ISSN 2090-3359 (Print)
ISSN 2090-3367 (Online)

ΑΔΣ

Advances in Decision Sciences

Volume 31
Issue 1
March 2027

亞洲大學 ASIA UNIVERSITY

SCIENTIFIC & BUSINESS WORLD

Published by Asia University, Taiwan and Scientific and Business World

Fragile Peace, Fractured Lives:

How Geopolitical Risk Shapes Human Well-Being in BRICS

Mosab I. Tabash
College of Business, Al Ain University, Al Ain, United Arab Emirates
Faculty of Economics and Business, Universitas Brawijaya, Indonesia
Email: Mosab.tabash@aau.ac.ae

Umar Farooq
School of Economics and Finance, Xi'an Jiaotong University, Shaanxi, Xi'an, China
Corresponding author Email: umerrana246@gmail.com

Suzan Sameer Issa
Faculty of Administrative and Financial Sciences, University of Petra, Amman, Jordan
Email: sissa@uop.edu.jo

Abdurrahman Hakim
Faculty of Economics and Business, Universitas Brawijaya, Indonesia
Email: mr.hakim@ub.ac.id

Zokir Mamadiyarov
Department of Economics, Mamun University, Khiva, Uzbekistan
Department of Finance, Alfraganus University, Tashkent, Uzbekistan
Email: mamadiyarov_zokir@mamunedu.uz

Received: July 7, 2026; First Revision: August 9, 2026;

Last Revision: September 16, 2026; Accepted: September 21, 2026;

Published: September 29, 2026

Abstract

Purpose: In today's globalized world, geopolitical risks (GPR) have grown in frequency and pose serious obstacles to human well-being (HWB) in all countries. Therefore, understanding how rising geopolitical tensions affect a nation's socioeconomic structures has become crucial. Given this, the current study intended to check the impact of GPR on HWB.

Design/methodology/approach: The study's goal is to use data from the BRICS countries from 1990 to 2022 to examine the relationship between GPR and HWB. Regression analysis is conducted using the CS-ARDL model, and robustness is confirmed using 2SLS and FMOLS techniques.

Findings: The results show that GPR has a major detrimental effect on HWB by lowering human well-being mostly through increased inflation, economic disruptions. It is discovered that while inflation rates have a negative impact on HWB, control variables such as economic growth, FDI inflows, financial sector development, and health expenditures have a positive impact.

Implications: The results emphasize how crucial it is to reduce the negative impacts on human well-being by promoting economic growth and reducing geopolitical tensions.

Originality/value: In addition to providing pertinent policy recommendations for boosting resilience against geopolitical risks, this study adds to the body of literature by providing fresh insights into how GPR impacts HWB. This study contributes to the decision sciences literature by providing robust empirical evidence on how geopolitical risk influences human well-being, thereby supporting evidence-based policy formulation and strategic decision-making under conditions of uncertainty.

Keywords: BRICS; CS-ARDL; Geopolitical Risk; Human Development Index; Human Wellbeing

JEL Classifications: F51, I31

1 Introduction

Each nation of the world tries its best to ensure the well-being of its inhabitants. In essence, it is essential for policymakers to develop various policies aimed at enhancing the delivery of various facilities that ensure the overall well-being of the population. In the contemporary age, where nations are interconnected, the theme of globalization brings various opportunities, such as cross-border trade and the sharing of knowledge and technology. However, any disruption among the nations poses equal threats to overall human well-being. This disturbance among the nations is termed as geopolitical risk (GPR), which has many threats to the overall delivery of facilities (Tutuncu et al., 2024). Among others, the emanating GPR can threaten the well-being by disturbing the supply of food, medicine, and other necessary items (Uche et al., 2025). It is well said that the potential implications of these risks arising from cross-border tensions go far beyond state security and border politics. They pierce the very fabric of human existence, upsetting livelihoods, compromising public health, making poverty worse, and eroding social cohesiveness (Gewehr & Guerr, 2022). In view of these circumstances, the current study explores the potential impact of GPR on human well-being.

Geopolitical risk (GPR) is the term used to describe the possibility of political, diplomatic, or military events between states or within regions that could endanger global stability. This includes civil wars, terrorism, territorial disputes, armed conflicts, sanctions, and even strategic rivalries and diplomatic tensions are all included in this broader category of GPR. All of these social and political upheavals indicate elevated GPR (Caldara & Iacoviello, 2022; Palaios & Chatzimichailidou, 2024). Some examples of GPR include the conflict between Russia and Ukraine, the ongoing tensions between the United States and China, the instability in the Middle East, and the rise of authoritarian populism in other parts of the world. All these disruptions can change the balance of power and the way states interact and handle crises. These occurrences don’t happen in a vacuum; rather, they have a ripple effect that affects global supply chains, economic markets, migration trends, and social cohesion. On the flip side, human well-being (HWB hereafter) is a multifaceted concept that includes subjective indicators of freedom and life satisfaction as well as physical and mental health, income security, education, and access to resources (Morse, 2023). According to the UNDP, human well-being encompasses more than just economic prosperity or survival; it also involves empowering individuals to fulfill their potential and lead meaningful lives. As a result, systemic stresses and shocks, particularly those with geopolitical roots, have a fundamental impact on it. In both development economics and international relations, the relationship between geopolitical uncertainty and human well-being is therefore a crucial field of study.

The emanation risk from geopolitical tensions can influence human well-being in a number of different ways. The first is through the disruption of the economy. There are some factors like inflation, unemployment, and fiscal austerity that are often the results of trade sanctions, foreign investment withdrawals, and commodity price volatility caused by geopolitical shocks (Kyriazis & Economou, 2025). In this wake, lower-income groups spend more of their income on necessities after a higher GPR, which has a detrimental effect on their way of life. The second pathway includes displacement and forced migration. More than 110 million people were forcibly displaced globally in 2023, according to the

UNHCR, with many of them being directly impacted by political upheaval, persecution, or war. The physical and mental health of refugees and internally displaced people (IDPs) is severely hampered by issues like inadequate housing, food insecurity, and a lack of access to healthcare (Wang et al., 2024). The decline of community trust and social capital is a third channel. Long-lasting geopolitical conflicts frequently lead to polarization, tensions between groups, and the disintegration of civic institutions. The collective sense of safety and belonging that is necessary for well-being is also threatened, undermining democratic norms and governing frameworks. Similarly, the GPR can influence the environmental quality, which is another channel disturbing the HWB. In resource-rich regions, geopolitical conflict frequently results in unchecked exploitation, environmental harm, and the disruption of sustainable livelihoods. For example, there are ecological and humanitarian ramifications to the dispute and control over mineral-rich areas in Central Africa. Lastly, geopolitical tensions also have psychological effects on people's well-being. Anxiety over diplomatic uncertainty, fear of terrorism, or the ongoing threat of war can all contribute to widespread mental distress.

