural change (agricultural to industrial or services sector) is an essential factor in absorbing the labor supply. In the late 19th century, this trend increased due to education and economic activities. In simple words, the expanded economy can provide easier jobs, which leads to a rise in labor force participation in productive activities. Modernization theorists argue it LFP is positively associated with income per capita via a change in occupational structure and an increase in educational opportunities. The modernization process is associated with labor demand, which provides equal opportunities in education and employment. Therefore, LFP significantly contributes to economic development, and it is crucial to add labor force participation as a determinant of the Human Development Index.

RESEARCH QUESTION AND INNOVATION

There may arise a question: why does this study use the interaction term? This study presents a fresh idea by investigating the moderate effect of openness on the nexus between financial developments, FDI, and labor force participation for human development. Fundamentally, it is being considered that openness has a moderating impact on the association between three variables, i.e. FD, FDI, and LFP; if a variation in openness causes some significant change, otherwise the moderating

effect is unfavorable. Heterogeneous interactions are essential because they allow us to estimate the impact of continuous variation in openness and other selected variables. Moreover, it is helpful to measure the marginal effect of LFP, FD, and foreign direct investment on human development. Unlike the past literature, we have employed innovative empirical strategies to measure the heterogeneity, endogeneity, and cross-sectional dependence to obtain robust outcomes.

Research problem and contribution of this study is explained as follows. Firstly, it addresses a critical gap by exploring the direct impact of trade openness on the Human Development Index (HDI) and its sub-components (health, education, and income) in Indonesia. While previous research often links trade liberalization to economic growth, or focuses on poverty and income inequality (e.g., Adha et al., 2018; Agusalmim & Pohan, 2016), a comprehensive assessment of its collective impact on HDI dimensions has been notably absent.

Secondly, this research uniquely investigates both the direct (main effect) and indirect (moderating) roles of openness on human development. Unlike prior studies that may have considered openness solely as an independent variable for development, potentially leading to biased outcomes, this study emphasizes its moderate role in conjunction with factors such as Foreign Direct Investment (FDI), Labor Force Participation (LFP), and financial development on HDI. This approach provides a more nuanced understanding of the channels through which trade openness influences human development.

Furthermore, the study acknowledges the potential for heterogeneous impacts of selected indicators on human development. To address the common assumption of a homogeneous impact of openness across economies, this research accounts for similarly ranked economies within the sample. This ensures a more accurate estimation of the effect of openness on human development by considering potential variations.

Finally, a key empirical contribution lies in utilizing updated panel data across Indonesian provinces post-2015. This timeframe is crucial as it reflects recent trade regimes, including the Regional Comprehensive Economic Partnership (RCEP) and Omnibus Law reforms. By applying province fixed-effects estimation, the study aims to reveal heterogeneous long-run versus short-run impacts of trade openness (TOR) on HDI sub-indices. This methodological rigor and use of contemporary data offer policy-relevant insights into trade's broader developmental potential beyond mere income growth within Indonesia.

The remaining parts of this study are organized as follows: Section 2 consists of literature reviews, Section 3 shows the data and empirical estimation, Section 4 presents the empirical results and discussion and finally Section 5 consists of the conclusion with policy recommendations..

LITERATURE REVIEW

Linkages of Gross National Income with Social Well-being

Commonly, gross national income is measured as the total amount earned by a nation's people. Therefore, it is crucial to include GNI as a determinant of human development, which may explain the current human development situation. In light of the literature, numerous case studies have tried to estimate the connection between gross national income (GNI) with human development. For instance, Allareddy et al. (2015) attempted to investigate the long-term association of the human development index with gross national income. Using the bibliometric data scheme, they have summarized that human development is directly linked with gross national income and dental research productivity.

Likewise, Maniyalath and Narendran (2016) presented the female entrepreneurship to measure human development, and they tried to investigate the connection of human development with GNI. The outcomes showed that the national income has no significant contribution to HDI. Similarly, Maqin and Sidharta (2017) investigated the long-term association between growth and human development in the case of Indonesia over the period of 1980-2015. They found a positive correlation between HDI and income by employing descriptive statistics. In the past literature, gross national income has not been considered a main determinant of the human development index. Therefore, it is crucial to add GNI as an explanatory variable for human development in the case of the selected sample. By this consideration, the existing gap in the literature can be filled and can propose a better way forward for other economies.

Associations of Urbanization with Social Well-being

Urbanization is the main instrument that directly links to human development. The primary purpose of urbanization is to seek out good health, education, and job opportunities. Therefore, it is essential to add this factor to human development. Previous research has tried to estimate this connection across different datasets and has not reached a single point. For instance, Anisujjaman (2015) examined the long-term association of urbanization with human development in West Bengal from 1901 to 2001. The concluding remarks supported the positive linkage of URB with human development.

Huang and Jiang (2017) investigated the linkage of urbanization with the human development index for the Inner Magnolia over 2000-2010. By employing the partial correlation analysis, they found a positive correlation between urbanization and HDI. Xiaojun and Zhu (2017) reported the connection of urbanization with human development in 151 economies covering the span of 1990-2012. They have tried to estimate the link between treated urbanized people with untreated urbanized people with their human development. Findings showed that the treated urbanized people have a robust connection with human development compared with others. Likewise, da Silva, et al. (2017) investigated the connection of urbanization with human development in the case of Brazilian Amazonia over 2005-2012.

Using the simultaneous autoregressive models, they found that urbanization has no significant impact on the change in human welfare. Furthermore, the case

study on Pakistan's economy (Khan, et al. 2018) tried to check out the link between urbanization and human development over the period of 1990-2016. They have employed the ARDL bound test and obtained the positive contribution of urbanization to HDI. (Kumar and Reshmi, 2018) estimated the contribution of urbanization towards human development across the different regions in the Indian economy over the period of 1981-2011. The estimated outcomes showed that development due to urbanization was found more in Uttarakhand compared with others. (Tripathi, 2019) investigated the cross-country analysis over the period of 1990-2017. There found a positive association was found between URB and human development.

Later on, a study related to urbanization and human development in the case of Ethiopia by Oranga (2020) found an upsurging trend in human development due to urbanization. (Tripathi, 2021) tried to investigate the connection of URB with human development in 187 income groups' economies over the period of 1990-2017. He has employed the Random Tobit Effect model and found the positive contribution by total urban populations, percentage of the urban populations, urban population growth rates, and percentage of the population living in million to human development, while urban population in the largest cities has vice versa.

Links of Trade Openness with Social Well-being

The trade sector has a leading role in the development of economies. Therefore, the trade sector can play a significant role in human development across the nations. To validate this association, numerous case studies have tried their best to find the heterogeneous outcomes via different data sets and estimation techniques. For description, Dara (2015) has attempted to estimate the long-term connection of TO with human development (HDI) in Sub-Saharan African economies over the period of 1980-2014. The outcome represented that there found no significant impact of TO on human development was found. Moreover, results validated that trade openness causes to rise in foreign direct investment in home economies.

