Trade Globalization and Human Welfare: An Analytical Study of Pakistan

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Abstract

There is widespread consensus that international trade drives economic growth. There is a bunch of literature that confirms this consensus, while economic growth is concerned with the means to human welfare which is the intended end outcome of all economic activities. Thus, this study is concerned with whether global trade directly influences human welfare. We have conducted the time series analysis by taking the data from 1990 to 2021. We measured human welfare through the Human Development Index (HDI) and Global Trade through the KOF Trade Globalization Index. We chose the ARDL strategy for cointegration based on the characteristics of the time series data, and we presented both short- and long-term results. We concluded from data analysis that global trade and human development have a long-term, positive, and significant link. Moreover, Human development is also significantly and positively associated with population growth, public development spending, and economic growth. Hence, these findings suggest that, for Pakistan to pursue its human development goals, policymakers should adopt policies that promote free trade, complemented by measures to encourage economic growth, public development expenditure, and population.

Keywords: Trade, Globalization, Human Development, Cointegration

JEL Classification: F1, F6, O15

1. Introduction

Since the time of Adam Smith, International Trade and Economic Growth were considered to be interconnected. Adam Smith highlighted the beneficial effects of global trade on the growth of the economy. It was regarded as driving force for economic growth. But these both variables became independent during the neoclassical period, as in their framework, international trade was seen to offer static gain but did not fully explain the growth process, hence leading to the neglect of global trade's importance in fostering the growth of the economy until 1960s. The emergence of endogenous growth models brought these theories back together. A more precise understanding of the relationship between economic expansion and global trade was made possible by the incorporation of knowledge accumulation and innovation into the endogenous growth theory. According to empirical data, trade openness generally had a positive impact on growth, particularly for developed countries (DCs) because of higher rates of innovation at home and for less developed countries (LDCs) because of dynamic effects, catch-up convergence, importation of capital goods, and innovation adaptation. (Afonso, 2001).

Over the last thirty years, trade liberalization has gained significant traction, especially in developing and transition economies. Growing awareness of the shortcomings of import substitution development methods and the influence of global financial institutions such as the World Bank and the International Monetary Fund has contributed to this change. These organizations frequently condition their support on trade liberalization policies. The persistent

conviction that liberalization is necessary for the shift from closed to open economies is the primary motivating factor for the broad adoption of trade reform (Zahonogo, 2016).

1.1. Situational Analysis of Pakistan

During the last 32 years (1990 to 2021), Pakistan average economic growth is around 4 percent. In the latest UN Human Development Report, Pakistan's Human Development Index (HDI) ranking for 2021-2022 has deteriorated, dropping seven places compared to the previous year. Pakistan's Human Development Index (HDI) fell two spots in 2020, putting the country in the poor human development category. This decline was mostly caused by low income, health, and education indices. In the current HDI rating, Pakistan is ranked 161st out of 192 countries. In Pakistan, the average life expectancy at birth is just over 66 years. Pakistan's gross per capita national income is slightly over $4,600, yet the average person barely completes eight years of education.

Pakistan has shown consistent improvement in its Human Development Index (HDI) since the early 1990s. The significant drop in Pakistan's HDI ranking for 2021-22 can be attributed to both methodological changes in the ranking process and Pakistan's relatively modest progress compared to other countries. Although Pakistan managed the Covid-19 pandemic well, the aftermath of the summer flooding will likely continue to affect the HDI ranking for some time (the behavior of HDI is shown by figure 1). Additionally, the country grapples with issues like inflation, unemployment, and security concerns. Additionally, the government's focus on internal power struggles may divert attention from pressing economic and social issues, despite economic hardships and the impact of natural disasters.

In the context of Trade Globalization, Pakistan has steadily pursued trade liberalization policies, with notable advancements occurring in the 1950s, 1960s, and 1980s. Trade policies were implemented in the 1950s to increase access to reasonably priced agricultural products and raw materials, thereby aiding small businesses. The late 1960s saw the introduction of export promotion programs, which included import subsidies, export bonuses, and currency devaluation. Pakistan has likewise embraced liberal policies regarding financial inflows, especially during the 1990s. Pakistan started trade reforms by lowering its tariff rate from 17% to 10% in the late 1980s. Trade restrictions were lifted from the Pakistani market by subsequent changes in 2005 and 2007, which established the tariff rate at 25% and 14.7%, respectively. Due to these liberalization initiatives, commerce significantly increased. In 2007–2008, it increased from 25% to 37% of GDP, and in 2010–2011, exports reached $20 billion. Nevertheless, Pakistan's exports fell by 3.06% in 2017. To enhance international trade, the Pakistani government signed free trade agreements with various countries, including China, Sri Lanka, and members of the South Asian Free Trade Area (SAFTA). The connectivity infrastructure under the China-Pakistan Economic Corridor (CPEC) and initiatives in Central Asia aimed to improve trade connectivity further. These efforts aimed to create a more open and competitive trade environment, enhancing economic growth and development in the country (Luqman & Soytas, 2023).