This study explored the impact of GPR on HWB. To achieve the objective of the study, the analysis was conducted on BRICS nations from 1990 to 2022, and CS-ARDL and 2SLS models were employed for regression quantification. The empirical yield noteworthy findings as we observe the negative effect of GPR on HWB. This inverse correlation implies that geopolitical conflicts lead to long-lasting structural upheavals in social and economic structures. This negative effect was consistent across 2SLS and the inclusion of several control variables like FDI inflow, economic growth, inflation rates, financial sector development, and health expenditures. The findings indicate that all control variables except inflation rates positively influence the HWB, while inflation hampers this, highlighting inflation as a key impediment. The consistency of findings across both CS-ARDL and 2SLS models reinforces the conclusion that rising geopolitical tensions adversely affect human welfare outcomes in emerging economies.

This study significantly contributes to the existing discourse of literature by expanding the discussion of HWB through the prism of GPR, a factor that is frequently disregarded in the conventional development and welfare economics literature. Although previous research has mostly concentrated on institutional environmental or economic factors that affect HWB, this study includes GPR as a crucial determinant. By highlighting the external, frequently uncontrollable geopolitical forces that influence national development outcomes, it challenges conventional frameworks that treat well-being as primarily driven by internal policy or economic performance. With its proposal that stability in the global political environment is a necessary condition for long-term gains in human welfare, this study adds to the developing theoretical paradigm that acknowledges the convergence of security studies and development economics. Furthermore, the study offers a more comprehensive and multifaceted theoretical model for examining well-being under uncertainty by incorporating control variables. This study is among the first to empirically examine the effects of GPR on HWB in BRICS countries over a long period of time (1990–2022) using strong econometric techniques such as the 2SLS and CS-ARDL methods. By using CS-ARDL, the analysis can take into consideration various econometric issues, such as cross-sectional dependence (CSD) and heterogeneity among the BRICS nations, ensuring that the estimates accurately capture the intricate relationships between these significant emerging economies. The results are more reliable and broadly applicable due to the consistent negative correlation between GPR and HWB across both estimation techniques. Furthermore, the inclusion of several control variables strengthens the causal interpretation by helping to isolate the precise effect of GPR.

This study has important policy and practical ramifications equally for governments, international development organizations, and financial institutions functioning in the BRICS region and other emerging economies. Proactive risk management techniques that protect vulnerable populations from the socioeconomic shocks connected to political conflicts, trade tensions, and global crises are desperately needed, as there is ample evidence that GPR compromises human well-being. Funding for institutional resilience should be a top priority for policymakers in order to mitigate the negative effects of external shocks, especially in the areas of financial stability and health systems. Additionally, despite global uncertainty, the study emphasizes the significance of fostering foreign investment and preserving macroeconomic stability, particularly low inflation, as levers to improve well-being. These findings can also be used by development practitioners to create focused welfare interventions and backup plans that address the indirect effects of geopolitical instability on social outcomes like livelihood security, health, and education.

Other parts of the study explored the following sections: The review of literature is presented in Section 2, and a discussion on methodology was conducted in Section 3. The results of the study were presented in Section 4. This section further includes a discussion on estimated results. In Section 5, the conclusion of the study and policy implications were discussed.

2 Literature Review

2.1 Theoretical Framework

The relationship between geopolitical risk (GPR) and human well-being (HWB) can be grounded in Sen’s Capability Approach, which views well-being in terms of individuals’ substantive freedoms and capabilities to achieve valued outcomes, including health, education, livelihood security, and access to essential services. Geopolitical instability can constrain these capabilities by disrupting healthcare and food supplies, limiting economic opportunities, displacing populations, and weakening institutional service delivery. Thus, even when the direct effect on income is limited, heightened GPR can reduce individuals’ ability to achieve basic functionings and consequently deteriorate overall human well-being.

The relationship can further be explained through economic vulnerability and uncertainty mechanisms. Geopolitical shocks can divert public resources toward defense and crisis management, discourage investment, disrupt trade and supply chains, and generate inflationary pressures, thereby reducing the resources available for health, education, employment, and social protection. Higher uncertainty can also delay private investment and consumption decisions, while supply disruptions can increase the prices of essential goods and erode household purchasing power. Collectively, these channels suggest that persistent geopolitical risk can weaken both the economic and institutional foundations necessary for improving human well-being.

2.2 Empirical Review of Literature

Some recent studies urge the potential impact of GPR on HWB through various channels. For instance, Persaud et al. (2018) highlighted the often-overlooked mental health impacts of natural and man-made disasters, emphasizing the need to address psychological well-being alongside physical health. Gewehr and Guerr (2022) explored the link between chronic hunger and state fragility, using data from the WFP Hunger Map and Fragile States Index 2021 to highlight how hunger disproportionately affects the global south. They argued that addressing the geopolitics of hunger where fragility, geopolitics, and human security intersect is crucial to achieving food security and meeting SDG 2. Wu et al. (2022) investigated how economic, financial, political, and geopolitical risks influence income inequality across 19 emerging market economies from 1985 to 2020. Using multiple empirical models, they found that all types of risk significantly increase income inequality. Sweidan (2023) examined the evolving impact of GPR on environmental stress by analyzing its influence on energy and carbon intensities across 18 countries from 1992 to 2018. Findings revealed that GPR has a time-varying effect, often contributing positively to environmental sustainability, suggesting the need for adaptive policy strategies to harness its beneficial outcomes.

Deng (2024) analyzed how GPR affects national food availability, introducing an external GPR index (EGPR) to assess vulnerability from international food suppliers. Results showed domestic GPR hampers local production, EGPR reduces imports, and low-GDP countries face greater food insecurity risks from geopolitical tensions. Jha et al. (2024) analyzed the impact of GPR on economic growth across 41 countries from 2000 to 2020 using FGLS, system GMM, and PCSE methods. Findings revealed that while GPR boosts growth overall, especially in advanced economies, it harms growth in emerging ones, with institutional factors like democracy and economic freedom reinforcing positive effects. Lang and Vo (2024) investigated how GPR and military spending affect public health expenditure in 43 countries from 1990 to 2021, using advanced causal inference methods like system GMM, Lewbel-IV, and HPJ estimation. Results showed that GPR lowers health spending, especially in low-income countries, with military spending acting as a key mediating factor. Pandey et al. (2024) examined how national happiness levels influence market reactions to geopolitical shocks by analyzing stock market responses to the Israel–Hamas conflict across 71 countries. Using event study methodology, they found that happier nations' markets show greater resilience, while regions like EMEA are more adversely affected.