Sinha and Sen (2016) described the association of the trade sector with human development in BRIC economies between 1980 and 2013. They used the GMM and causality tests and obtained the feedback hypothesis from the trade sector to human development. (Jawaid and Waheed, 2017) investigated the linkage of trade with human development in the case of Pakistan over the period of 1980-2013. By employing the sensitivity analysis, they have obtained the robust association of trade with human development. Moreover, they found the causal association of openness with HDI.

Kumar (2017) investigated the long-run relationship between trade openness and the human development index in 7 ASEAN economies over 1975- 2005. Using the fully modified OLS, he found a significant relationship between trade with human development. (Wang, et al., 2018) confirmed the connection of human development with trade openness in Pakistan over 1990-2014. They have employed the 2SLS and found that trade openness discourages human development. (Ma, et al., 2019) also demonstrated the association of trade with human capital in China from 1995 to

2015. Using the system GMM, they obtained the positive association of trade with human capital.

Dara (2019) investigated the connection of openness with human development in Sub-Saharan Africa over the period of 1980-2016. By employing the Pooled Ordinary Least Squares, they obtained an insignificant relation between trade openness and with human development index. Hasan and Waheed (2021) demonstrated the long-term connection of trade openness with human development in selected SAARC economies over the period of 2000-2019. They have employed the fixed effect model and found the positive association of globalization (trade openness & FDI) with human development. Hamdi and Hakimi (2021) investigated the impact of trade openness on HDI for 13 MENA economies over the period of 2002-2015. They have utilized the co-integration and error correction model to validate the positive response of openness with HDI.

Connections of Labor Force Participation with Social Well-being

Labor force participation also plays an essential role in economic development and leads to an increase in social well-being. While in the past literature, the studies have not keenly focused on this association to examine the role of labor force participation in human development. For instance, Naidu (2016) tried to investigate the association between LFP and human development, and the outcomes showed no association between LFP and HDI in Fiji. Wulandari (2018) estimated the impact of LFP on human development in East Nusa Tenggara Province. By employing the fixed effect model, they obtained the labor force participation has the main contributor towards human development.

Later on, Wijaya, et al. (2021) investigated the association of labor force, human development, and economic growth over 2013-2019. They have employed the path analysis and obtained that labor force and human development are contributing to economic growth. Moreover, they tried to explain that human development has a significant effect on economic growth via the labor force. However, limited literature has attempted to investigate the link between the labor force with human development. Therefore, it is essential to examine the association of the labor force with human development, which may contribute to the literature.

Association of Financial Development with Human Development

Financial development (FD) is considered a supportive instrument for the progress of an economy and causes an increase in human development. Therefore, numerous case studies have tried to estimate this link to validate the contribution of FD to human development. For instance, Sehwat and Giri (2014) tried to estimate the link between FD and human development in India over the period of 1980-2012. Using the ARDL bound test, they confirmed the positive relationship between FD and HDI.

Akhmat, et al. (2014) examined the relation of FD with HDI in SAARC economies covering the period of 1988-2008. The estimated outcomes by the panel co-integration approach showed the supportive role of FD for human development. Likewise, a case study of Bangladesh also tried to examine the connection of FD with

HDI (Hatemi-J and Shamsuddin, 2016). By employing the bootstrap causality test, they validate that human development causes to increase in financial development. Similarly, the study interrelated to OECD economies by Ozpolat and Ozsoy (2016), and validated the supportive role of FD towards human development by using the panel causality test. (Chhorn and Chhorn, 2017) explained the association of FD with HDI in the case of CLMV economies.

The concluding remarks explained that financial development causes to rise in human development in urban areas, while it has a decreasing effect on rural areas. Later on, a case study related to emerging economies tried to estimate the long-term association between FD and human capital (Ozcan, 2018). Findings showed the positive role of FD towards human capital. In the continuous year, Dutta and Sobel (2018) showed the inverse association of financial loans available with human capital. Abdelaziz and Helmi (2019) described the connection of financial development with human development in 13 MENA economies. This group has been divided into oil-exporting and oil-importing economies, and to test this association, they have applied the panel smooth transition regression model. Finally, the outcomes showed that the share of financial development in human well-being found negative below the threshold level, and positive for vice versa. Tekin (2020) described the relationship between financial development and human development for the developing countries, 1970-2016. Concluding remarks showed the two-way causal association between FD and human development.

Relations of Foreign Direct Investment with Social Well-being

No doubt, foreign direct investment also plays a vital role in boosting economic development. Therefore, it has a significant role in boosting human development via job opportunities in home economies. Also, numerous case studies have tried to estimate the linkage between FDI and human development across different regions. For instance, Torabi (2015) investigated the connection between foreign direct investment and human development in developing economies. They found the positive role of FDI towards human development. Afoakwa (2016) demonstrated the relationship between FDI and human development in Sub-Saharan African economies over 2003-2014. By using the fixed-effect technique, they confirmed the negative role of FDI towards human development.

Zhuang (2017) demonstrated the long-run association of FDI with human development in 16 East Asian economies from 1985 to 2010. Findings showed the inverse association of FDI with human capital accumulation in the selected panel. (Orbes, 2018) examined the long-term association of FDI and human development and found the positive contribution of FDI to human development. (Orbes, et al., 2019) tried to investigate the connection between FDI with human development in the host economies. Findings showed the inverted U-shaped relationship between FDI and human development across the selected economies. (Sartori, 2019) tried to investigate the connection between FDI and human development in Africa. Outcomes showed the positive behavior of FDI on human development.

Later on, (Bayar, et al., 2020) described the linkage of FDI with human development in European Union economies from 1995 to 2015. By employing the

co-integration approach, they confirmed the significant long-run association of human development with FDI. Moreover, they also confirmed the mutual causal interaction between FDI and human development. (Fagbemi and Osinubi, 2020) investigated the long-run relationship between FDI and human development in Nigeria over the period of 1980-2018. They have employed the N-ARDL and confirmed the insignificant relationship between FDI and human development.

Another case study related to the Iranian economy by Asaad and Marane (2020) also tried to investigate the linkage of FDI with human development. The outcomes of the OLS approach showed that human development caused to increase in FDI inflows. Srivastava and Talwar (2020) investigated the linkage of FDI with the human development index in thirty economies over 2012-2017. The outcomes of the FMOLS estimator showed the statistically insignificant association between FDI and human development in the selected economies. Furthermore, Hamdi and Hakimi (2021) investigated the connection of foreign direct investment with human development in 13 MENA economies over the period of 2002-2015. They have employed the panel co-integration approach and found a significant relationship between FDI and human development.

