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Empirical Analysis of Impacts of Globalization on the Dynamics of Inflation & HDI in Developed Economies

Muhammad Maqbool Ur-Rahman

PhD Scholar / Assistant Vice President

University of Karachi / National Bank of Pakistan

mmaqbool145@gmail.com

Dr. Mustafa Hyder

Associate Professor, Department of Public Administration

University of Karachi

mustafahyder@uok.edu.pk

Abstract

This study aims to overcome theoretical, contextual, and geographical gaps in the current frameworks for HDI analysis and inflation in developed states. The sample population for this study includes three developed countries: the UK, the USA, and Canada. The research study used the sample period from 1990 to 2023. The data structure is an annual-based balanced panel data set, which maintains the preposition of having the sample for each country in the same form in all the years. The study found that inflation has a positive but statistically insignificant long-term relationship with globalization, while HDI has a positively significant long-term relationship with globalization. In the short-run, inflation shows a positively significant relationship with globalization, whereas HDI has a positive but statistically insignificant short-run relationship with globalization. The study has recommended that there is a need to build up the inflation indexes by including variables such as food and energy, which are frequently unpredictable.

Keywords: Globalization, Inflation, Human Development Index, Developed Economies, Econometrics.

1. Introduction

Globalization is a broad process that can be described as a combination of various interconnected processes and affects the different spheres of national economies, explicitly emphasizing the developed ones (Behera & Sahoo, 2023). Globalization dramatically influences one central sphere (Sheraz et al., 2024). Globalization of markets ensures that markets for products and services, factors of production, and other related productive elements cross national boundaries, thus affecting the prices within economies (Shoukat et al., 2023). This interdependence also tends to increase competition; for developed nations, this constrains the inflation rates towards lower levels (Osakede et al., 2023). The effects of globalization are also reflected in the HDI of developed countries, where, again, the developed Asian nations show tremendous improvement (Uddin et al., 2023). HDI, which is defined as the average of a country's rankings in the three dimensions of a long, healthy, and productive life, access to education and health, and income, is described as positively impacted by the opportunities and resources unlocked by globalization (Gao et al., 2024).

Moreover, globalization enhances the sharing of information and technology, enhancing educational institutions and delivering healthcare services (Negintaji & Esmailinia, 2024). These improvements, therefore, positively affect the life experience and human development accomplishments (Ascari et al., 2024). Secondly, globalization enhances the diffusion of cultures and successful practices within the constantly growing international context, enhancing institutions' governance and proper implementation in developed countries (Naz, 2023). Globalization has positive effects on the performance of the supply chain, but it does not mean that the effects are evenly distributed and that no inequity can occur; thus, sound policy intervention is highly required for equitable supply chain growth (Behera & Sahoo, 2023).

Many developing countries face real-life issues with HDI measurement and controlling inflation (Ascari et al., 2024). The HDI, which measures health,

education, and income, conceals the disparity at the domestic level in these countries (Osakede et al., 2023). They become the areas with higher HDI because of better availability of health care, education, and job opportunities. At the same time, rural regions are found to have lower HDI levels because of the unhealthy standards of their environment (Awan et al., 2024). The management of inflation in these economies is, however, eased by globalization. Unforeseen events observed outside the domestic economy, like oil price changes or conflict, may cause inflation differently (Nafi'Hasbi et al., 2023). Also, setting inflation targets and achieving economic growth and employment remain another difficulty (Hasan & Waheed, 2021). Still, globalization results in inflation through demand pull and supply shock factors such as demand for the products as well as alteration of suppliers (Uddin et al., 2023).

Current HDI indices mainly target health, education, and income without capturing the essence of inequality, environmental conservation, and cultural practices (Kim & Lin, 2023). Promoting mental health and social well-being, which are preconditions for realizing human development potential, remains unrecognized (Behera & Sahoo, 2023). Moreover, there is a need for theoretical frameworks that create measures that encompass these omitted characteristics so that a broader and more accurate portrayal of society and improvements to the resilience of the world economy can be obtained (Adukevičiūtė, 2023).

Even in developed countries, the differences in development, welfare, and living standards between urban and rural residents are noticeable (Uddin et al., 2023). Differences in healthcare, education, and employment opportunities are expected, with metropolitan areas enjoying favourable conditions while rural area suffers from system issues (Adukevičiūtė, 2023). Inflation effects are also multiple; more than others, low-income households risk inflation in food and other necessary products. Bridging this contextual gap necessitates developing measures sensitive to different target populations' varied needs and circumstances, fostering more effective and less skewed development processes (Kim & Lin, 2023).