Sun and Su (2024) discovered the dynamic relationship between GPR and food prices (FP) using bootstrap causality tests. Findings revealed a time-varying bidirectional causality where GPR often raises FP by disrupting markets while FP also signals geopolitical tensions, highlighting the need for policy attention, especially amid conflicts like Russia–Ukraine. Khan (2025) investigated the dynamic relationship between global supply chains and energy security under GPR using wavelet analysis. Results revealed that while global supply chains enhance energy security in the medium term, this direction reverses during geopolitical disruptions, with energy security influencing supply chains instead. The relationship gets stronger over time in geopolitical stability, highlighting the necessity of coordinated energy logistics policies to reduce the impact of volatility. Khurshid et al. (2025) used the NARDL model to examine the effects of globalization, ICT, and GPR on poverty in Pakistan between 1980 and 2022. The findings demonstrated that while rising GPR exacerbates poverty, improved ICT and positive globalization lessen it, highlighting the necessity of both political stability and ICT growth to aid in poverty alleviation.

Paramati et al. (2025) analyzed how GPR influences carbon emissions and public health risks across 17 countries from 1990 to 2018. Their findings revealed that rising GPR increases carbon emissions, which in turn worsens public health outcomes and thereby harms human well-being. Uche et al. (2025) investigated how GPR and economic policy uncertainty (EPU) affect poverty and income inequality across 17 emerging economies from 2010 to 2021. Their results revealed that GPR intensifies income inequality, while EPU drives poverty, with institutional quality and financial inclusion showing limited impact, unlike human capital and ICT infrastructure, which significantly alleviate human misery.

Even though previous research examines the dynamic relationship between energy security and global supply chains under GPR, emphasizing bidirectional causality and the significance of coordinated policy responses, there is still a significant lack of information on how these geopolitical risks directly affect more general aspects of human well-being. The majority of earlier studies concentrate on sectoral or macroeconomic outcomes like trade disruptions, food security, or energy security. It does not, however, address how these risks result in modifications to life quality, access to necessary services, and general societal resilience. By investigating how GPR affects human well-being and providing a more comprehensive understanding of its socio-economic ramifications, this study aims to close this knowledge gap by exploring the following hypothesis.

H_1: Geopolitical risk has a significant but negative impact on human well-being.

3 Data and Methods

3.1 Data, Sample, and Variable Description

To achieve the underlying objective of the study, the study makes use of panel data that spans 33 years of observations for each of the BRICS nations from 1990 to 2022. Relevance and the availability of data both played a role in choosing this time frame. Data on the Human Development Index (HDI) (serving as a measure of human wellbeing) is obtained from the UNDP website, whereas data on GPR is taken from the popular GPR index created by Caldara and Iacoviello (2022) and made accessible via the Policy Uncertainty website. Since 2022 is the most recent year for which complete and consistent data for both GPR and HDI are available across all sample countries, it is used as the endpoint of the analysis. It makes sense and is a strategic decision to use the BRICS nations as the study sample. In addition to being some of the world's biggest and fastest-growing emerging economies, these countries are also highly vulnerable to global geopolitical events because of their regional clout and participation in international investment trade and diplomacy. The study can capture the effects of geopolitical uncertainty on countries that are extremely susceptible to external shocks, but have a significant influence on how the world develops in the future by concentrating on BRICS. Additionally, the 33-year period offers enough temporal variation to detect long-term patterns and structural connections between GPR and human well-being, guaranteeing solid and pertinent policy insights.

Table 1 summarizes the variables employed in the empirical analysis, including their definitions, measurement, and roles in the proposed empirical model. The selection of these variables is guided by the existing literature on GPR and HWB. The HDI combines three essential dimensions, life expectancy, education (as determined by mean and expected years of schooling), and per capita income to capture the multifaceted nature of human development. This index allows for cross-national comparisons and long-term evaluations by acting as a thorough stand-in for HWB. Given that health education and income disparities still exist and are frequently impacted by both internal policies and external shocks, the HDI selection is especially pertinent in the context of the BRICS countries. By using HDI, this study enables a more comprehensive assessment of the ways in which both domestic and global factors influence people's lived experiences and capacities. On the other hand, GPR serves as the main independent variable and is measured using the country-specific historical GPR measures developed by Caldara and Iacoviello (2022). These measures are based on a systematic text-based analysis of international newspapers and archives to capture the prevalence of terms associated with geopolitical risks, including terrorist activity, war threats, international tensions, armed conflict, and political instability. GPR is particularly relevant in the context of BRICS countries, many of which face significant geopolitical pressures and occupy strategically important positions in international affairs.

Table 1: Variables of Study

Acronym	Variable	Measurement	Role
HWB	Human well-being	HDI index	Dependent
GPR	Geopolitical risk	Natural logarithm of country-specific historical GPR article share (GPRHC)	Independent
GDP	Economic growth	GDP per capita growth (annual %)	Control
IFR	Inflation rates	Inflation, consumer prices (annual %)	Control
FDI	FDI inflow	Foreign direct investment, net inflows (% of GDP)	Control
FSD	Financial sector development	Domestic credit to the private sector by banks (% of GDP)	Control
HEX	Health expenditures	Current health expenditure per capita (current US$)	Control

Note: This table summarizes the definitions, measurements, and roles of the variables employed in the empirical analysis. HWB is the dependent variable, GPR is the primary explanatory variable, and GDP, IFR, FDI, FSD, and HEX are included as control variables. Source: Compiled by the authors based on previous literature and the respective data sources.

To enhance the statistical review, we estimate the average values of all variables across the sampled nations. Table 2 provides a comparative overview of HWB, GPR, and key macroeconomic and institutional indicators across the five BRICS countries during the study period (1990–2022). The results reveal considerable heterogeneity in human well-being, with India (0.541) recording the lowest average HDI, while Russia (0.773) exhibits the highest level, followed by Brazil (0.700) and South Africa (0.671). Despite relatively lower HWB levels, China (8.136%) and India (4.333%) record substantially higher average GDP growth rates, suggesting that sustained economic growth alone does not necessarily translate into higher human development without complementary investments in social and institutional development. In terms of geopolitical risk, Brazil (0.381) reports the highest average GPR score, followed by India (0.302) and South Africa (0.307), whereas Russia (0.210) records the lowest average value over the sample period, reflecting the behavior of the global geopolitical risk index during the study period. Inflation rates also vary across the BRICS economies, with Russia recording the highest average inflation rate (10.679%), followed by India (7.186%), while China experiences the lowest average inflation (3.865%). These differences highlight variations in macroeconomic stability that may influence human well-being through their effects on purchasing power and economic conditions.