Gaps in the Literature and Contribution of the Study

The existing literature on trade openness, foreign direct investment, financial development, and human development offers valuable insights, but several gaps remain. First, many studies tend to focus on the direct effect of trade openness, neglecting its complex interplay with other factors that determine human development, such as financial development and labor market dynamics. According to Dollar and Kraay, a systematic focus on growth policies that can generate economic development is highly linked with trade. (Dollar and Kraay, 2004)

Second, the cross-country data used by other researchers have limited capabilities to examine the issue of openness since they are static (Yanikkaya, 2003). This leads to a biased conclusion since most of them are static, and no endogeneity is present in the results.

Furthermore, the results may not be appropriate, since prior literature studies do not test the heterogeneous relations. Also, our study takes in account the interaction term to see if the results are favorable or not to human capital, therefore adding depth to this topic.

This study contributes to the literature by:

1. Simultaneously examining the direct and moderating effects of trade openness on human development in NICs.
2. Employing FMOLS and DOLS estimators, which are robust to endogeneity and cross-sectional dependence.
3. Focusing specifically on NICs, offering insights tailored to their unique economic structures and challenges. By addressing these gaps, this study provides a more nuanced and rigorous examination of the relationship between trade openness and human development in NICs, offering valuable insights for policymakers.

METHOD

The data for the empirical estimation have been taken from different sources over the period of 1995-2021. The human development process is measured as the value of HDI, and data is extracted from the Knoema data source. Gross national income is measured in US current dollars, and the data is collected from the WDI. Urbanization is measured as the percentage of the total population and is collected from the WDI. Trade openness is measured as the sum of total exports and imports of goods and services divided by GDP in US current \$ and collected from WDI. Moreover, data for FDI and FD are taken from WDI in percentage of GDP. Likewise, the data on labor force participation is measured as a percentage of the total and collected from WDI. The summary of the selected variables is given in Table 1 and the trend graphs are presented in Figure 1.

Table 1. Description of Variables

Variable	Unit	Source
Explained Variable		
Social Well-beings (HDI)	Human Development Index	Knoema
Explanatory Variables		
TO	Trade openness (exports + Imports/GDP US \$)	WDI
LFP	Labor force participation (% of total)	WDI
FDI	Foreign direct investment, inflows (% of GDP)	WDI
FD	Financial development (% of GDP)	WDI
Control Variable		
GNI	Gross National Income (Current US \$)	WDI
URB	Urbanization (% of total population)	WDI

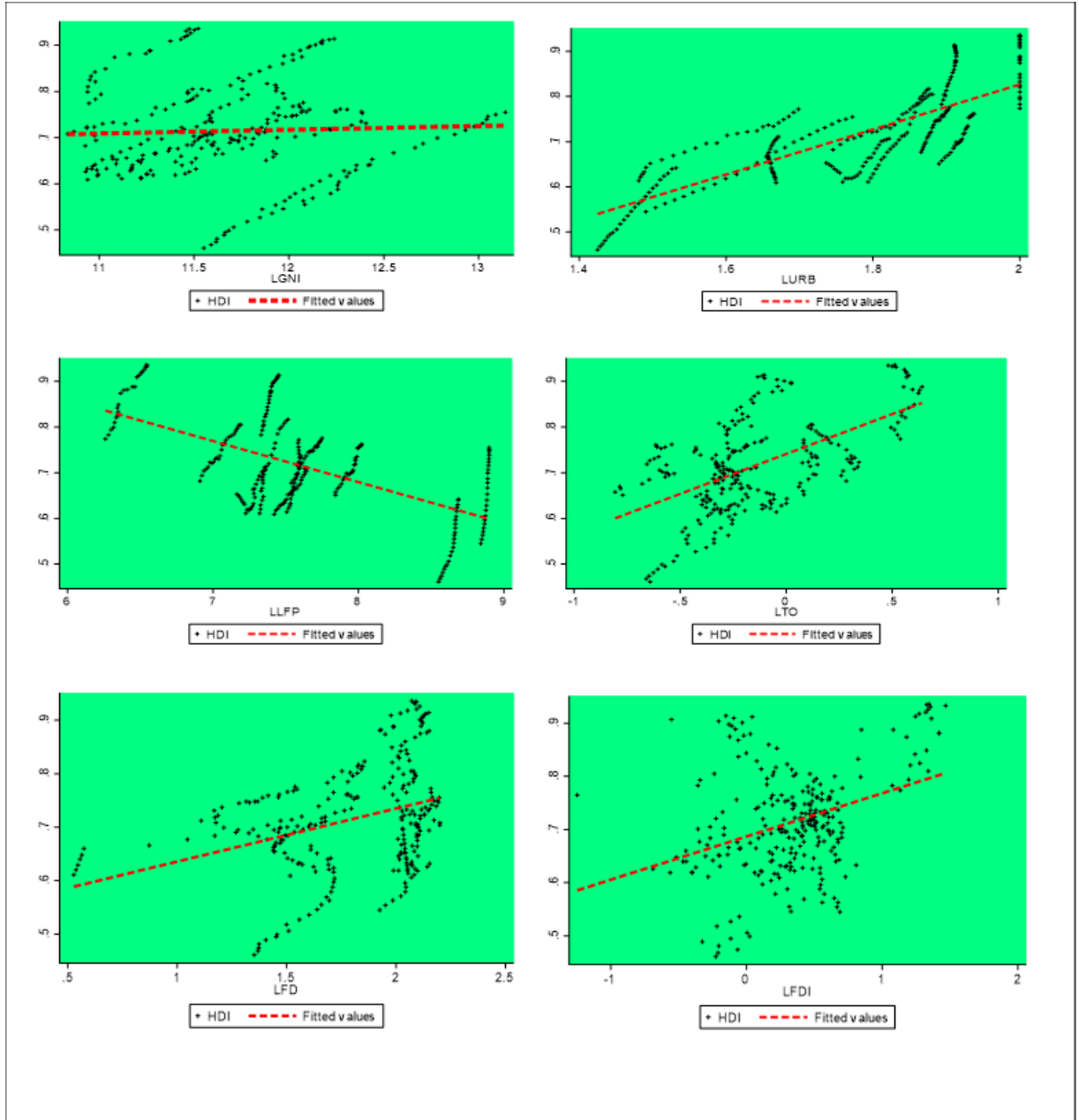


Figure 1. Trend Graphs

This study investigates selected Newly Industrialized Economies (NICs): Brazil, China, India, Malaysia, Mexico, Philippines, Singapore, South Africa, South Korea, Thailand, and Turkey. These economies represent a range of human development levels, from medium to very high, as classified by the HDI report. In 2021, the selected economies exhibited a wide range of economic indicators: HDI values ranged from 0.624 to 0.925; trade openness, measured as a share of exports

and imports, varied from 27.4% to 326.1%; and gross national income per capita ranged from \$8,395 to \$78,162

Theoretical Framework and Model Construction:

The theoretical framework is essential to make an economic model; therefore, an empirical theory can validate the selection of variables. Likewise, gross national income (GNI) is playing an important role in boosting human development. The continuous rise in income is highly correlated with essential components of human development, i.e., education, life expectancy, and living standard. Also, another opinion is that urbanization can affect human development over the current and future span. Likewise, labor force participation can influence human development, via people's income, living standard, and purchasing power. With the rapid progress of the economy, it is convenient for people to access health care, education, and job opportunities. Therefore, TO and FDI are considered essential drivers of economic growth. Trade openness helps to reduce the resource deficit, and FDI fulfils the capital needs. Both the FDI and openness create more opportunities in the employment sector and cause increased human development. Thus, due to being concerned with logic, it is believed that openness and FDI could increase human development.