It is found that developed countries like the USA, the UK, and Canada have better HDI scores in metropolitan areas than in remote and rural areas because the availability of infrastructures and services is high in urban areas (Kim & Lin, 2023). These countries were chosen for a study because they highlight large regional imbalances even if they belong to the group of developed nations. (Negintaji & Esmailinia, 2024). These attributes are because metropolitan areas exhibit good health, education, and infrastructure in these nations, contributing to a very high HDI (Elatroush, 2024). Studying such countries is relevant because it enables one to assess the effects of micro- and macro-economic and policy changes on these gaps (Qadeer & Jehan, 2021).

This study aims to overcome theoretical, contextual, and geographical gaps in the current frameworks for HDI analysis and inflation in developed states, including the UK, the USA, and Canada. Therefore, this research contributes to understanding these dimensions within the context of the HDI above approach by including the factors of inequality, impact on the environment, and cultural beliefs.

To address such gaps, the study is more inclined to develop and propose region-specific policies about development and tackling inflation to end this inequality. This will subsequently offer a more realistic quantification and higher efficiency than the current traditional measurement in policy formulation and management to achieve equitable development. The key research questions guiding this study include: How can HDI be widened to incorporate other dimensions not currently being considered? Moreover, how can policy considerations be made more sensitive to the context in which they operate?

The following section thoroughly reviews the existing literature about the study to formulate hypotheses, followed by the study's research methodology. The fourth section deals with the study's results, analysis, and findings, followed by a discussion to compare the findings with past studies. Finally, in the last section, the paper summarizes the findings and provides theoretical implications, policy recommendations, and suggestions for future research.

2. Literature Review

2.1. Stolper-Samuelson Theorem

One of the theories that can be used to explain how globalization impacts inflation and HDI in developed countries is the Stolper-Samuelson theorem, which is derived from the Heckscher-Ohlin model of international trade (Cerezo García & Landa Díaz, 2023). This theory argues that through trade, return on capital and wages increase equally amongst the different countries, indicating that globalization leads to factor price convergence (Elatroush, 2024). The SST promises an alteration of income distribution when globalization is considered in light of the abundant factor of production, which generally belongs to the holders of capital in the developed world, hence a chance to boost investment in human development (Hasan & Waheed, 2021).

In practice, the SST describes that globalization increases HDI for developed countries (Akinci, 2021). Enhanced trade and capital imply that it allows capital to be utilized better, hence, better wages and living standards. It also expounds how globalization exercises inflationary pressure by increasing productivity and supply of goods and services and stabilizing prices (Ikechukwu et al., 2022). For instance, Germany and Japan can be seen to have benefited a lot from the process of globalization through export and investments, overall economic growth rate, inflation rates as well as high HDI (Brondino, 2023).

2.2. Relationship between Globalization and Inflation

Globalization, on the other hand, is defined as a phenomenon in which the national and regional economies, societies, and cultures become linked together through a worldwide web of commercial and other exchanges (Elatroush, 2024). This has enormous meaning for developed countries from the perspective of globalization and inflation. Competition from the international market results in prices from the increased import supplies, exerting a push for lower prices and hence having a deflation effect (Kibria & Toufique, 2024).

Thus, the SST is a hypothetical framework that may explain this connection (Ikechukwu et al., 2022). In light of the theorem, a country's factor price is

determined by the global average factor price, which globalization influences (Awan et al., 2024). Developed countries typically have a relative abundance of capital; thus, improved trade and investment increase productivity and firm competition (Akıncı, 2021). With the globalization of markets, domestic firms are forced to shift up the ladder and engage in research and development, an efficiency drive that leads to decreased production costs and cheaper products (Hasan & Waheed, 2021).

As for the highly developed countries immersed in globalization, such as Germany and Japan, their inflation rates reveal a decreasing trend (Adukevičiūtė, 2023). These countries reap from liberalization, which allows them to diversify through integration in global markets, hence improving the availability of cheaper inputs and technologies (Tan et al., 2023). A similar observation can be made regarding FDI and trade openness, as both have been found to negatively impact the inflation rate because they enhance competition within the market (Sheraz et al., 2024). Hence, it is hypothesized that:

H1. Globalization has a negative effect on inflation.