Despite these efforts, there is still room for improvement in Pakistan's trade liberalization policies. Additionally, the influence of the IMF and the impact of the war on terror have constrained trade policies and affected investment opportunities, leading to challenges in sustaining export growth. Pakistan needs to continue working on improving its trade policies to strengthen its position in the global market. Figure 1 shows the behavior of series of Trade globalization in Pakistan. By observing the graph of trade globalization we can conclude that from 2014 to 2019, the trade globalization index experienced a decline, dropping from 35 to 34, because of the economic challenges and geopolitical factors that impacted Pakistan's trade relations. In 2020 and 2021, the index slightly decreased to 33, indicating a plateau in trade globalization, which can be attributed to the global economic slowdown and pandemic-related disruptions affecting international trade.
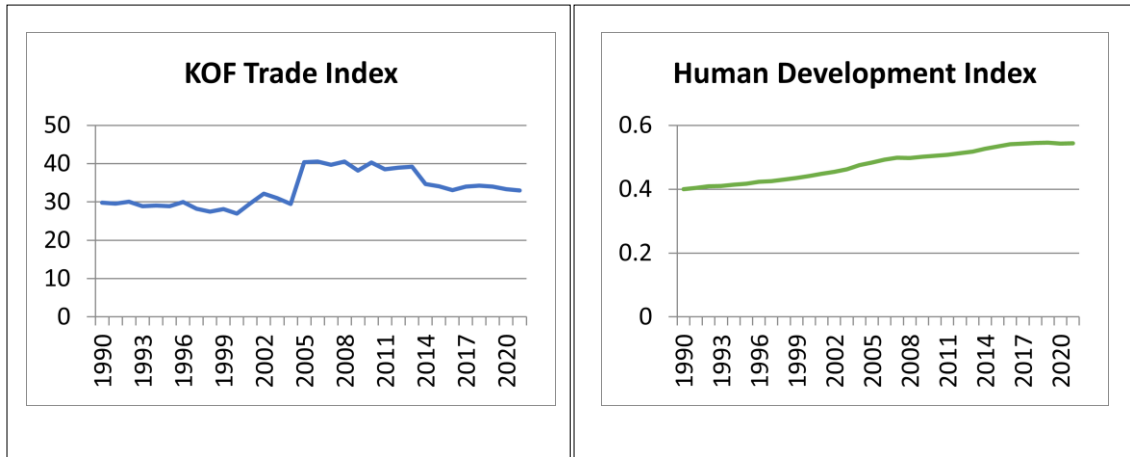
Figure 1: Trade Globalization and Human Development in Pakistan
(**Source:** Author's Construction by using data)

It is widespread consensus that trade is very much important for the economic expansion, hence a significant source of human development. Therefore, there is need to put serious attention on these issues like trade globalization and human development. However, it is difficult to extract the relationship between trade globalization and economic development from the figure 1. There is need of proper data analysis on this study. Previous studies just focused on the economic return of trade globalization while there is lack of examination of social return (in the form of human development) of trade globalization. This study explores the complex relationship between the dependent variable of human welfare, as determined by the Human Development Index (HDI), and independent variables such trade liberalization, economic growth, government development expenditure, inflation, and demographic data.

Our goal is to identify the complex relationships and pathways by which these factors affect human welfare through analysis. It is anticipated that trade liberalization will promote economic expansion and increase accessibility to necessities, ultimately improving human welfare. The GDP Growth Rate, which measures economic growth, is essential for raising living conditions and promoting social progress. Moreover, government development expenditures have a significant direct impact on human welfare. Furthermore, human welfare depends on maintaining stable economic conditions through the management of inflation. Finally, tackling socioeconomic issues and improving general human welfare require an understanding of demographic dynamics, particularly population changes. Thus this study is going to explore the relationship between trade globalization and human development for the 32 years from 1990 to 2021.

The paper had been set up as fellows. Following the introduction, section 2 offers a thorough analysis of earlier research as well as a theoretical framework derived from the literature. Prerequisites for data analysis are given in Section 3, along with a review of research methodology and the selection of variables and data. The outcomes of the data analysis are discussed in Section 4. The study's conclusion and recommendations are given in Section 5.

2. Review of Literature
The connection between international trade and economic well-being has been the subject of several theoretical, descriptive, and empirical investigations. The researchers continued to disagree on the direction of the link. While some researchers found a negative correlation between these two variables, others found a positive correlation. However, the data type, duration of analysis, selection

of variables and econometric method varied across these studies. Most of the studies measured the economic well-being through GDP growth rate, and poverty (head count ratio), while only few studies used human development index to measure the economic well-being. Similarly, different proxies for trade liberalization are used by these studies.

The positive and significant association between international trade and economic well-being has been confirmed by a multitude of empirical investigations (Makki & Somwaru, 2004; Narayan & Smyth, 2005; Akmal et al. 2007; Wacziarg & Welch, 2008; Chaudhry et al. 2010; Hussain et al. 2010; Klasra, 2011; Ahmad et al. 2012; Busse & Königer, 2012; Shahbaz, 2012; Simplice, 2013; Chaudhry & Imran, 2013; Jawaid, 2014; Ali & Panhwar, 2017; Jawaid & waheed, 2017; Onakoya, Johnson & Ogundajo, 2019, Abbasi et al. 2022). Using the Cobb Douglas production function, Narayan & Smyth (2005) discovered that trade agreements has a long-term positive correlation with economic activity, but a short-term correlation that is negligible. In a similar vein, Akmal et al. (2007) claimed that trade liberalization contributes to Pakistan's poverty reduction over time but not immediately.