Based on the theoretical background, we use the following empirical models to discover the main and moderate impact of trade openness and human development by incorporating the gross national income, urbanization, labor force participation, financial development, and foreign direct investment. Here, the general model is given as follows,

$$HDI = f(GNI^{\beta_1}, URB^{\beta_2}, TO^{\beta_3}, LFP^{\beta_4}, FDI^{\beta_5}, FD^{\beta_6} e^{\mu}) \quad (A)$$

HDI, GNI, URB, TO, LFP, FDI and FD refer to human development index, urbanization, gross national income, trade openness, labor force participation, foreign direct investment, and financial development. Equation 1 can be transformed into the lin-log model and given as,

$$HDI = \beta_0 + \beta_1 LGNI_{i,t} + \beta_2 LURB_{i,t} + \beta_3 LTO_{i,t} + \beta_4 LLFPI_{i,t} + \beta_5 LFDI_{i,t} + \beta_6 LFD_{i,t} + \mu_{i,t} \quad (1)$$

HDI refers to the human development index, LGNI, LURB, LTO, LLFP, LFDI, and LFD refer to the natural log of gross national income, urbanization, trade openness, labor force participation, foreign direct investment, and financial development. Likewise, i refer to cross-sections, and t is a time series. Similarly, μ is the white noise error term.

Furthermore, to discover the moderate effect of trade openness, we have proposed the 3 models and written as follows.

$$HDI = \beta_0 + \beta_1 LGNi,t + \beta_2 LURBi,t + \beta_3 LFDi,t + \beta_4 LLFPi,t + \beta_5 LTO \times LFDi,t + \mu_{i,t} \quad (2)$$

$$HDI = \beta_0 + \beta_1 LGNi,t + \beta_2 LURBi,t + \beta_3 LFDi,t + \beta_4 LLFPi,t + \beta_5 LTO \times LFDi,t + \mu_{i,t} \quad (3)$$

$$HDI = \beta_0 + \beta_1 LGNi,t + \beta_2 LURBi,t + \beta_3 LFDi,t + \beta_4 LFDi,t + \beta_5 LTO \times LLFPi,t + \mu_{i,t} \quad (4)$$

In the given models from 2-4, HDI refers to social well-being, LGNI presents the natural log of gross national income, LURB shows the natural log of urbanization, LLFP presents the natural log of labor force participation, LFDI shows the natural log of foreign direct investment, and LTO presents the natural log of trade openness, respectively. Likewise, μ is the error term, i represents the cross-sectional, and t represents the time series. Similarly, $LTO \times LFDI$ shows the moderate impact of trade openness with FDI on social well-being, $LTO \times LFD$ shows the moderate role of trade openness with financial development on social well-being, and $LTO \times LLFP$ explains the moderate role of trade openness with LFP on social well-being.

Estimation Strategy

This study tries to estimate the empirical models by exploring the cross-sectional dependency across the nations. There may be a chance of spillover effects due to globalization across economies. Globalization may lead to the problem of dependence among the cross-sectional units in selected data. It is the main constraint of previous studies that have not focused on cross-sectional dependence. Therefore, checking out the presence of cross-sectional dependence is essential to obtain unbiased estimators (Aydin, 2019).

Moreover, to validate the presence of cross-sectional units, this study has employed three different tests, i.e. Pesaran (2004), Friedman (1937), and Frees (1995), and their general form is given as in Eq. 5, 6 and 7

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) N(0,1) \quad (5)$$

$$FRI = (j-1) \left[\frac{2}{N} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \gamma_{ij} + 1 \right] \chi^2 (j-1) \quad (6)$$

$$FRE = \frac{(j-1) \left[\frac{2}{N} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \gamma_{ij} + \frac{1}{j} \right]}{SE(Q)} N(0,1)_{i,j} \quad (7)$$

Furthermore, CDs tests have less power to consider the cross-sections when pairwise correlations are equal to zero. We have used the Lagrange Multiplier (LM) test developed by Pesaran (2008) to deal with this problem. Whereas the general form of LM statistics is given as follows,

$$LM_{adj} = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \left[\frac{(T-k)\hat{\rho}_{ij}^2 - \mu T_{ij}}{v(T-k)\hat{\rho}_{ij}^2} \right] N(0,1) \quad (8)$$

Whereas K denotes with regressor. Also, to estimate the slope of homogeneity, we have applied the Pesaran and Yamagata (2008) test.

$$\begin{aligned} &H_0: \beta_i = \beta_j \\ &H_1: \beta_i \neq \beta_j \\ \Delta_{adj} &= \sqrt{N} \left[\frac{N-1S - E(zit)}{\sqrt{V(zit)}} \right] \end{aligned} \quad (9)$$

N shows the Cross-sectional dimension to time (t).

Panel Units Root Test

By having the slope of homogeneity and cross-sectional dependence, the next step is to estimate the unit root test for the selected panel. Most of the studies have used the Levin-Lin-Chu test by (Levin, et al., 2002) and Im, Pesaran and Shin (IPS) test by (Im and Pesaran 2003), while these tests are unable to capture CDs. We have employed the 2nd generation unit root tests to deal with this problem, i.e. Covariate-Augmented Dickey-Fuller (CADF) and cross-sectional augmented IPS (CIPS). Such tests can capture the problem of CD and heterogeneity. The test statistics of CADF are expressed as Equation (10):

$$\Delta X_{it} = \Phi_i + \delta_i X_{i,t-1} + \gamma_i \bar{X}_{t-1} + \Psi_i \Delta \bar{X}_t + \mu_{it} \quad (10)$$

Further, the CIPS test can be presented as follows (Equation 11):

$$CIPS = \frac{1}{N} \sum_{i=1}^N \delta_i (N, T) \quad (11)$$

Panel Cointegration Tests

The next step is to check out the long-run co-integration of variables. Therefore, to estimate the long-term association among the variables, we have employed the error correction-based test (Westerlund 2007). The general form of Westerlund cointegration can be written as in Equation (12):

$$\Delta Y_{it} = \delta'_i d_t + \eta_i (Y_{i,t-1} - \beta'_i x_{i,t-1}) + \sum_{j=1}^{p_i} \eta_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{p_i} \gamma_{ij} \Delta x_{i,t-j} + \mu_{it} \quad (12)$$

Whereas $\delta'_i d_t$ and η_i are coefficient of the error correction term. Westerlund's co-integration test is based on group and panel statistics.

$$H_0: \delta_i = 0$$

$$H_1: \delta_i = \delta < 0 \text{ (for all } i \text{)}$$

The rejection of H_0 means that all the panel is co-integrated.