2.3. Relationship between Globalization and Human Development Index (HDI)

Globally, the HDI in all the developed countries adds up to the HDI as it increases economic development, promotes proper technology and education, and improves health. Increased globalization improves nations' living standards by boosting their export and import earnings, attracting foreign direct investment, and sharing know-how in technology and governance (Gao et al., 2024).

The SST offers a theoretical underpinning for the positive correlation between globalization and HDI (Ascari et al., 2024). As the theorem prescribes, globalization provides an impetus for a shift in the use of the available global resources to where they are most valued, based on comparative advantage (Qadeer & Jehan, 2021). This leads to higher wages and standards of living in developed countries as these nations have capital and technology (Cerezo García & Landa Díaz, 2023). They also use enhanced trade and investment connections to plug into sophisticated technologies and best practices for boosting productivity and human development (Uddin & Rahman, 2023).

For instance, Sweden and Norway, countries with most of their economic activities entwined in the global financial system, are among the countries that post high HDI scores (Hasan & Waheed, 2021). These countries enjoy sound trade connections, large inflows of foreign investment, and exposure to the best technologies that, in turn, impact their people's health, education, and purchasing power (Kibria & Toufique, 2024). Cross-sectional evidence reveals that globalization improves economic growth and, as a result, improves the different aspects of life in the HDI (Osakede et al., 2023). Therefore, it is hypothesized that:

H2. Globalization has a positive effect on HDI.

3. Methodology

3.1. Sample and Population

The sample population for this study includes three developed countries: the UK, the USA, and Canada. These countries have been selected because of their importance in the world economy and because there has been adequate data for an extended period

(Ikechukwu et al., 2022). The research study used the sample period from 1990 to 2023, which gives enough time series data to comprehend the impacts of globalization on inflation and the human development index (Hasan & Waheed, 2021). The data structure is an annual-based balanced panel data set, which maintains the preposition of having the sample for each country in the same form in all the years (Hsiao, 2022). This method enables the analysis of the periodic nature of most economic indicators, including the theoretical, contextual, and geographical gaps in HDI and inflation rates (Asongu & Nwachukwu, 2017).

3.2. Econometric Model

The two models used in the study to estimate the hypotheses are the following.

$$\text{Model 1: } KOF_{it} = \alpha_{it} + \beta_1 (CPI)_{it} + \beta_2 (GDP)_{it} + \beta_3 (ER)_{it} + \varepsilon_{it}$$

$$\text{Model 2: } KOF_{it} = \alpha_{it} + \beta_1 (HDI)_{it} + \beta_2 (GDP)_{it} + \beta_3 (ER)_{it} + \varepsilon_{it}$$

In the above equation, α is the constant term, β is the regression coefficient, and ε is the residual or error term. KOF denotes globalization measured by KOF globalization index for i^{th} country at a specific time t , HDI denotes human development index measured by HDI value for i^{th} country at a specific time t , CPI denotes inflation measured by consumer price index (annual %) for i^{th} country at a specific time t , GDP denotes economic growth (annual %) for i^{th} country at a specific time t and ER denotes exchange rate measured by national currency per SDR (End of Period) for i^{th} country at a specific time t .

4. Results and Discussions

4.1. Descriptive Statistics

Table 4.1 shows the descriptive statistics of the variables and bivariate correlation analysis between series.

Table 4.1:

Descriptive Statistics and Correlation Analysis (n = 108)

	Mean	S. D.	CPI	ER	GDP	HDI	KOF
Inflation	2.513	1.575	1.000				
Exchange Rate	1.394	0.387	-0.158	1.000			
Economic Growth	2.087	2.352	0.052	0.072	1.000		
Human Development Index	0.897	0.031	-0.237**	0.306**	-0.052	1.000	
Globalization	81.585	4.868	-0.191	-0.434**	-0.100	0.446**	1.000

Table 4.1 presents descriptive statistics and correlation analysis for inflation (CPI), exchange rate (ER), economic growth (GDP), human development index (HDI), and globalization (KOF) based on a sample of 108 observations. The average inflation rate is 2.513, with a standard deviation of 1.575, indicating moderate inflation across the sample. The exchange rate has a mean of 1.394 and a standard deviation of 0.387, reflecting some variability in national currencies per SDR. Economic growth shows more variability, with a mean of 2.087 and a higher standard deviation of 2.352,

indicating significant fluctuations in growth rates. The human development index, with a mean of 0.897 and a low standard deviation of 0.031, suggests consistent HDI values across the countries. Globalization, measured by the KOF index, has a high mean of 81.585 and a moderate standard deviation of 4.868, indicating a high level of globalization with some variation among countries.