China also stands out with the highest average FDI inflows (3.199% of GDP) and the most developed financial sector (FSD = 122.380% of GDP), reflecting its expanding financial infrastructure and openness to international investment. Meanwhile, Brazil (US$576.159) and South Africa (US$402.237) record the highest average health expenditures, followed by Russia (US$393.441), which is consistent with their comparatively higher levels of human well-being. In contrast, India's relatively low health expenditure (US$34.952 per capita) may partly explain its lower HDI despite strong economic growth. Overall, the results highlight the complex interplay between geopolitical risk, macroeconomic conditions, institutional quality, and public investment in shaping human well-being across the BRICS economies.

Table 2: Average Trend Among the Variables Across Sampled Nations

Country	HWB	GPR	GDP	IFR	FDI	FSD	HEX
Brazil	0.700	0.381	1.022	6.617	2.719	52.352	576.159
Russia	0.773	0.210	0.842	10.679	1.567	33.279	393.441
India	0.541	0.302	4.333	7.186	1.266	39.110	34.952
China	0.647	0.267	8.136	3.865	3.199	122.380	204.772
South Africa	0.671	0.307	0.674	6.654	1.412	58.757	402.237

Note: The reported values represent the arithmetic mean of annual observations for each variable over the sample period (1990–2022) for each BRICS country. HWB = Human Well-being (Human Development Index); GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure. Source: Authors' calculations.

To provide a comprehensive overview of the dataset prior to the econometric estimation, Tables 3 and 4 present the descriptive statistics and correlation matrix of the study variables. These preliminary analyses facilitate an understanding of the distributional characteristics and bivariate relationships among the variables before proceeding to the regression analysis.

Table 3: Descriptive Analysis

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
HWB	0.665	0.668	0.839	0.434	0.099	-0.466	2.587
GPR	0.296	0.182	1.581	0.013	0.325	1.804	3.798
GDP	3.199	3.177	13.635	-12.540	4.478	-0.419	3.526
IFR	5.510	5.125	14.514	-1.401	3.176	1.314	3.528
FDI	2.064	1.799	9.703	-1.787	1.595	1.002	3.175

FSD	62.099	53.156	185.363	13.295	36.930	1.363	4.562
HEX	326.593	256.047	1078.235	5.822	286.546	0.737	2.533

Note: The table reports the overall descriptive statistics computed from the pooled panel observations for the BRICS countries over the period 1990–2022. Mean, median, maximum, minimum, standard deviation, skewness, and kurtosis summarize the distributional characteristics of each variable. HWB = Human Well-being; GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; Quality; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure. Source: Authors' calculations.

Table 3 presents the descriptive statistics of the variables employed in the study, providing an overview of their central tendencies and distributional characteristics across the BRICS economies during the study period. The average value of human well-being (HWB) is 0.665, indicating a moderate level of human development among the sampled countries. Accordingly, the reported mean GPR value of 0.296 does not represent ln(100), as the analysis uses country-specific article-share measures rather than the aggregate GPR index normalized to 100. Economic growth (GDP) records an average annual growth rate of 3.199%, reflecting a generally positive growth trajectory. The average inflation rate (IFR) is 6.820%, with values ranging from −1.401% to 27.684%. To minimize the influence of extreme historical hyperinflation episodes, observations associated with exceptionally high inflation rates were excluded from the estimation sample. The specific country-year observations excluded are reported in Appendix Table A2 to ensure transparency and replicability of the final estimation sample. Foreign direct investment (FDI) inflows average 2.064% of GDP, reflecting moderate levels of international capital inflows. Financial sector development (FSD), measured by domestic credit to the private sector, averages 62.099% of GDP, suggesting a relatively developed financial system across the sample economies. Finally, health expenditure (HEX) averages US$326.593 per capita, highlighting the level of investment in healthcare among the BRICS countries. Overall, these descriptive statistics indicate that the variables exhibit reasonable variation across countries and over time, thereby providing a suitable basis for the subsequent econometric analysis.

Table 4: Correlation Analysis

Variable	HWB	GPR	GDP	IFR	FDI	FSD	HEX
HWB	1.000						
GPR	-0.019	1.000					
GDP	0.234	-0.099	1.000				
IFR	-0.047	-0.048	-0.201	1.000			
FDI	0.135	-0.062	0.377	-0.196	1.000		
FSD	0.171	0.010	0.372	0.006	0.258	1.000	
HEX	0.642	0.072	-0.321	-0.023	0.132	0.136	1.000

Note: The table reports Pearson's pairwise correlation coefficients among the study variables. Positive (negative) values indicate positive (negative) linear associations, while larger absolute values indicate stronger relationships. HWB = Human Well-being; GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure**.** Source: Authors' estimation.

Table 4 reports the correlation coefficients among the study variables. Human well-being (HWB) exhibits the strongest positive correlation with health expenditure (HEX) (r = 0.642), followed by economic growth (GDP) (r = 0.234) and financial sector development (FSD) (r = 0.171), indicating that these factors are positively associated with improvements in human well-being. Foreign direct investment (FDI) displays positive, although comparatively weaker, correlations with HWB. Conversely, geopolitical risk (GPR) (r = −0.019) and inflation (IFR) (r = −0.047) are negatively correlated with HWB, providing preliminary evidence that higher geopolitical uncertainty and inflationary pressures may adversely affect human development. Furthermore, the correlation coefficients among the explanatory variables remain well below the conventional multicollinearity threshold, suggesting that multicollinearity is unlikely to pose a serious concern in the subsequent regression analysis.

3.2 Research Models

To examine the short-run and long-run effects of GPR on HWB, this study employs the CS-ARDL model. The empirical CS-ARDL model is expressed as follows:

$$\begin{aligned}\Delta HWB_{it} = \alpha_i + \emptyset_i(HWB_{i,t-1} - \varphi_{1i}GPR_{i,t-1} - \varphi_{2i}GDP_{i,t-1} - \varphi_{3i}IFR_{i,t-1} - \varphi_{4i}FDI_{i,t-1} \\ -\varphi_{5i}FSD_{i,t-1} - \varphi_{6i}HEX_{i,t-1}) + \sum_{j=1}^{p_i-1}\alpha_{i,j}\,\Delta HWB_{i,t-j} + \sum_{j=0}^{q_{1i}-1}\beta_{1,i,j}\,\Delta GPR_{i,t-j} + \sum_{j=0}^{q_{2i}-1}\beta_{2,i,j}\,\Delta GDP_{i,t-j} \\ + \sum_{j=0}^{q_{3i}-1}\beta_{3,i,j}\,\Delta IFR_{i,t-j} \\ + \sum_{j=0}^{q_{5i}-1}\beta_{4,i,j}\,\Delta FDI_{i,t-j} + \sum_{j=0}^{q_{6i}-1}\beta_{5,i,j}\,\Delta FSD_{i,t-j} + \sum_{j=0}^{q_{7i}-1}\beta_{6,i,j}\,\Delta HEX_{i,t-j} \\ + \sum_{j=0}^{m_i}\delta_{1,i,j}\,\overline{HWB}_{t-j} + \sum_{j=0}^{m_i}\delta_{2,i,j}\,\overline{GPR}_{t-j} + \sum_{j=0}^{m_i}\delta_{3,i,j}\,\overline{GDP}_{t-j} + \sum_{j=0}^{m_i}\delta_{4,i,j}\,\overline{IFR}_{t-j} + \\ + \sum_{j=0}^{m_i}\delta_{5,i,j}\,\overline{FDI}_{t-j} + \sum_{j=0}^{m_i}\delta_{6,i,j}\,\overline{FSD}_{t-j} \\ + \sum_{j=0}^{m_i}\delta_{7,i,j}\,\overline{HEX}_{t-j} + \varepsilon_{it}, \qquad (1)\end{aligned}$$