Panel Regression Estimation

Equation A is the main quantitative regression model in this study. In this paper, the FMOLS model method is applied to regress the model. Likewise, for the robust empirical outcomes, this study also adopts the DOLS method, and this can correct sequence correlation Pedroni (Pedroni, 2001) proposed a cointegration system as follows,

$$Y_{mn} = \beta_m + \alpha x_{mn} + \theta_{mn} \tag{13}$$

In the above equations, all parameters have a cointegration relationship. Pedroni (2001) also proposes an equation in which regressions and cointegration regression are added to manage the impact of endogeneity.

$$Y_{mn} = \beta_m + \alpha x_{mn} + \sum_{p=-pm}^{pm} \mu_{mp} \Delta x_{mn} - p + \theta_{mn} \tag{14}$$

$\rho_{mn} = (\theta\text{-hat}, \Delta x_{mn}) = \lim_{D \rightarrow \infty} E \left[\frac{1}{\sum_{d=1}^D \beta_{mn} \sum_{d=1}^D \rho_{mn}} \right]$, definition δ_{mn} is the long-term covariance of FMOLS regression process. The long-term covariance can be decomposed into $\delta_m = \delta^0_m = \omega_m = \omega'_m$, where ω_m is automatic covariance and δ^0_m is the weighted sum of covariance and ω_m . The mathematical form of FMOLS is given below,

$$\alpha_{FMOLS} = \frac{1}{\beta} \sum_m^B \left[\frac{1}{(\sum_{d=1}^D x_{mn} - \text{bar } x_{mn})^2} (\sum_{d=1}^D (x_{mn} - \text{bar } x_{mn}) y_{mn}^* - \omega_{\mu m}) \right] \tag{15}$$

Moreover, D-H panel causality is also applied to check the causal association among selected determinants of the human development index.

RESULTS AND DISCUSSION

It is imperative to check out some basic tests before moving forward to a long-term relationship among the variables. Therefore, this study conducts descriptive and pairwise correlation tests for the concerned economies. Table 2 represents the outcomes of descriptive statistics and shows no significant difference between the mean and median values of all selected variables. In simple words, it is evident that actual values deviate from the mean value between the selected variables under the selected panel. Table 2 shows that HDI, LGNI, LURB, LLFP, LTO, LFD, and LFDI deviate from the mean value by 0.714, 11.683, 1.774, 7.612, 0.152, 1.793, and 0.336, respectively.

Table 2. Descriptive Statistics

	HDI	LGNI	LURB	LLFP	LTO	LFD	LFDI
Mean	0.71439	11.68384	1.77449	7.61292	-0.1525	1.79367	0.33674
Median	0.7075	11.61809	1.81347	7.52286	-0.2389	1.96177	0.35342
Maximum	0.936	13.14094	2	8.89914	0.64081	2.20004	1.46768
Minimum	0.461	10.83419	1.425	6.25998	-0.8059	0.528	-1.2465
Std. Dev.	0.099464	0.488622	0.16007	0.66064	0.32684	0.35181	0.42969
Skewness	0.114562	0.503935	-0.5718	0.36489	0.67962	-1.2354	0.16534
Kurtosis	2.971756	3.067672	2.26021	2.87526	2.97645	4.64884	3.77631
J-Bera	0.586254	11.22422	20.4046	6.02962	20.3288	97.064	7.832
Prob.	0.005927	0.003653	3.7E-05	0.04906	3.9E-05	0	0.01992

Similarly, this study uses the pairwise correlation test to estimate the positive or negative relationship among variables. Table 3 shows the outcomes of pairwise correlation. GNI is positively correlated with the human development index and urbanization. Similarly, the correlation between labor force participation and human development is negative. Also, trade openness, financial development, and FDI are positively correlated with the human development index.

Table 3. Pairwise Correlation Test

	HDI	LGNI	LURB	LLFP	LTO	LFD	LFDI
HDI	1						
LGNI	0.0397*	1					
LURB	0.8023*	-0.0221**	1				
LLFP	-0.5974*	0.72082*	-0.6383*	1			
LTO	0.5742*	-0.5414*	0.30117*	-0.7124*	1		
LFD	0.3510**	0.02115*	0.03271**	-0.1312**	0.43437**	1	
LFDI	0.3514*	-0.0975**	0.28374*	-0.2608**	0.52436*	0.28214*	1

Note: * and ** show the significance level at 1% and 5%, respectively.

Table 4: Cross-Sectional Dependence Tests

	Value	P-Value
Pearson (CD)	6.371	0
Frees (Q)	2.007	0.011
Friedman (CD)	61.142	0

Table 4 represents the outcomes of the cross-sectional dependency test. Under the estimated results, the CSD and homogeneity tests show a significant outcome, and this study rejects the null hypothesis for cross-sectional independence (Tables 4 & 5). In other words, we can support the presence of cross-sectional dependence. Besides the problem of CSD, this study also revealed the presence of a slope of homogeneity and outcomes are presented in Table 5. According to the given p-values, all are less than 5%, and the slope of the homogeneity hypothesis is rejected. Considering such interesting outcomes, it is imperative to move forward with the second-generation unit root test.

Table 5. Slope of Homogeneity Test

		Delta	adj.
Statistics (P-value)		13.554 (0.000)	16.250 (0.000)
Dependent Variable	LM	LM adj*	LM CD*
Statistics (P-value)	86.18 (0.004)	3.077 (0.002)	3.034 (0.002)

The results of panel unit root tests are given in Table 6. The outcomes of CIPS show the reliable outcomes that human development, gross national income, and FDI are integrated at the level. Moreover, the LFP, urbanization, openness, and FD are integrated at first difference. Likewise, the outcomes of CADF do not vary from the CIPS unit root test results. The existence of a unit root for the selected variables urges us to investigate the possible cointegration among selected variables.