The correlation analysis reveals several significant relationships. Inflation shows a significant negative correlation with HDI (-0.237, $p < 0.01$), suggesting that higher inflation is associated with lower human development, but it has no significant relationship with exchange rate, economic growth, or globalization. The exchange rate has a significant positive correlation with HDI (0.306, $p < 0.01$), indicating that stable exchange rates are linked to higher levels of human development. Furthermore, a significant negative correlation exists between the exchange rate and globalization (-0.434, $p < 0.01$), meaning that more stable exchange rates are associated with higher levels of globalization. However, Economic growth does not show significant correlations with any other variables. HDI is positively and significantly correlated with globalization (0.446, $p < 0.01$), suggesting that higher human development is linked to greater levels of globalization.

4.2. Panel Stationarity Analysis

A panel stationarity test (also known as panel unit root test) is conducted in econometrics to help the analyst identify whether a variable in the time series is non-stationary and hence has a unit root (Ditzen et al., 2021). This test serves one essential purpose: it determines the constancy of the variable under consideration, which is very important in modeling and forecasting processes (Hsiao, 2022). In the panel data framework, characterized by cross-sectional units in time, the test determines whether the variables return to the long-run averages or are permanently affected by shocks (Brondino, 2023). The panel unit root test provides a null hypothesis H_0 , which states that the series is non-stationary or contains a unit root. If we reject H_0 , we can say that the series is stationary (Gujarati, 2009). Table 4.2 shows the result of panel stationarity analysis using Im et al. (2003) test.

Table 4.2:
Panel Stationarity Analysis using Im et al. (2003) Statistics

Series	Level		First Difference	
	t-Stats	Prob.	t-Stats	Prob.
Globalization	-5.219	0.000	-7.162	0.000
Inflation	-5.324	0.000	-8.617	0.000
Human Development Index	-0.989	0.161	-8.981	0.000
Economic Growth	-7.726	0.000	-11.398	0.000
Exchange Rate	-1.559	0.060	-9.939	0.000

Above table showed that variables/series have mixed results of stationarity at level and first difference. Some variables/series are stationary at level failed to reject

the null hypothesis, i.e., series has unit root at level, for instance, HDI and exchange rate. Therefore, the analysis manifested that ARDL should be used for testing the long-run relationship between variables.

4.3. Autoregressive Distributive Lag

ARDL is considered another widely applied type of econometric estimation as it can capture the behavior of $I(0)$ and $I(1)$ of the series (Hsiao, 2022). This flexibility makes ARDL particularly suitable when dealing with variables that are not precisely stationary or are partly stationary, in other words, when there is a difference in the degree of stationarity of the variables (Ghumro, 2014). One of the tests that enable analyzing both the short-run and long-run dynamics is the ARDL test (Uddin et al., 2023). The null hypothesis of panel ARDL states that the variables are not cointegrated in the panel data, implying no long-run association of the variables within the panel data (Gujarati, 2009). Table 4.3 shows the result of hypothesis testing using panel ARDL analysis for long-run and short-run assessments.

Table 4.3:
Hypothesis Testing using ARDL Technique

Predictors	Model 1			Model 2		
	Beta	t-Stats	Prob.	Beta	t-Stats	Prob.
Long Run Equation						
CPI	0.532	1.243	0.218			
HDI				70.410	8.552	0.000
GDP	0.571	1.735	0.086	0.279	2.281	0.025
ER	-5.709	-1.427	0.157	-2.594	-1.436	0.155
Short Run Equation						
COINTEQ01	-0.108	-5.580	0.000	-0.246	-3.711	0.000
D(CPI)	0.031	3.274	0.002			
D(HDI)				6.390	0.197	0.845
D(GDP)	-0.029	-2.862	0.005	-0.036	-6.876	0.000
D(ER)	0.227	0.293	0.770	0.068	0.096	0.924
Constant	9.768	5.443	0.000	5.900	2.975	0.004