Chaudhry et al. (2010), in contrast, confirm the beneficial effects of trade on growth of economy over the long and short terms. Furthermore, Busse & Königer (2012) made a significant contribution to the trade liberalization literature by establishing the more precise measure of trade openness, which is the volume of import and export as a percentage of the total GDP that is lagged. They thought that by taking this metric into account, biases that can arise from simultaneous changes in GDP and trade volume are avoided. Shahbaz (2012) furthered this conversation by highlighting the ways in which trade is positively connected with economic growth. A number of factors, such as the effective use of resources from export-oriented policies, the draw of foreign direct investment, the accessibility of cutting-edge technology for domestic production, and the encouragement of financial and economic integration, are some of the ways that trade liberalization promotes the growth of the economy.

Simplice (2013) contributed to the debate by analyzing a rich panel data set, used instrumental variable methodology with the new indicator of human development adjusted for inequality and found that trade globalization positively affects human development, particularly in terms of life expectancy. Jawaid (2014) made contribution by comparing the three different measures of trade openness. He applied rigorous econometric techniques and found that it is export which is positively associated with economic growth while import has negative influence on economic growth. Similarly, Jawaid & waheed (2017) confirmed these findings that export-oriented policies are important for economic expansion in the context of Pakistan. However, Abbasi et al. (2022) reveals that while globalization initially has a negative short-term impact on economic growth, it eventually becomes a positive driver. Globalization has had an influence, although not as much as was once thought, even though it has helped the economy.

The significance and advantages of economic liberalization in developing economies like Pakistan cannot be denied. However, it is crucial to avoid focusing solely on economic aspects while neglecting other dimensions of human and social development, as this can have detrimental consequences (Noshab, 2002). Globalization is essential for economic growth, yet it brings risks like increased poverty. Studies show a weaker link between trade openness and economic growth over time. Pakistan's experience with globalization has been inconsistent, leading to poor trade performance despite liberalization efforts. Foreign direct investment hasn't boosted exports. This period saw decreased GDP growth, rising unemployment, increased indebtedness, and higher poverty rates due to swift trade liberalization and other factors. (Anwar, 2002). Some of empirical research support the notion that trade and economic well-being are negatively correlated (Siddiqui

& Iqbal, 2005; Yasmin et al. 2006; Hye, 2012; Ali & Abdullah, 2015; Hasan & Waheed, 2021; Luqman & Soytas, 2023).

Yasmin et al. (2006) added to the debate by presenting the unexpected finding that trade liberalization and poverty do not significantly correlate, contradicting the idea that trade leads to economic progress. Hye (2012) also offered a contribution, stating that while trade is clearly adversely correlated with economic growth, it can really promote it when linked with human capital. Additionally, Ali & Abdullah (2015) argued that, in the context of Pakistan, trade has a negative long-term impact on economic growth that can be attributed to an emphasis on raw material exports rather than finished goods and weak conflict management institutions. Hasan & Waheed (2021) similarly claimed that domestic variables, such as a high dependent population ratio, infant and maternal mortality rates, and a lack of basic amenities like sanitary services, might be blamed for the detrimental effects of trade.

Overall, there is ongoing debate at the national and international levels on the connection between trade liberalization and economic prosperity. Our research revealed conflicting findings about how trade globalization affects economic prosperity. The majority of research revealed a correlation between economic growth and trade, indicating that the social benefits of trade—namely, human development—were mostly disregarded in favor of the social benefits of trade. Few researches have examined how trade globalization affects human development. Furthermore, there is a dearth of work discussing the social effects of trade globalization in the context of Pakistan. Therefore, by examining the connection between trade globalization and human development, this study aims to close this gap.

3. Methodology
This section focuses on providing a comprehensive understanding of theoretical framework, model specification, selection of variables, and data behavior. Additionally, it discusses the calculations necessary for selecting an appropriate technique to estimate the proposed model (stationarity test of time series data)