Table 6. CADF and CIPS Unit Root Tests

Variable	CIPS Unit Root		CADF Unit Root	
	Level	1 st Difference	Level	1 st Difference
HDI	-3.033*	-5.654	-2.513**	-5.744
LGNI	-2.415**	-4.826	-2.401*	-2.754
LLFP	-1.345	-4.683*	-1.285	-3.667*
LURB	-0.749	-2.716*	-0.749	-4.131*
LTO	-1.595	-3.235*	-1.595	-3.532*
LFD	-1.24	-3.956*	-1.284	-5.718*
LFDI	-3.115*	-5.125	-3.255*	-2.38

Table 7. Outcomes of the Westerlund Co-integration Test

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-2.353	2.927	0.998	0
Ga	-3.595	6.039	1	0
Pt	-4.031	5.795	1	1
Pa	-1.915	5.464	1	1

Moreover, this study has employed Westerlund cointegration to investigate the long-term cointegration association. The significant outcomes of the specified trial are given in Table 7 and show strong evidence for long-run cointegration amongst the selected variables.

Fundamental estimations of this study are stated in Table 8. By using the FMOLS and DOLS estimators, this study has found the following results. This study investigates the main and moderate effects of openness on HDI, and the results show significant results for the specified models. Gross national income (GNI) is being used as a determinant of human development (HDI), and its coefficient is positively associated with HDI under the specified models (1-4). All things remaining constant, a 1% rise in this factor would increase HDI by 0.067%, 0.073%, 0.095%, and 0.122% (according to FMOLS) and 0.070%, 0.060%, 0.087% and 0.127% (according to DOLS). The positive coefficient value implies that HDI rises with an increase in GNI. This outcome is justifiable, as with a rise in economic growth across the selected panel, specified economies have experienced better education. This progress has attained the highest schooling rate among its inhabitants. Another logic could be that with a rise in growth; there may be a shift in structural changes.

Undoubtedly, every economy has connected its population with the agriculture sector, and a rise in the production side may cause an increase in income and ultimately increase human development. In simple words, a rise in income would lead to an increase in the demand for health opportunities and better education. Therefore, it can be concluded that concerned economies are investing in their human beings for better health and education. Thus, the allocated budget for education and health facilities is high across the selected panel. Furthermore, a rise in income per capita is not the final logic to boost human development; it may not be wrong if we say some other unseen factors may be responsible, such as good governance. This outcome is in line with the case study of Indonesia by (Maqin and Sidharta, 2017).

Another factor for human development is being considered be urbanization, which is significant at 1%. It implies that urbanization accelerates the level of HDI in the long run. Urbanization (URB) can be considered a supportive factor for human development across economies. But the question is how urbanization can increase human development? This factor can pull resources from predominantly agricultural to industrial and services sectors and ultimately raise income. Such improvement in income level boosts structural change and adds to a higher urbanization rate. Two forces are working behind such urbanization rate, i.e., push from the country and pull from the city (Lewis, 1954, Fei and Ranis, 1964). It is understood that labor with specialization can get more and more benefits (Smith, 1776) (Duranton, 2008). It is

associated with the increasing return of urbanization that consists of local infrastructure development, communication between employees and employers, and technical skills (Duranton and Puga, 2004). In addition, public leadership is encouraged to facilitate urbanized sector with decent infrastructure and arrangements in towns and cities (Hunt, 2004). Thus, urbanization not only enhances the income level but also spurs the quality of life. Likewise, our outcome is in line with the case studies of Huang and Jiang (2017); Xiaojun and Zhu (2017); Khan, et al. (2018); Tripathi (2019) and Oranga (2020).

The slope of trade openness concerning human development is positive. A 1% upsurge in openness would cause to rise in human development by 0.059% and 0.065% under the specifications of FMOSL and DOLS. This implies that openness causes to increase in human development across the selected region. The possible logic behind this outcome is that openness increases the progress of economies and offers employment opportunities, ultimately raising the income per capita. Furthermore, trade liberalization is co-integrated with the rise in human development. Also, it will not be negligible if we say the trade sector has a directly proportional relationship with income level. The trade sector can transfer innovative technologies and boost human skills that promote human development. Under the open economy, specified regions are investing more in the education and training of human capital. Moreover, openness is correlated with human beings because it offers cheaper goods to citizens in education and health. Such an outcome is in line with the case studies of Kumar (2017), Wang, et al. (2018), Ma, et al. (2019), and Hasan and Waheed (2021).

Likewise, the given coefficient value of labor force participation positively correlates with human development. This implies that 1% increase in this factor would cause an increase in human development by 0.190% (model 1), 0.183% (model 2) and 0.191% (model 3) under the FMOLS estimator, while for the DOLS estimator by 0.223% (model 1), 0.261% (model 2) and 0.244% (model 3). This implies that labor force participation is significantly contributing to human development. This outcome can be explained via two logics. Firstly, it is directly linked with urbanization and a cause of human development. More interestingly, urbanization is based on three types of opportunities across the globe, i.e. health, education, and job facilities. When urbanization takes place, urbanized people try to find a decent job. Having jobs available in the industrial, educational and construction sectors is helping to raise income level and increase the level of human development. Secondly, the labor force is also directly linked with the agriculture sector, and people engaged in the agriculture sector cause an increase in income level and boost human development. This finding is in line with Wijaya, et al. (2021).

Concerning the coefficient of foreign direct investment, it has a negative but insignificant association with human development. On behalf of the negative coefficient, we can explain this association. The negative role of FDI in human development (HDI) is due to the harmful impact of environmental pollution. It is unable to neglect the role of FDI in industrialization and economic growth via the provision of essential resources. Due to lower environmental standards, specified economies attract FDI and import highly polluting industries and outdated technologies from other nations. This finding is in line with the study by (Fagbemi

and Osinubi 2020). They pointed out that FDI inflows are an essential determinant for transferring technology and skill improvement. But the insignificant impact of FDI on human development shows that concerned economies are not using FDI's resources at the optimal level for human beings. In this case, FDI's investment for human development may be enhanced if such investment is considered by a well-organized financial system and effective government policies. While this outcome is in contrast with the findings of Torabi (2015), Afoakwa (2016), Orbes (2018), and Sartori (2019).

The coefficient of financial development in models 1, 2 & 4 is positively associated with human development. This implies that a 1% increase in this factor would cause to increase in human development by 0.043%, 0.015% and 0.047% under the FMOLS specification, and 0.039%, 0.052% and 0.038% under the DOLS specification. This outcome is fascinating because this factor can boost human development. In simple words, the results draw attention to the vital function of the financial system in newly industrialized economies. Therefore, the financial system performs well as an effective channel to transfer funds from savers to borrowers. This action for resource mobilization effectively transforms the funds into real productive capital. Moreover, FD tries to help in risk reduction via diversification possibilities. Due to such logic, financial development indirectly enhances the level of human development. In the case of selected economies, it is a need for time for a sound financial sector for human development. Besides, there should be dynamic institutional reforms for a more efficient allocation of financial resources. This finding is in the same vein as Chhorn and Chhorn (2017), Ozcan (2018), Abdelaziz and Helmi (2019), and Tekin (2020).