where HWB_{it} denotes human well-being for country i at time t; $GPR, GDP, IFR, FDI, FSD,$ and HEX represent geopolitical risk, economic growth, inflation rate, foreign direct investment inflows, financial sector development, and health expenditure, respectively. The operator Δ indicates the first-difference transformation, while i identifies the cross-sectional units (BRICS countries), t denotes the time dimension, and j represents the lag order used in the dynamic specification. The parameter α_i represents the country-specific intercept, φ_i denotes the error-correction coefficient, and φ_{1i} to φ_{7i} represent the long-run coefficients. The coefficients $\alpha_{i,j}$ and $\beta_{(k,i,j)}$ capture the lag-specific short-run dynamics, while $\overline{HWB}_{t-j}$, $\overline{GPR}_{t-j}$, $\overline{GDP}_{t-j}$, $\overline{IFR}_{t-j}$, $\overline{FDI}_{t-j}$, $\overline{FSD}_{t-j}$, and $\overline{HEX}_{t-j}$ denote the corresponding cross-sectional averages, with $\delta_{(k,i,j)}$ representing their associated coefficients. Finally, ε_{it} denotes the stochastic error term. This specification accounts for both country-specific dynamics and unobserved common factors across the BRICS economies.

Given the small cross-sectional dimension of the panel (N = 5), a parsimonious lag structure was adopted to minimize parameter proliferation arising from the inclusion of cross-sectional averages. The lag orders were selected using the Schwarz Information Criterion (SIC). The selected specification uses one lag for the dependent variable and one lag for the explanatory variables, while the cross-sectional averages of all variables are included with one lag. Thus, the estimated model follows a CS-ARDL(1,1) specification with m = 1 for the cross-sectional average terms. This lag structure provides a parsimonious representation of the short-run dynamics while allowing the model to account for unobserved common factors and cross-sectional dependence across the BRICS economies.

3.3 Estimation Technique

The current study employs the CS-ARDL model as a primary estimation technique, and robustness of results was performed by employing alternative estimation techniques like FMOLS and 2SLS models. The selection of these regression techniques was purely motivated by the results of some pre-estimation techniques like the CSD test, the unit root test, and the cointegration analysis. Explaining the rationality of each technique, since the data from the BRICS countries were panel data, the first step was to evaluate the cross-sectional dependence (CSD) between variables. Ignoring this problem could result in estimates that are inconsistent and biased. The outcomes of the Pesaran CD test and the Breusch-Pagan LM test are shown in Table 5. The results reported in Table 5 indicate statistically significant CSD across the raw panel variables, confirming that shocks affecting one BRICS economy may transmit to other economies. This finding justifies the use of the CS-ARDL framework with cross-sectional averages. Importantly, the residual-based Pesaran CD test reported in the final row of Table 5 yields an insignificant probability value of 0.400, indicating that the null hypothesis of cross-sectional independence cannot be rejected for the CS-ARDL residuals. This provides evidence that the inclusion of cross-sectional averages successfully captures the common factors underlying the cross-sectional dependence observed in the raw series.

Table 5: Estimation of Cross-Sectional Dependence (CSD)

	Breusch Test		Pesaran Test	
Variables	***Statistic***	***Probability***	***Statistic***	***Probability***
HWB	276.139	0.000	58.392	0.000
GPR	20.685	0.021	-3.443	0.001
GDP	70.936	0.000	7.457	0.000
IFR	79.057	0.000	8.089	0.000
FDI	30.175	0.000	2.619	0.008
FSD	115.967	0.000	8.847	0.000
HEX	256.957	0.000	15.984	0.000
CS-ARDL Residuals			0.842	0.400

Note: Breusch–Pagan LM and Pesaran CD tests are employed to examine cross-sectional dependence among panel units. The null hypothesis states that cross-sectional independence exists. A statistically significant probability value indicates the presence of cross-sectional dependence. HWB = Human Well-being; GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; Quality; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure. Source: Authors' estimation.

All of the variables' p-values in both tests are extremely significant, indicating that CSD exists. This suggests that political and economic shocks in one BRICS nation may have an impact on others, supporting the application of econometric methods that take interdependencies between panel units into consideration. The stationarity properties of the variables were then investigated using second-generation unit root tests, namely the CADF and CIPS tests, which are suitable when CSD is present. Some variables, like GPR, GDP, and IFR, are among the variables that are stationary at the level, as indicated in Table 6, whereas HWB, FDI, FSD, and HEX only become stationary following initial differencing. For example, in both the CADF (p = 0. 000) and CIPS (p = 0. 012) tests, HWB becomes stationary after the first difference despite being non-stationary at the level.

Table 6: Analyzing Stationarity through Unit Root Testing

	CIPS		**CADF**	
Variables	**At Level (0)**	**At first difference (1)**	**(0)**	**(1)**
HWB	(0.344)	(-2.212)	(7.643)	(28.311)
	0.634	0.012	0.412	0.000
GPR	(-7.933)	-	(74.566)	-
	0.000		0.000	
GDP	(-3.394)	-	(31.012)	-
	0.000		0.000	
IFR	(-5.572)	-	(55.034)	-
	0.000		0.000	
FDI	(-1.380)	(-7.221)	(14.442)	(66.195)
	0.082	0.000	0.153	0.000
FSD	(0.969)	(-6.087)	(9.055)	(56.103)
	0.838	0.000	0.526	0.000
HEX	(4.622)	(-3.701)	(1.429)	(33.214)
	0.999	0.000	0.991	0.000

Note: CIPS (Cross-sectionally Augmented IPS) and CADF (Cross-sectionally Augmented Dickey–Fuller) tests are employed to examine the stationarity properties of the panel variables while accounting for cross-sectional dependence. Values reported in parentheses are test statistics, with the corresponding probability values presented below. A significant probability value indicates rejection of the null hypothesis of a unit root. HWB = Human Well-being; GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure. Source: Authors' estimation.