3.1. Theoretical Framework
We have extracted a structured perspective on the theoretical correlation between Global Trade and Human Development from (Ali & Panhwar, 2017) which is based on a comprehensive analysis of international sources and a thorough review of prior literature. An upsurge in global trade is anticipated to create avenues for importing essential equipment linked to Education, Health, Transportation, and Infrastructure, along with an augmentation in the arrival of capital goods. This, in turn, is projected to stimulate efficiency, productivity, investment, and exports, thereby fostering a chain reaction towards economic growth, increased employment opportunities, elevated per capita income, and improved healthcare and education provisions, ultimately culminating in enhanced human development. This conceptual framework is represented in Figure 2.
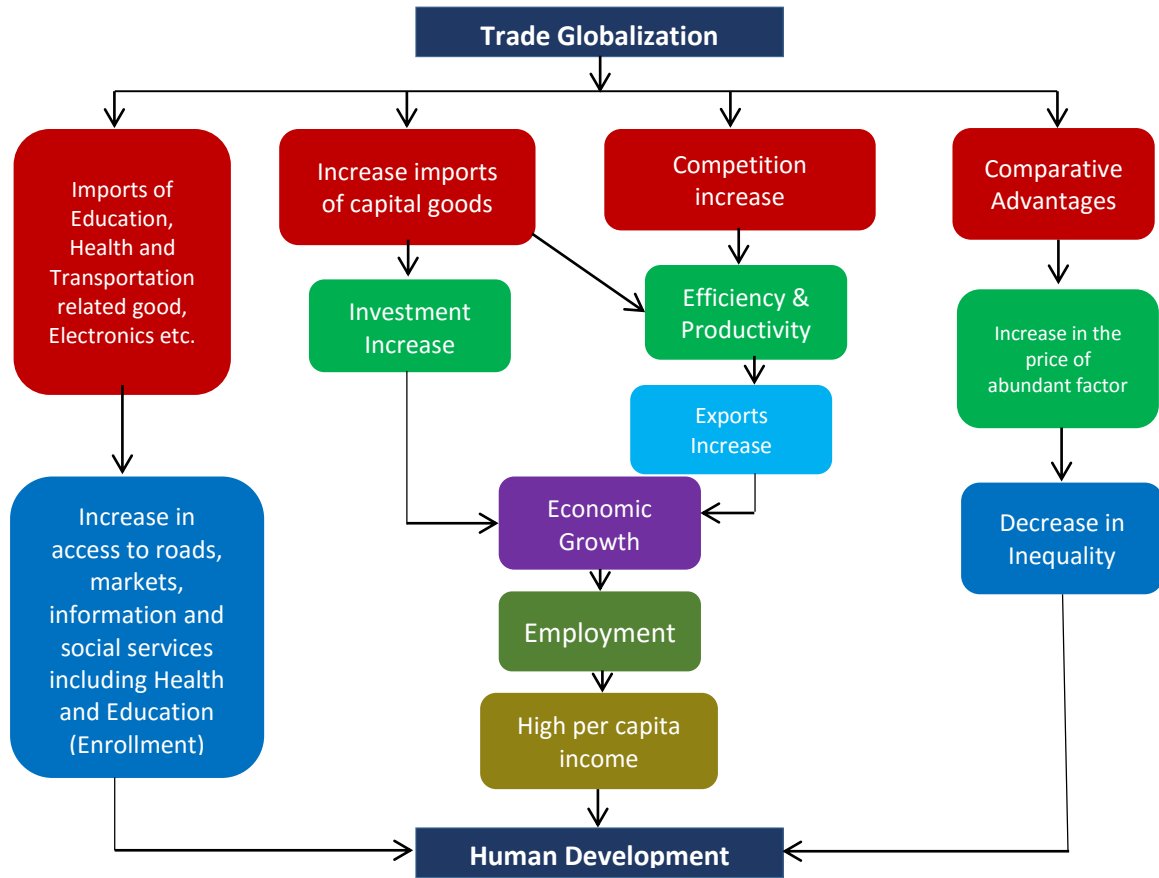
Figure 2: Theoretical Framework (Source: Author's Construction)

3.2. Model Specification

This primary goal of this paper is to determine how trade globalization affects human welfare. Generally this relationship can be defined as

$$Human\ welfare_t = f(trade\ Globalization_t, Z_t) \tag{1}$$

Here the human welfare at the time *t* is defined as a function of trade globalization at the time *t*, where Z includes other control variables at the time *t* that might have influence on human welfare. As far as the measurement of these variables are concerned, the best measurement of human welfare is human development index which is a composite index including the dimensions of health (long and healthy life), Education (expected and average years of schooling) and better living standard (per capita income), constructed by UNDP. On the other hand, the best measure of trade globalization is the Trade Globalization (*de facto, de jure)* indicator of Economic Globalization Dimension of Globalization Index initially constructed by Axel Dreher (Dreher, 2006). We have used the latest version of this index (Gygli et al. 2019). Trade Globalization Index includes trade in goods, trade in services, trade partner diversity, trade regulations, trade taxes, tariffs, and trade agreements. Hence the equation (1) could be written in econometrics terms as equation (2)

$$HDI_t = \beta_0 + \beta_1 Trade\ Globalization\ Index_t + \beta_i Z_t + \varepsilon_t \tag{2}$$

Where β_0 shows the intercept term and β_1 is the slope coefficient which shows the sensitivity of HDI due to one unit change in trade globalization index, while β_i shows the slope coefficients of

control variables and ε_t is the error term which captures the effects of all those variables that are not included in model.

3.3. Data and Variables

Data has been collected from authentic sources and selection of variables is done based on the literature review. The following Table 1 shows the description about the variables:

Table 1: Description of Variables

Type of Variable	Variable Names	Proxy	Unit of measurement	Source of Data
Dependent variable	Human Welfare	Human Development Index	Scale (between 0 to 1)	UNDP
Independent variables (explanatory)	Trade Liberalization	KOF Trade Globalization Index	Scale (between 1 to 100)	KOF Swiss Economic Institute
Controlled variables	Economic Growth	GDP Growth Rate	Annual percentage	WDI
	Public sector Development programme	Govt. Development Expenditure	Million Rupees	Economic Survey of Pakistan
	Inflation	GDP Deflator	Annual Percentage	WDI
	Demographic information	Population	Annual Total	WDI

Data for these variables have been collected from 1990 to 2021.

Table 2: Summary Statistics

Summary Statistics	Variables					
	HDI	KOF trade index	GDP Growth	Development Expend.	Inflation	Population Total
Mean	0.477813	33.32037	4.083490	509833.8	10.03697	1.75E+08
Median	0.488500	33.04623	4.414541	296409.0	8.606082	1.76E+08
Maximum	0.546000	40.58247	7.705898	1693474.	38.51199	2.31E+08
Minimum	0.400000	26.97735	-1.274087	56050.00	3.258605	1.15E+08
Std. Dev.	0.050614	4.517870	1.970196	511689.0	6.696291	35710132
Normality test of data						
Jarque-Bera	2.884496	2.918284	0.997869	4.739668	129.9379	2.170739
Probability	0.236396	0.232436	0.607177	0.093496	0.000000	0.337777

The variables' summary statistics, including the mean, median, maximum and lowest values, standard deviation, and Jarque-Bera test of normality, are displayed in Table 2. The HDI in Pakistan has varied between 0.40 and 0.54 between 1990 and 2021, according to the above table, whilst the trade globalization index has fluctuated between 26.97 and 40.58. The Jarqu-Bera test is used to determine whether or not data is normally distributed while assessing data normality. A series is

said to be normally distributed if the probability of the Jarqu-Bera statistics is higher than 0.05. With the exception of inflation, every data series is regularly distributed, as the accompanying table demonstrates.