Dependent Variable: Globalization

Above table showed that inflation ($\beta = 0.532$; $p > 0.05$) has a positive but statistically insignificant impact on globalization while economic growth ($\beta = 0.571$; $p > 0.05$) and exchange rate ($\beta = -5.709$; $p > 0.05$) remains controlled. However, HDI ($\beta = 70.410$; $p < 0.05$) has a positively significant impact on globalization, while economic growth ($\beta = 0.279$; $p < 0.05$) does impact the relationship between HDI and KOF, but the exchange rate ($\beta = -2.594$; $p > 0.05$) remains controlled. The table also showed that COINTEQ01 found significant manifesting that cointegration exists between series, and thus, there is a long-run relationship of inflation ($\beta = -0.108$; $p < 0.05$) and HDI ($\beta = -0.246$; $p < 0.05$) with globalization. Above table further showed that CPI ($\beta = 0.031$; $p < 0.05$) has a short-run relationship with globalization, whereas HDI ($\beta = 6.390$; $p > 0.05$) does not have short-run relationship with globalization.

5. Discussions

The study found that inflation has a positive but statistically insignificant long-run relationship with globalization. The results are similar to the study of Kibria and Toufique (2024). This indicates that although, in theory, globalization may influence inflation, other factors probably offset this effect. One is the effect of the balance due to globalization of trade and markets. Globalization has led to improvement in competition and the opening of frontiers to overseas markets where prices can be pricey due to domestic factors such as demand-pull or cost-pull inflation. Further, other domestic monetary policies, supply chain disruption, and other economic factors may pull the inflation rate higher than globalization (Adukevičiūtė, 2023). Hence, although they may have brought elements that curbed inflation – such as efficiency or cheaper imports – globalization results are outdone by much more robust national trends in the long-run. Consequently, the correlation stays positive but remains non-significant, affirming that several remnant factors shape inflation other than globalization (Kibria & Toufique, 2024).

The study found that HDI has a positively significant long-run relationship with globalization. The results are similar to the study of Gao et al. (2024). This is particularly true since global integration positively affects economic and social development. It also improves access to knowledge, technology, and investment, which influences education, healthcare, and standards of living, all of which are inherent in the HDI. As countries get more involved with the global community, they meet the conditions of FDI, trade, and the spread of knowledge, and as this brings about economic growth, there is the promotion of infrastructure and social amenities (Ascari et al., 2024). Also, globalization makes it easier for countries to adopt the best practices in governance, health, and education, hence promoting better rates of human development. This enhanced availability of resources and innovations favors life expectancy, years of schooling, and income, all of which are vital in improving the HDI of a country. Therefore, long-term relationships between HDI and globalization are highly positive, and globalization enhances human development in a significant way (Gao et al., 2024).

The study found that inflation has a positively significant short-run relationship with globalization. The results are similar to the study of Sheraz et al. (2024). This result can be attributed to first-order changes directly associated with changes in demand and prices in global markets. In the short-run, globalization threatens enhanced globalization awareness and opened more exporting countries to externalities and changes in international prices and demands. For instance, increasing demand for products worldwide can cause prices to rise in the short-run, which means inflation (Tan et al., 2023). Also, opening markets may expose domestic industries to elevated competition, resulting in cost-push inflation. Specifically, exchange rates guarantee that imported goods are expensive internationally, resulting in inflation in the short-run. These factors give prices in the economy a temporary boost before the economy corrects them. As a result, the effects of globalization on prices and demand lead to a tremendous but transient surge in inflation (Hasan & Waheed, 2021).

The study found that HDI has a positive but statistically insignificant short-run relationship with globalization. The results are similar to the study of Qadeer and Jehan (2021). This could be because the positive impacts of globalization on human development, including education, health, and income, are time-bound. In the short-run, such globalization means new economic variables such as trade or foreign investment, but they hardly contribute to an increase in life expectancy, literacy, or a better standard of living – the pillars of HDI (Uddin & Rahman, 2023). In the same respect, in terms of specific impacts of global globalization for a short period, the phenomena can be aimed primarily at economic changes. At the same time, improvements in human development can be anticipated in the time necessary to introduce the reforms and the policies that stimulate the improvements. For instance, foreign investment may raise economic growth and development but will remain years before improving education standards or health systems. Thus, although globalization provides the context for long-lasting social development improvements, its short-term effect on HDI is small, suggesting an overall short-run relationship of near zero (Kibria & Toufique, 2024).