The CS-ARDL model can handle variables integrated at different orders as long as none are I(2). These mixed orders of integration (I(0) and I(1)), and some variables are AR(1), support the selection of this model (Chudik & Pesaran, 2015). The stationarity results also warrant consideration of the possibility of misleading or spurious-like regression relationships, even when conventional stationarity conditions appear to be satisfied. Recent econometric literature demonstrates that significant regression relationships may arise under particular combinations of persistence, autoregressive dynamics, and mixed integration properties (Cheng et al., 2021, 2022; Wong, Cheng, & Yue, 2024; Wong & Pham, 2022a,b, 2023a,b; Wong, Pham, & Yue, 2024; Wong & Yue, 2024). These concerns are particularly relevant for panel settings involving I(0) and I(1) variables, where conventional regression results may require additional diagnostic assessment (Wong & Pham, 2025a,b, 2026a,b). Accordingly, the present study does not rely solely on the unit-root results but additionally employs the Westerlund (2007) panel cointegration test, the error-correction specification within the CS-ARDL framework, alternative estimators, and the Ramsey RESET test to assess the stability and adequacy of the empirical specification.

Table 7: Westerlund (2007) Panel Cointegration Test

Test	Statistic	Z-value	Asymptotic p-value	Bootstrap p-value
Gt	-2.841	-2.963	0.002	0.012
Ga	-15.624	-3.417	0.001	0.008
Pt	-5.382	-3.126	0.001	0.014
Pa	-18.745	-3.582	0.000	0.006

Note: Westerlund's (2007) error-correction-based panel cointegration test is employed to examine the existence of a long-run equilibrium relationship among the study variables while accounting for cross-sectional dependence. The null hypothesis is that there is no cointegration. Statistically significant test statistics indicate rejection of the null hypothesis and support the existence of a long-run cointegrating relationship. Source: Authors' estimation.

Westerlund's (2007) error-correction-based panel cointegration test was employed to examine the long-run relationship among the study variables while accounting for cross-sectional dependence. The findings reported in Table 7 show that all four test statistics (Gt, Ga, Pt, and Pa) are statistically significant, with probability values below 0.01. Thus, the null hypothesis of no cointegration is rejected, confirming the existence of a stable long-run equilibrium relationship between human well-being (HWB), geopolitical risk (GPR), and the set of control variables, despite short-run fluctuations and mixed orders of integration. This finding provides support for the application of the CS-ARDL framework to estimate the short-run and long-run effects of GPR on HWB. These diagnostics led to the use of the CS-ARDL model for the primary regression analysis. This model successfully separates short-term dynamics from long-term relationships and is well-suited for managing heterogeneity and CSD across panel units. Additionally, two alternative estimation methods, i.e., FMOLS and 2SLS, were used to guarantee the robustness of the results. By addressing possible endogeneity and offering a robustness check, these techniques support the stability and dependability of the CS-ARDL estimates. The study's conclusions about how GPR and other macroeconomic factors affect HWB in the BRICS nations are supported by the meticulous application of pre-estimation diagnostics and strong estimation techniques.

Although the HDI is bounded between 0 and 1, the observed values for the BRICS countries are not concentrated at either boundary but remain within the interior of the admissible range throughout the study period. Accordingly, the use of linear dynamic panel estimators is unlikely to produce meaningful violations of the theoretical bounds. Furthermore, because the primary objective of this study is to estimate short-run and long-run cointegrating relationships under cross-sectional dependence, the CS-ARDL framework is considered appropriate. This approach is consistent with previous studies that have modeled HDI as a continuous dependent variable using linear time-series and panel econometric techniques, including ARDL, FMOLS, panel cointegration, and simultaneous equation models (Sohail et al., 2025; Wang et al., 2018).

To examine the robustness of the baseline CS-ARDL estimates and to address potential endogeneity concerns arising from simultaneity and reverse causality, the study additionally employs the two-stage least squares (2SLS) estimator. The 2SLS estimation serves as a robustness check to verify whether the estimated relationships remain consistent under an alternative estimation technique that accounts for potential endogeneity. Specifically, the first lag of each explanatory variable is employed as an internal instrument for its corresponding endogenous regressor. The use of lagged instruments is based on the assumption that past values are correlated with the potentially endogenous regressors while remaining uncorrelated with the contemporaneous error term. The validity of the selected instruments is assessed using the Hansen–Sargan overidentification test, and the insignificant J-statistic ($p = 0.536$) confirms that the overidentifying restrictions cannot be rejected, thereby supporting the validity of the chosen instruments.

4 Results and Discussions

4.1 Regression Analysis

To explore the proposed relationship among variables, the study employs the CS-ARDL model, and the findings are presented in Table 8.

Table 8: Effect of GPR on Human Wellbeing (HWB)

	HWB as a dependent variable			
	CS-ARDL Model			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
	Long Run Equation			
GPR	-0.083 **	0.036	-2.301	0.024
GDP	0.022 ***	0.005	4.087	0.000
IFR	-0.007 ***	0.002	-3.214	0.002
FDI	0.027 *	0.014	1.929	0.058
FSD	0.080 ***	0.021	3.814	0.000
HEX	0.001 ***	0.0003	2.746	0.007
	Short-Run Equation			
COINTEQ01	-0.072 ***	0.021	-3.143	0.002
D(HWB(-1))	0.365 ***	0.084	4.345	0.000
D(GPR)	0.001	0.001	0.881	0.380
D(GPR(-1))	0.001	0.001	0.826	0.411
D(GDP)	0.0003	0.0003	0.852	0.397
D(GDP(-1))	0.0003	0.0003	1.061	0.291
D(IFR)	-0.0001	0.0002	-0.566	0.573
D(IFR(-1))	0.0003	0.0003	1.074	0.286
D(FDI)	-0.0008	0.0007	-1.019	0.312
D(FDI(-1))	-0.0006	0.0006	-1.046	0.299
D(FSD)	-0.008	0.009	-0.887	0.377
D(FSD(-1))	0.0001	0.0001	0.728	0.468
D(HEX)	-0.001	0.001	-0.563	0.574

D(HEX(-1))	0.0001	0.0001	1.039	0.302
C	0.007 *	0.003	1.882	0.064

Note: Results are estimated using the Cross-Sectionally Augmented Autoregressive Distributed Lag (CS-ARDL) model. The long-run and short-run coefficients are reported separately. COINTEQ represents the error-correction term, while D(.) denotes the first-difference operator. HWB = Human Well-being; GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure. ∗∗∗p<0.01, ∗∗p<0.05, ∗p<0.10**.** Source: Authors' estimation.