3.3. Properties of time series data (Stationarity of Data, Pre-Estimation Test)

Testing the attributes of time series data is essential prior to performing any analysis on a time series. Most time series analysis estimators rely on having (weakly) stationary data in order to be valid. A process that exhibits constant mean, variance, and auto-covariance throughout time is said to as weakly stationary.. Ensuring stationarity allows us to confidently apply various time series analysis techniques, as they assume a stable and consistent behavior of the data over its entire duration. On the other hand, non-stationary time series may have varying statistical characteristics, making conventional analysis methods unreliable. Before moving on to more analysis if a time series is determined to be non-stationary, suitable transformations or differencing can be used to bring the series into stationarity.

3.3.1. Augmented Dickey Fuller Test (ADF)

Data stationarity is tested using the ADF test. It examined whether or not the variable adheres to a unit root process. The alternative is that the variable was formed by a stationary process; whereas the null hypothesis of this test is that the variable includes a unit root or was not generated by a stationary process. The following table 3 demonstrates the results of ADF test:

Table 3: Unit Root Test (Stationarity Test)

Variable Names	Level			First Difference			Stationarity	Order of integration
	Drift and Trend	*Drift only*	*None*	*Drift and Trend*	*Drift only*	*None*		
HDI	-1.674 (0.737)	-1.110 (0.698)	-1.839 (0.981)	-2.758 (0.222)	-2.654 (0.093)	-1.557 (0.110)	Stationary at 1st difference	I(1)
KOF Trade Index	-1.616 (0.762)	-1612 (0.465)	0.015 (0.680)	-6.057 (0.000)	-6.095 (0.000)	-6.187 (0.000)	Stationary at 1st difference	I(1)
GDP Growth	-4.276 (0.012)	-4.359 (0.001)	-1.403 (0.146)	-	-	-	Stationary at level	I(0)
Development Expend.	-1.961 (0.598)	-0.278 (0.917)	0.893 (0.893)	-4.314 (0.011)	-4.689 (0.000)	-4.441 (0.000)	Stationary at 1st difference	I(1)
Inflation	-5.986 (0.000)	-5.897 (0.000)	-1.435 (0.137)	-	-	-	Stationary at level	I(0)
Population	-0.779 (0.955)	-1.697 (0.421)	1.147 (0.931)	-3.314 (0.085)	-2.821 (0.068)	-0.170 (0.615)	Stationary at 1st difference	I(1)

Note: Values in column shows the tau-statistics and the value in parenthesis shows the respective probability of tau-statistics.

Since the p-value in every model under level is more than 0.10, we are unable to reject the null hypothesis of a non-stationary series, which makes it clear from Table 3 above that HDI is not stationary at level. Nevertheless, under the model with drift, HDI is found to be stationary at first difference; hence, we can conclude that HDI has an order of integration of one. In a similar vein, it is discovered that the population, government development spending, and the KOF trade index are all stationary at first difference, while the GDP growth rate and inflation are integrated of order zero.

3.4. ARDL approach to cointegration (Estimation)

When the variables have mix integration orders of zero and one, the Auto Regressive Distributed Lag (ARDL) model is applied. Regression models that include both lagged values of the independent variables and lagged values of the dependent variable are known as ARDL models. Through the use of autoregressive terms, it enables us to investigate the relationship between the lagged values of independent variables and the present value of the dependent variable. Regarding the creation and use of ARDL models in time series analysis and econometrics, Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001) have made important contributions.

To apply the ARDL model, the dependent variable needs to be integrated of order one. We estimate our model using the ARDL approach to cointegration as Table 3 shows that the HDI is integrated of order one, meaning that it is also affected by its own prior values. The estimation of the Error Correction Mechanism, or the short-term relationship between the variables, is the first step in the ARDL technique of cointegration. Next, the long-term relationship between the variables is tested. If there is a statistically significant negative Error Correction Term (less than one) in the cointegration equation, adjustment always attempts to "error correct". This suggests that the variables have sustained associations with one another.