By having a long discussion about the determinants of human development and their response to human development. As we have explained the main effect of openness on human development, it is also necessary to re-check the moderate role of openness with foreign direct investment, financial development, and labor force on human development. Therefore, the estimated coefficient of the moderate effect of openness with FDI on human development is positive but insignificant for model 2 under the FMOLS & DOLS specifications. This infers that a 1% increase in this moderate role would cause to increase in human development by 0.012% for the FMOLS estimator and 0.020% for the DOLS estimator. But it has an insignificant impact on human development. This association is explainable. It is found that the coefficient of the interaction term is positive and insignificant under the two specifications.

This outcome indicates that openness with FDI is not conducive to improving the level of human development. The interaction term is positive but insignificant under the different specifications and does not pass the significance test at the required significance level. This indicates that the impact of technological spillover through FDI and openness on human development is not satisfactory in the selected region. The moderate role of openness with FDI is not helping to strengthen the spillover effect through technology and skills. The interaction term cannot strengthen the promotion effect of technical spillovers on human development in the concerned economies because foreign direct investment enterprises cannot acquire the

intellectual capital required for social well-being to absorb the technical talents from other economies.

Financial development includes an additional variable to sort out the moderate role of openness on human development. The estimated coefficient of the interaction term is positively associated with the human development index, which implies that the moderating role of openness with FD causes to rise in human development. This indicates that openness increases the impact of FD on human development in the concerned economies. The marginal effect of FD on human development is computed at the level of openness. It implies that FD increases the level of human development as openness increases.

The last interaction term of openness with labor force participation also shows a significant contribution to human development. Whereas the labor force participation has different skills and under trade, it may increase the income level. There is also the counterargument that trade openness can lead to an increase in the labor force by offering job opportunities in different sectors if jobs accompany greater openness offers which may be helpful in human development. Another spillover effect of openness on the labor force may be due to high technology imports and exports. The flow of technology via openness may have a supportive role in skill and low-cost production; therefore, it may help in timesaving and cause an increase in development level.

Table 8. Outcomes of FMOLS and DOLS Estimators

	Model 1		Model 2		Model 3		Model 4	
LGNI	0.0670*	0.0107	0.0735*	0.0152	0.0952*	0.0133	0.1228*	0.0150
LURB	0.3406*	0.0503	0.3382*	0.0700	0.3017*	0.0651	0.1880**	0.0855
LTO	0.0529*	0.0159	–	–	–	–	–	–
LLFP	0.1900*	0.0339	0.1831*	0.0482*	0.1913*	0.0435	–	–
LFDI	-0.0031	0.0048	–	–	-0.0121	0.0058	-0.0017	0.0084
LFD	0.0436*	0.0083	0.0513*	0.0115	–	–	0.0474*	0.0144
LTO × LFDI	–	–	0.0214	0.0221	–	–	–	–
LTO × LFD	–	–	–	–	0.0280*	0.0110	–	–
LTO × LFP							0.0071**	0.0034
R ²		0.98		0.98		0.97		0.97
LGNI	0.0700*	0.0087	0.0605*	0.0127	0.0874*	0.0134	0.1270*	0.0045
LURB	0.3170*	0.0371	0.3418*	0.0555	0.2940*	0.0631	0.1616*	0.0274
LTO	0.0654*	0.0125	–	–	–	–	–	–
LLFP	0.2236*	0.0266	0.2614*	0.0366	0.2446*	0.0404	–	–
LFDI	-0.0022	0.0038	–	–	-0.0094	0.0060	-0.0006	0.0031
LFD	0.0393*	0.0074	0.0524*	0.0095	–	–	0.0386*	0.0062
LTO × LFDI			0.0207	0.0163	–	–	–	–
LTO × LFD					0.0238*	0.0113	–	–
LTO × LFP							0.0075*	0.0011
R ²		0.98		0.98		0.97		0.97

Table 9. Granger Causality Test

Null Hypothesis	F-Statistic	Prob.
LGNI >> HDI	1.14530	0.3199
HDI >> LGNI	0.87841	0.4168
LURB >> HDI	2.84788	0.0400
HDI >> LURB	0.36435	0.6950
LLFP >> HDI	1.72576	0.1803
HDI >> LLFP	1.19921	0.3033
LTO >> HDI	4.92283	0.000
HDI >> LTO	3.12194	0.003
LFD >> HDI	0.52016	0.5951
HDI >> LFD	3.51377	0.0313
LFDI >> HDI	3.49375	0.0320
HDI >> LFDI	0.95041	0.3880
LURB >> LGNI	2.53348	0.0515
LGNI >> LURB	3.64758	0.0042
LLFP >> LGNI	4.05415	0.0186
LGNI >> LLFP	2.67674	0.0709
LTO >> LGNI	1.25470	0.2870
LGNI >> LTO	2.71514	0.0083
LFD >> LGNI	0.62264	0.5374
LGNI >> LFD	4.31826	0.0144
LFDI >> LGNI	0.08238	0.9209
LGNI >> LFDI	1.10092	0.3343
LLFP >> LURB	0.40769	0.6656
LURB >> LLFP	0.47918	0.6199
LTO >> LURB	1.14454	0.3201
LURB >> LTO	0.14797	0.8625
LFD >> LURB	0.27681	0.7584
LURB >> LFD	1.82810	0.1630
LFDI >> LURB	2.41650	0.0014
LURB >> LFDI	0.91949	0.4001
LTO >> LLFP	1.53564	0.2175
LLFP >> LTO	1.18135	0.3087
LFD >> LLFP	3.54775	0.0064
LLFP >> LFD	5.62819	0.0041
LFDI >> LLFP	0.77347	0.4626
LLFP >> LFDI	1.17679	0.3101
LFD >> LTO	0.27670	0.7585
LTO >> LFD	0.35460	0.7018
LFDI >> LTO	0.68734	0.5039
LTO >> LFDI	3.53275	0.0308
LFDI >> LFD	0.27198	0.7621
LFD >> LFDI	0.30407	0.7381

This study uses the Granger causality test to estimate the causal association among the selected variables by having reliable long-run outcomes. Table 9 shows the results of the causality test. The surprising outcome is that there

was a two-way causal association between openness and human development. It implies that any change in openness would lead to variation in HDI and vice versa. Such an outcome, alongside the long-term association, prompts policymakers to boost openness for human development. Likewise, the estimated causal association also presents the bi-directional causality between national income and urbanization. This implies that any significant change in income would cause changes in the urbanized level and vice versa. In other words, we can say the policies concerning urbanization and national income are working together to increase human development. Furthermore, there was found a two-way causal association found between labor force participation and financial development.

It is understood that well-functioned financial institutions are performing well to increase human development. Therefore, the policies relevant to the labor force and financial institutions are parallel with each other and cause to boosting development. Contrary to the mentioned findings, we also found unidirectional causality running from HDI to FD. Also, foreign direct investment Granger cause of human development. Furthermore, labor force granger causes national income; national income granger causes openness and financial development, foreign direct investment granger causes urbanization, and openness granger causes foreign direct investment. Moreover, the graphical representation of the Granger causality test is given in Appendix A.