As reported in Table 8, the CS-ARDL estimation indicates that geopolitical risk (GPR) has a significant and negative long-run effect on human well-being (HWB). However, the short-run coefficients of GPR and its lagged change are statistically insignificant, indicating that the adverse effect of geopolitical risk does not materialize as an immediate short-run deterioration in human well-being within the estimated model. Rather, the significant long-run coefficient suggests that persistent geopolitical uncertainty can gradually weaken the socioeconomic conditions that support human well-being. This distinction is important because the empirical results indicate that the consequences of geopolitical risk are primarily realized through longer-term adjustment rather than through statistically significant immediate changes.

The negative long-run effect of GPR can be understood through several interconnected channels affecting economic stability and social outcomes. Persistent geopolitical tensions can increase macroeconomic uncertainty, discourage investment, and disrupt international trade, which may gradually constrain economic growth and public revenues (Himounet, 2022). Over time, such pressures can reduce the fiscal capacity available for social protection, health, and education, which are important components of human development. Geopolitical tensions may also encourage governments to redirect public resources toward defense and security-related priorities, potentially reducing the resources available for social-sector investment (Gbadegesin, 2024). Similarly, prolonged supply-chain disruptions and higher risk premiums can generate inflationary pressures that disproportionately affect lower-income households and gradually erode their purchasing power and living standards. Geopolitical instability may also weaken institutional effectiveness and public confidence, while prolonged conflict can contribute to forced migration and displacement, with implications for access to education, healthcare, and livelihood opportunities (Khan et al., 2024). These mechanisms provide a plausible explanation for the significant negative long-run association observed in Table 8, while the absence of significant short-run coefficients indicates that such effects may accumulate progressively rather than occur immediately.

For the control variables, the long-run estimates reported in Table 8 show that GDP, FDI inflows, financial sector development (FSD), and health expenditures have positive and statistically significant effects on HWB, whereas inflation has a significant negative effect. The positive effect of economic growth can be explained by its contribution to national income and the capacity to invest in infrastructure, education, and healthcare, thereby improving human development. Better living conditions, employment opportunities, and access to basic public services associated with higher economic activity can contribute to higher HDI outcomes (Cárcaba et al., 2022; Croes et al., 2021). FDI inflows can contribute to HWB through employment creation, economic activity, and the transfer of managerial and technological capabilities, which may improve incomes, infrastructure, and access to services (Sohail et al., 2024).

The positive effect of FSD on HWB suggests that a more developed financial system can promote financial inclusion by facilitating access to savings and credit and supporting investment in businesses, healthcare, and education. Greater financial access can therefore contribute to individual economic opportunities and broader sustainable development (Chowdhury & Chowdhury, 2024). Similarly, higher health expenditure can improve access to healthcare, reduce the burden of disease, and contribute to longer life expectancy, which represents an important dimension of the HDI. Greater commitment to health investment can therefore support improvements in human well-being (Kouadio & Mom, 2025).

In contrast, the negative effect of inflation indicates that persistent increases in prices can adversely affect human well-being by raising living costs and eroding household purchasing power. These effects can be particularly pronounced among lower-income households, while sustained inflation may also reduce the real value of wages and savings and constrain access to essential goods and services such as food, healthcare, and education (Tripathi, 2021). Overall, the findings indicate that GPR and inflation are associated with lower HWB in the long run, whereas economic growth, FDI, financial sector development, and health expenditure contribute positively to human well-being.

The robustness of the long-run findings was assessed using FMOLS and 2SLS, with the results reported in Table 9. The estimated coefficients broadly support the main long-run relationship reported in Table 8, particularly the negative association between GPR and HWB. The use of these alternative estimation approaches, therefore, provides additional evidence regarding the stability of the principal findings.

As an additional specification diagnostic, the Ramsey RESET test was conducted to examine whether the linear functional form of the baseline CS-ARDL model is appropriately specified. The results, reported in Appendix Table A1, indicate an F-statistic of 1.284 with a probability value of 0.281. Since the probability value exceeds the 5% significance level, the null hypothesis of correct functional-form specification cannot be rejected. This suggests that there is no statistically significant evidence of omitted nonlinear terms or functional-form misspecification in the estimated model. The result therefore provides additional support for the adequacy of the linear CS-ARDL specification over the 1990–2022 sample period, despite the presence of major economic and geopolitical shocks.

Table 9: Robustness Analysis

	HWB as a dependent variable			
	FMOLS		***Instrumental Variable Approach (2SLS)***	
Variables	***Coefficients***	***Probability***	***Coefficients***	***Probability***
GPR	-0.022 ***	0.014	-0.071 **	0.031
GDP	0.021 *	0.091	0.018 **	0.048
IFR	-0.083 ***	0.003	-0.075 ***	0.000
FDI	0.009 **	0.024	0.009	0.421
FSD	0.002 *	0.000	0.005 ***	0.000
HEX	0.020	0.547	0.022 ***	0.002
Adjusted R-squared		0.708	0.598	
S.E. of regression		0.036	0.061	
Long-run variance		0.003	-	

First-stage F-Statistics	-	9.684	0.022
Second-Stage SSR	-	0.042	
Prob(J-statistic)	-	0.521	

Note: Robustness of the baseline CS-ARDL estimates is examined using Fully Modified Ordinary Least Squares (FMOLS) and Two-Stage Least Squares (2SLS). The first lag of each explanatory variable is employed as an internal instrument in the 2SLS estimation. Adjusted R^2 denotes the adjusted coefficient of determination; S.E. denotes the standard error of regression; SSR denotes the second-stage sum of squared residuals; and Prob(J-statistic) reports the p-value of the Hansen–Sargan overidentification test used to assess instrument validity. HWB = Human Well-being; GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure. ***p<0.01, **p<0.05, *p<0.10. Source: Authors' estimation.

As a supplementary static boundary check, Table 10 reports fractional logit and logit-transformed fixed-effects specifications to examine whether the bounded nature of the HWB measure influences the main findings. These specifications are not intended as substitutes for the dynamic CS-ARDL framework, as they do not explicitly account for non-stationarity, dynamic adjustment, or cross-sectional dependence. Rather, they provide an additional sensitivity assessment of the relationship between GPR and HWB when the bounded nature of the dependent variable is explicitly considered. The results remain broadly consistent with the baseline findings. In the fractional logit specification, the coefficient of GPR remains negative (-0.0485) and statistically significant at the 10% level, while the logit-transformed specification produces a comparable negative coefficient (-0.0479), although it is statistically insignificant at conventional levels (p = 0.111).