Short Run Equation

$$\Delta HDI_t = \alpha + \sum_{i=1}^{q} \rho_i \Delta HDI_{t-i} + \sum_{i=0}^{p} \beta_{1i} \Delta Trade\ GI_{t-i} + \sum_{i=0}^{p} \beta_{2i} \Delta GDP\ Growth_{t-i} +$$

$$\sum_{i=0}^{p} \beta_{3i} \Delta Development\ Expend_{t-i} + \sum_{i=0}^{p} \beta_{4i} \Delta Inflation_{t-i} + \sum_{i=0}^{p} \beta_{5i} \Delta Population_{t-i} + \delta_1 HDI_{t-1} +$$

$$\delta_2 Trade\ GI_{t-1} + \delta_3 GDP\ Growth_{t-1} + \delta_4 Devel.Expend_{t-1} + \delta_5 inflation_{t-1} + \delta_6 Population_{t-1} + \varepsilon_t$$

(3)

Long Run Equation

$$HDI_t = \alpha + \sum_{i=1}^{q} \rho_i HDI_{t-i} + \sum_{i=0}^{p} \beta_{1i} Trade\ GI_{t-i} + \sum_{i=0}^{p} \beta_{2i} GDP\ Growth_{t-i} +$$
$$\sum_{i=0}^{p} \beta_{3i} Development\ Expend_{t-i} + \sum_{i=0}^{p} \beta_{4i} Inflation_{t-i} + \sum_{i=0}^{p} \beta_{5i} Population_{t-i} + \varepsilon_t$$

(4)

The Error Correction Model (ECM) of ARDL is represented by equation (3) above. If the coefficients $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 \neq 0$, then we can draw the conclusion that the variables have a long-term relationship. The coefficient in the long run based on the ideal lag duration at level is represented by equation (4).

4. Results and Discussions

The result presentation commences with descriptive statistics and correlation matrix. The outcome of the descriptive statistics is offered in Table 1. The result deliberates on the statistics that check normality of data distribution. The dependent variables considered in this study are financial development, while the independent variables are ICT variable measured by mobile phone subscription and internet, economic growth, FDI and human capital. In the descriptive statistics, foreign direct investment has lowest average and middle values; ICT variable has highest average and median values while other dependent and explanatory variables' mean and median values fall with these two extreme values.

By using the ARDL approach to estimate the aforementioned model, results are produced. These findings include cointegration results, which show the long-term relationship between the variables, and short-term outcomes in the form of error correction model. The following tables display the findings:

Table 4: Short Run Results

Variables (Short run form)	Coefficients and Standard Errors
ΔHDI_{t-1}	0.333*** (0.108)
$\Delta KOF\ Trade\ GI_t$	-2.22E-05 (9.10E-05)
$\Delta GDP\ Grwoth_t$	0.001*** (0.000)
$\Delta GDP\ Grwoth_{t-1}$	-0.0003** (0.0001)
$\Delta Development\ Expenditure_t$	0.0006 (0.0014)
$\Delta Development\ Expenditure_{t-1}$	-0.0072*** (0.0014)
$\Delta Population_t$	-0.013 (0.109)
$\Delta Population_{t-1}$	-0.202* (0.108)
Cointegration Term	-0.516*** (0.064)
Selected Model	ARDL (2, 1, 2, 0, 2, 2)
Included Observation (Sample)	30 years after adjustment (1990-2021)

Note: Standard Errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

The findings of an error correction model are shown in the table 4 above. The calculated short-run coefficients mentioned above are either difficult to interpret or cannot be understood simply. The error correction or cointegration term is the most important component of this model since it is critical to determining how well the variables are convergent. The error correction term must be statistically significant, negative, and consistent with accepted econometric theory in order for convergence to take place. The model's error correction term in this instance complies with these predictions. Furthermore, according to the coefficient of the error correction term (ECM), each period will see an adjustment of roughly 52% which shows how quickly the model's variables converge to their long-term equilibrium connection.

The next step will be to perform a bound test to see if there is a long-term relationship between Trade Globalization and the HDI. The results of this test will produce a Wald or F-statistic, which we will use to determine whether or not the variables have a stable, long-term relationship.

Null Hypothesis: H0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$

Alternative Hypothesis: H1: $(\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6) \neq 0$

Table 5: Bound Testing

Test Statistics	Value	K (Degree of Freedom)
F- Statistics	6.57***	5
Critical Bound Values		
Significance	Lower Bound	Upper Bound
10% (*)	2.407	3.517
5% (**)	2.910	4.193
1% (***)	4.134	5.761

The bound test findings, including the F-statistic and the accompanying lower and upper critical bounds, are shown in Table 5. We compare the F-statistic with the upper critical bound in order to ascertain whether cointegration is present. We reject the null hypothesis of no cointegration, if the F-statistic is greater than the upper critical bounds. In the present case, the table's F-stat exceeds the upper bound, suggesting a long-term relationship between trade globalization and the HDI. Having established the long-run association between the variables, we can now proceed to interpret the long-run results presented in Table 6. These results will provide insights into the equilibrium relationship between the HDI and Trade Globalization along with other controlled variables and their long-term behavior, allowing us to understand the underlying dynamics and implications of their interactions over an extended period.

Table 6: Long Run Results

Independent Variables (Long run form)	Human Development Index (dependent) Coefficients and Standard Errors
KOF Trade Globaliztion Index	0.0062*** (0.0002)
GDP Growth rate	0.0036*** (0.0007)
Development Expenditures	0.0078** (0.0036)
Inflation	-9.30E-05 (8.87E-05)
Population (Total)	0.1768*** (0.0131)
Constant	-2.9907*** (0.2116)
Log Likelihood	168.8812
F-Statistics	3175.403***

Note: Standard Errors are in parenthesis,
*** p<0.01, ** p<0.05, * p<0.1

The long-term association between the variables is seen in Table 6. The significance of the F-statistic suggests that all explanatory variables and the Human Development Index (HDI) have a

substantial long-run relationship. This indicates that the model as a whole has significance in explaining the long-term connection between these variables. We find that there is a significant and positive relationship between the HDI and the KOF Trade Globalization Index when we look at the individual importance. To be precise, a rise of one unit on the Trade Globalization Index scale translates into a corresponding increase of 0.006 units on the HDI. This result supports our premise that trade globalization and human welfare do really has relationship. The rationale behind this positive relationship lies in the widely accepted notion that trade acts as an engine of economic growth, leading to higher per capita income. Moreover, global trade facilitates the exchange of ideas, knowledge, and technology among countries, which, in turn, improves infrastructure, healthcare services, and education systems. Consequently, the HDI ranking of a country improves. Considering the context of Pakistan, we can conclude that trade globalization contributes to the long-term enhancement of human development. The positive association between trade globalization and the HDI suggests that as Pakistan engages more with global trade, its human welfare indicators are likely to improve over time.