CONCLUSION

The current study aims to explore a new look at innovative determinants of human development in the context of newly industrialized economies over the period of 1999-2021. The trade sector plays well in encouraging the economic situation and human development. Therefore, the current study tries to estimate the main and moderate openness with human development by incorporating gross national income, urbanization, labor force participation, FDI, and financial development in a multivariate framework. For this purpose, CADF and CIPS unit root tests, Westerlund co-integration test, FMOLS and DOLS estimators and Granger causality test are used. The main purpose of these tests is to overcome slope homogeneity and cross-sectional dependence in panel data. Some interesting results are obtained from empirical analysis. Gross national income, urbanization, and financial development are development-friendly indicators. Likewise, in NIC economies, the FDI has an insignificant impact on HDI. Furthermore, the main effect of openness causes an increase in HDI, while the moderate effect of labor force and FD has a significant effect on HDI. Moreover, the Granger Causality Test shows reliable outcomes for the selected panel.

Based on the empirical outcomes, numerous policy implications are suggested for NIC economies. Firstly, the gross national income has a positive association with human development. This study has tried to investigate the ultimate objective for improvements in human development. Therefore, policymakers suggest that national income is necessary to boost the level of HDI. Moreover, economic and social policies tend to stress economic fundamentals for national income, and it can be considered that such income may improve human development. This study does not ignore the importance of economic reforms, but policymakers should focus on human development at the beginning of any

reform. National income in terms of growth itself will not continue unless preceded by HD improvements.

Moreover, our results reflect that urbanization, labor force participation, trade openness, and financial development improve human development. Therefore, policies relevant to these determinants should be revised to boost human development. For instance, the higher authorities across the selected economies should allocate their productive budget into health, education, and services sectors to reduce income inequality. Moreover, they should prefer green FDI inflows to secure their human being. As the shocking outcome has been obtained from the long-run estimation. Therefore, to prove the significant role of FDI in human development, there is an urgent need to revise policies that may be friendly to human beings. Moreover, there is a need to restrict those projects that have outdated technologies and cause environmental problems, thereby deteriorating human welfare.

Having a positive association of openness with human development makes it imperative to suggest some policies relevant to the trade sector. Policymakers should promote trade policies and facilitate the exchange of goods and services between the economies by multiplying trade agreements and removing barriers. This will help households acquire new commodities at low costs and promote export activities, which will benefit economic development and the growth of social well-being. Likewise, the interaction effect of openness with FDI on human development shows an insignificant association. Therefore, policymakers of selected economies should promote further investment activities and prepare the proper conditions to attract more investment from domestic and abroad. This could be achieved by lowering the cost of doing business and fighting all types of threats, such as corruption, that affect green investment. Therefore, it is necessary to revise investment and trade policies to enhance human development.

The outcome concerning to interaction effect of openness with financial development shows a significant contribution to human development. Current findings concerning multiple aspects of openness and financial development suggest that NIC economies should promote the performance of domestic financial institutions if they want to increase their level of openness. No doubt, FD and openness are development-friendly indicators, and they perform well to boost human development. Our findings suggest that opening trade and supporting financial institutions can significantly impact human development. Therefore, the current study promotes the interaction between trade and financial development in supporting the upsurge in human development.

Likewise, the interaction effect of openness with labor force participation shows a positive and significant impact on HDI. According to their expertise, the finding indicates that concerned economies should employ their workers in the openness sector. Thus, the rise in the number of workers must be in line with increased productivity. This research will help to determine the driving factors in human development for selected economies. Finally, the current study has some limitations that may support future directions. Firstly, the current study has collected sample size from different sources; there may be a chance of error, so future researchers should access different sources to validate our outcomes. Secondly, this study has used the FMOSL and DOLS estimators, but these estimators have some restricted assumptions. Therefore, future studies should

adopt different estimators to produce the same or heterogeneous outcomes. Moreover, this study has focused on determinants of human development to measure social well-being, while alternative measures, such as the happiness index, can perform differently with selected determinants. Likewise, future studies should add some governance factors, such as political stability, corruption, and the rule of law, to development models; this scheme may support other factors and ultimately raise human development.

Our results suggest that trade openness (TOR) positively affects the education and income sub-indices of HDI, while the health index effect is modest or statistically insignificant. This confirms partial alignment with Agusalim & Pohan (2016), who found TOR beneficial in reducing inequality in the short term, though not consistently over the long term. In contrast to Adha et al. (2018), who reported adverse poverty outcomes from openness, our provincial-level analysis indicates human development gains outweigh poverty risks in certain provinces, possibly due to improved access to quality education and formal employment sectors.

These findings resonate with World Bank analyses highlighting that trade, if coupled with enabling reforms (e.g., NTMs removal, trade facilitation), can accelerate Indonesia's path to high-income status by 2045. That said, regional disparities persist, echoing Safitri et al. (2022): provinces with weaker infrastructure or limited access to global markets gain less from openness and may experience widening HDI gaps

Some policy recommendations are as follows: (1) to amplify human development benefits, trade reforms should be paired with targeted investment in human capital (education and healthcare), infrastructure improvements, and inclusive labor market access, (2) Complementary policies addressing geographic inequality—e.g., logistics improvements in eastern provinces—can help equalize benefits from openness, (3) Given the complementarity between FDI, human capital, and TOR identified by Setiyanto et al. (2024), policies encouraging FDI inflows along with human capital development can yield long-term development dividends.

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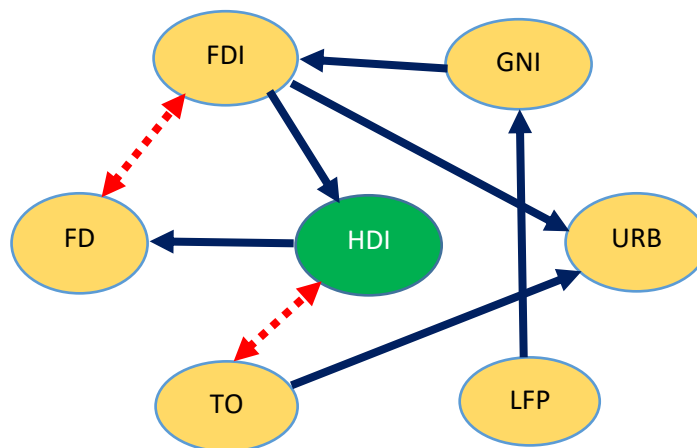
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Appendix A. Graphical representation of Granger Causality



Note: HDI: Human development Index, GNI: Gross national income, URB: urbanization, LFP: Labor force participation, TO: Trade openness, FD: Financial development, FDI: Foreign direct investment, bi-directional and uni-direction.