6. Conclusion and Recommendations

6.1. Conclusion

This study aims to overcome theoretical, contextual, and geographical gaps in the current frameworks for HDI analysis and inflation in developed states. The sample population for this study includes three developed countries: the UK, the USA, and Canada. The research study used the sample period from 1990 to 2023. The study found that inflation has a positive but statistically insignificant long-term relationship with globalization, while HDI has a positively significant long-term relationship with globalization. In the short-run, inflation shows a positively significant relationship with globalization, whereas HDI has a positive but statistically insignificant short-run relationship with globalization.

Hence, the study concludes that addressing the nuanced relationship between globalization, inflation, and human development is crucial for policy formulation in developed countries. Policymakers can better understand and manage globalization's effects by refining inflation metrics and incorporating broader economic variables. This research underscores the importance of adapting economic strategies to maximize globalization's long-term developmental benefits while mitigating short-term inflationary pressures. The findings provide valuable insights for creating more resilient and inclusive economic policies in an increasingly interconnected global landscape.

6.2. Theoretical Implications

This research provides significant theoretical advancements in analyzing HDI and inflation and identifying gaps in the current theories. By incorporating the dimensions of inequality, environmental sustainability, and cultural values into the construction of HDI, the research offers a measure of human development that is more holistic than the one previously provided (Akinçı, 2021). This concurs with Asongu and Nwachukwu (2017), who stated that a few assessment tools must be used to determine development indicators. The study also contributes to the growth of

inflation estimation by including the latter, as food and energy are often ruled out when constructing conventional indices (Shoukat et al., 2023).

This enhancement is in concurrence with Kibria and Toufique (2024), who claimed that inflation indices should better reflect changes in the cost of living to facilitate efficient policymaking. Therefore, by analyzing the differences in the HDI and inflation in the context and geography of developed countries, the authors provide knowledge of the gaps of regional inequality, which aligns with Nafi'Hasbi et al. (2023) observation that regional analysis is crucial in economics. The suggested regional strategies and policies appear insightful as they are particular to regions, thus improving the practical implementation of the HDI and inflation theories (Uddin & Rahman, 2023).

6.3. Recommendations

Policy makers must adopt highly integrated strategies to tackle the multifaceted problems related to HDI and inflation in developed countries (Negintaji & Esmailinia, 2024). Firstly, with the help of several indicators, it is necessary to add new dimensions to the HDI: inequality, environmental conditions, and culture. This will give a better indication of general human advancement; more focused efforts to eliminate disparities within the subdivisions of the population will thus be enforced (Qadeer & Jehan, 2021).

Moreover, there is also a need to build up the inflation indexes by including variables such as food and energy, which are frequently unpredictable (Adukevičiūtė, 2023). This adjustment would present a better picture of the changes in the cost of living and help prepare better policies to control inflation while defending the groups in the society that cannot bear the brunt of the price (Shoukat et al., 2023). Further, there is the need to devise proper regional initiatives to enhance economic growth and human development throughout all the regions to ensure that the existing disparities between the populated centers and the rest of the areas are closed (Osakede et al., 2023). Last, future development strategies should involve technological advancement and sustainability to enhance economic diversity and environmental performance (Elatroush, 2024).

6.4. Limitations and Future Research

This study has some limitations that are worth noting despite the overall richness of the findings. Perhaps due to secondary data, the study may need to observe accurate information concerning regional disparities or genuine HDI and inflation concerns arising due to globalization. Future studies might include collecting primary data or using more specific data better to understand such regional differences and the effects of globalization. By focusing on developed countries, the study limits the transferability of findings to other economic environments. Subsequent research needs to investigate these questions under various economic conditions to improve the comparison of globalization's impact on HDI and inflation rates, especially in developing and emerging countries. One of the disadvantages of the annual data is that it only provides information at a point in time and thus cannot reveal inevitable periodic fluctuations that may exist, which could be revealed if data was collected at, say, quarterly or monthly intervals. Future studies might use data at higher

frequencies than the annual frequency that we used to include short-run dynamics of globalization, HDI, inflation, and their mutual connections. The study provides no quantitative analysis of the sociocultural and environmental factors driving HDI. Future research studies could also incorporate more quantitative and qualitative research methods to understand better these sociocultural and ecological factors, which will help enrich the literature and practical knowledge in the field.

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