As far as the relationship of control variables with HDI are concerned, we found that all the variables except inflation, are significantly explaining the HDI. We find that Economic growth has direct influence on HDI, as increase in the economic growth would bring the increase in the overall income leading to the better living standard. Similarly, we find that increase in the govt. development expenditure which includes the expenditure on infrastructure, health services, education system, and employment generation helps to improve the ranking of Pakistan in HDI. Moreover, we also reached to very surprising results that increase in population of Pakistan is also positively associated with Pakistan's HDI. The rationale behind this relationship would be increase in population would generate more labor force or human capital that would generate more economic activities and would bring innovation, hence more economic growth leading to human development.

4.1. Statistic Diagnostic (Post-Estimation)

Statistic Diagnostic is residuals (estimated values of error term by model) based test which are used to test for assumptions of model to insure the stability of estimated coefficient attached with independent variables. The assumptions of model are, there should be no serial correlation in residuals, variance of residuals should be constant, and residual should be normally distributed. The following list of tests are applied to insure the stability of estimated results.

1. Serial correlation LM-Test
2. Heteroskedasticity Test
3. Histogram Normality Test
4. CUSUM and CUSUM sum of square Test

The null hypothesis of these entire tests is that there is no serial correlation in the residual series, variance of residuals remained constant over the time, and generated series of residual is normally distributed.

4.1.1. Serial correlation LM-Test:

Table 7: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.0905	*Prob. F(2,13)*	0.3649
*Obs *R-squared*	4.3102	*Prob. Chi-Square(2)*	0.1159

Based on the chi-square distribution, the observed R-squared has a p-value larger than 0.05, as shown in the above table. As a result, it is not possible to rule out the null hypothesis that there is no

serial association. This finding suggests that the model's assumption is satisfied because there is no serial correlation in the residuals.

4.1.2. Heteroscedasticity test

Table 8: Heteroskedasticity test: Brausch-Pegan-Godfray

F-statistic	0.6533	Prob. F (14,15)	0.7838
Obs*R-squared	11.3638	Prob. Chi-Square(14)	0.6572
Scaled explained SS	3.6672	Prob. Chi-Square(14)	0.9972

The above table is showing the results of heteroskedasticity test of whether the variance of residual remained constant or not. If we look at the probability value of observed R-squared then we can say variance of residual remained constant over the time, as the p-value is greater than 0.05 so we are unable to reject the null hypothesis of constant variance of residuals over the time, hence meeting the assumption of model.

4.1.3. Normality test

The Figure 3 displays the distribution of series of residuals which confirms that residual are normally distributed. Similarly, the probability of Jarque-Bera test is more than 0.05 so we are unable to reject the null hypothesis that residuals are normally distributed, meeting the assumption of model.

Figure 3: Normality Test of Residuals
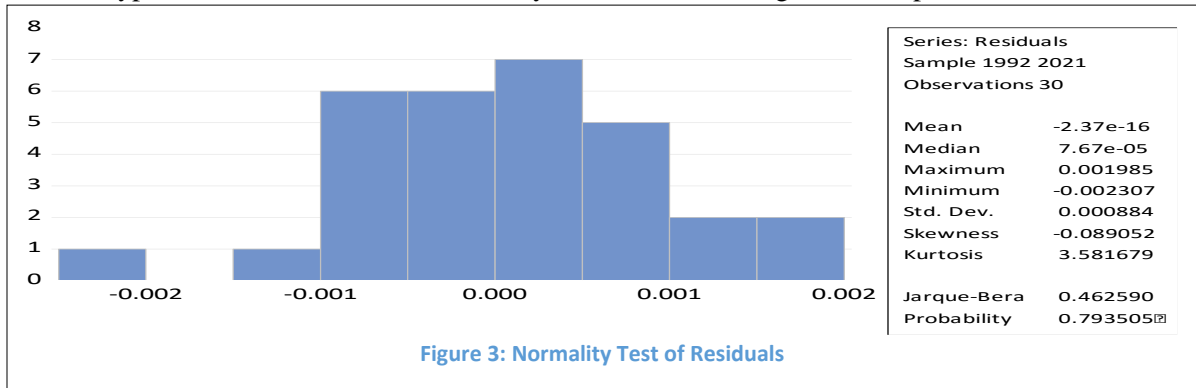
4.1.4. CUSUM and CUSUM sum of square

The Cumulative Sum of Recursive Residuals test, or CUSUM test for short, is a model's parameter constancy test. The upper and lower boundaries for the 5% significance threshold in this test are shown by red lines. The parameters are considered unstable when there is a break in the data, as indicated by the blue line crossing either of the red lines. The parameters, on the other hand, are said to be steady and constant over time if the blue line stays in between the red lines.
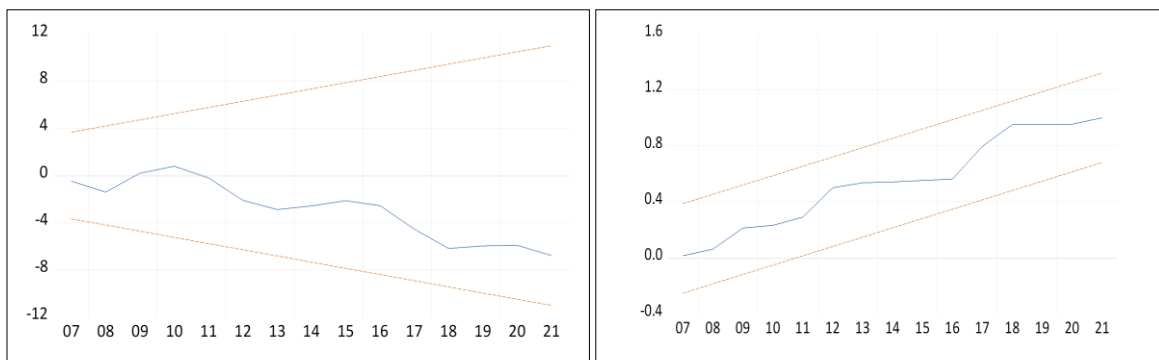
Figure 4: Stability Test of Estimated Parameters

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Cusum and Cusum sum of square are used to show the changing behavior of parameters that whether they remain stable or going to change over time. In above figure 2 it is obvious that blue lines are between the red lines so we can conclude that parameters estimated by ARDL bound testing approach are stable, hence there is stable relationship between HDI and Trade Globalization in Pakistan.

5. Conclusions and Policy Implications

International trade has been recognized as a catalyst for the growth of economy since the era of Adam Smith. A large amount of research backs up the widely held belief that trade opens up access to more expensive domestically produced items, which in turn promotes economic growth. Global trade also makes it easier to import infrastructure, capital goods, and supplies for the healthcare and educational sectors, which eventually boosts production and efficiency. This in turn fuels economic expansion, job creation, rising per capita income, and ensuing advancements in human welfare. Despite the wealth of research confirming the positive relationship between global trade and economic growth, relatively limited attention has been devoted to exploring the direct link between global trade and human welfare – the ultimate goal of economic activities. Consequently, this paper delves into the connection between trade globalization and human welfare. Initially, a straightforward functional relationship between these variables is proposed. To measure these variables, the Human Development Index (HDI) stands in for human welfare, while the KOF Trade Globalization Index serves as a proxy for trade globalization.

Subsequently, a model is formulated, with HDI as the dependent variable, trade globalization as the independent variable, and several control variables (comprising GDP growth rate, population, inflation, and public development expenditures) that could impact HDI. Time series analysis is undertaken using data spanning from 1990 to 2021, sourced from reputable entities such as the World Bank, Economic Survey of Pakistan, UNDP, and KOF Swiss Economic Institutes. The ADF test is used to account for time series qualities because the data are time series. Findings show that the variables' orders of integration ($I(0)$ and $I(1)$) are mixed, which prompts the use of the ARDL approach to cointegration and reveals both short- and long-term relationships between the variables. A strong and favorable long-term correlation between trade globalization and human development is revealed by ARDL estimation. In particular, a rise of one unit in the Trade Globalization Index is correlated with a 0.006-unit increase in the HDI; the small coefficient is explained by the dispersion and data range. Among the control regressors, all variables – except inflation – significantly predict HDI behavior, consistently aligning with theoretical expectations. To fortify the results, post-estimation techniques such as serial LM correlation tests, heteroskedasticity tests, normality tests, and cumulative sum of square assessments are employed. These confirm the stability and consistency of coefficients estimated through the ARDL approach.

Based on these findings, the following policy recommendations are proposed:

Given the established favorable and significant link between the KOF Trade Globalization Index and HDI, policymakers are advised to concentrate on further integrating Pakistan into the global economy. Strategies encompass trade liberalization, reduction of trade barriers, and promotion of export-focused industries. Encouraging foreign direct investment and strengthening trade ties with other nations can also enhance human welfare indicators. Economic growth directly impacts HDI through elevated per capita income and improved living standards. Therefore, policymakers should prioritize policies fostering sustainable and inclusive economic growth. This might entail investing in infrastructure, supporting small and medium-sized enterprises, and nurturing an environment conducive to business growth.

The study underscores the importance of government development expenditure in enhancing HDI. To bolster human development, policymakers should allocate adequate resources to sectors like healthcare, education, infrastructure, and job creation. Investing in human capital development can yield a skilled and productive workforce, contributing to overall societal and economic advancement. Surprisingly, a positive relationship between population growth and Pakistan's HDI is identified. However, policymakers must ensure that population growth is accompanied by strategies to harness the demographic dividend. This involves investing in education and healthcare to empower the expanding labor force and ensure it contributes to economic productivity and innovation. Finally, these policy recommendations aim to leverage the favorable relationship between trade globalization, economic growth, government development spending, and population growth with Pakistan's HDI. By implementing well-designed policies in these areas, Pakistan can enhance its human development indicators and improve the overall well-being of its citizens. However, it's essential to tailor these policies to the specific context and challenges faced by the country to achieve sustainable and inclusive human development.

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