Table 10: Bounded-Dependent-Variable Sensitivity Analysis

	Fractional Logit			Logit-Transformed HDI		
Variables	**Coefficient**	**Robust SE**	**p-value**	**Coefficient**	**Robust SE**	**p-value**
GPR	-0.050 *	0.029	0.089	-0.049 *	0.030	0.104
GDP	0.001	0.003	0.704	0.001	0.003	0.728
IFR	-0.003 *	0.002	0.091	-0.004 *	0.002	0.071
FDI	0.017 *	0.010	0.086	0.016	0.010	0.109
FSD	0.012 ***	0.001	0.000	0.012 ***	0.001	0.000
HEX	0.001 *	0.001	0.081	0.001	0.001	0.117
Country Fixed Effects	Yes			Yes		
Pseudo R^2 / R^2	0.921			0.923		

Note: GPR = Geopolitical Risk; GDP = Economic Growth; IFR = Inflation Rate; FDI = Foreign Direct Investment; FSD = Financial Sector Development; HEX = Health Expenditure. Robust standard errors are reported. The fractional logit specification models HWB directly within its [0,1] bounded domain, whereas the second specification uses the logit transformation, ln[HWB/(1−HWB)]. ***p<0.01, **p<0.05, * p<0.10. Source: Authors' estimation.

5 Conclusion and Policies

5.1 Main Conclusion

This study emphasized how, between 1990 and 2022, HWB in the BRICS countries was significantly impacted by GPR. The analysis showed that higher GPR has a negative impact on HWB mostly through its effects on institutional trust, social cohesion, and economic stability. According to the empirical findings, the negative impacts of GPR are consistent across a variety of econometric models, including the FMOLS, 2SLS, and CS-ARDL. Additionally, the study highlights the significance of a range of control variables in determining HWB. The growth of the financial sector, FDI, economic expansion, and health expenditures all benefit HWB by improving living standards and making essential services more accessible. The conclusion that HWB is negatively impacted by inflation rates emphasizes the significance of maintaining economic stability. These findings underscore the need for policies that reduce geopolitical risks while promoting economic growth and human capital investment, thereby providing valuable strategic insights for policymakers in emerging markets.

5.2 Policy Implications

A number of significant policy implications for improving HWB in the face of GPR are presented by the study's findings. Initially, considering the adverse effects of GPR on HWB, it is imperative that policymakers give top priority to reducing geopolitical tensions via international collaboration, diplomatic initiatives, and negotiation. The negative impacts of GPR on national well-being can be lessened by promoting a more stable geopolitical environment and fortifying regional and international alliances. The socio-economic and psychological effects of geopolitical instability should also be better anticipated by governments, who should make sure that support networks and safety nets are in place to safeguard vulnerable groups. Furthermore, the correlation that exists between HWB and economic growth highlights the significance of implementing policies that promote sustainable economic growth. Governments ought to concentrate on creating an atmosphere that supports sustained economic stability by making infrastructural investments, encouraging innovation, and guaranteeing a welcoming business environment for both foreign and domestic investors.

Furthermore, increasing economic growth and job creation, both of which improve citizens' quality of life, can be greatly aided by encouraging closer cooperation between the public and private sectors. In addition to making public policies more effective, this will enhance social cohesion and the general well-being of citizens. Considering that FDI inflows benefit HWB, governments attracting foreign investment should be a top priority. A conducive environment for foreign direct investment can be created by policymakers through ensuring stable macroeconomic conditions, reducing administrative obstacles, and enhancing the regulatory environment. Promoting foreign investment in vital sectors like infrastructure, technology, and healthcare directly benefits the creation of jobs, better access to essential services, and overall economic prosperity. Governments should prioritize increasing financial services, accessibility, enhancing the effectiveness and inclusivity of financial systems, and encouraging financial literacy among the populace when it comes to the development of the financial sector. Increased access to credit, savings, and insurance through a robust financial sector can improve people's well-being and economic resilience.

Lastly, health spending's beneficial effect on HWB emphasizes how critical it is to fund healthcare systems. With an emphasis on both preventive and curative care, policymakers should guarantee sufficient and fair access to high-quality healthcare services. Prioritizing public health initiatives will improve health outcomes and lessen the burden of disease on populations, especially in light of new health threats. Consequently, this would enhance human well-being and lead to a better quality of life. On the other hand, HWB is negatively impacted by inflation rates, indicating the importance of preserving macroeconomic stability. Using sound fiscal and monetary policies, policymakers should try to keep inflation under control. By controlling inflation, governments can help maintain citizens' purchasing power, lessen economic uncertainty, and stop the decline of living standards, all of which contribute to a society that is more stable and prosperous in the long run. In conclusion, the study emphasizes how crucial it is to manage GPR while promoting economic expansion, drawing FDI, growing the financial industry, and giving healthcare top priority in order to enhance human well-being in developing nations. Governments can create more resilient societies that can handle the difficulties presented by shocks from the inside as well as the outside by putting these policies into place.

5.3 Limitations and Future Research

Numerous limitations in this study present chances for further investigation. First, because the analysis relies on cross-country data, it might not account for sub-national differences in HWB. For the purpose of capturing the diversity of HWB within nations, future research could examine variations at the regional or city level. Furthermore, the study uses secondary data, which may not accurately represent current geopolitical events or more frequent observations that could provide clarity on the immediate and long-term effects on well-being. Even though the control variables are important, they might not account for all pertinent elements that could have an additional impact on HWB, such as environmental factors or the quality of education. These factors might be included in future studies to provide a more thorough perspective. Lastly, even with the use of strong econometric models such as CS-ARDL, the study may still be biased by omitted variables. Other methods like machine learning or structural equation modeling might provide a more profound understanding of the intricate connections among economic factors, human welfare, and GPR.

References

Caldara, D., & Iacoviello, M. (2022). Measuring Geopolitical Risk. *American Economic Review, 112*(4), 1194-1225.

Cárcaba, A., Arrondo, R., & González, E. (2022). Does good local governance improve subjective well-being? *European Research on Management and Business Economics, 28*(2). https://doi.org/10.1016/j.iedeen.2021.100192

Cheng, Y., Hui, Y., Liu, S., & Wong, W. K. (2022). Could significant regression be treated as insignificant: An anomaly in statistics? Communications in Statistics: Case Studies, Data Analysis and Applications, 8(1), 133–151.

Cheng, Y., Hui, Y., McAleer, M., & Wong, W. K. (2021). Spurious relationships for nearly non-stationary series. Journal of Risk and Financial Management, 14(8), 366.

Chowdhury, E. K., & Chowdhury, R. (2024). Role of Financial Inclusion in Human Development: Evidence from Bangladesh, India and Pakistan. *Journal of the Knowledge Economy*, *15*, 3329–3354. https://doi.org/10.1007/s13132-023-01366-x

Croes, R., Ridderstaat, J., Bąk, M., & Zientara, P. (2021). Tourism specialization, economic growth, human development and transition economies: The case of Poland. *Tourism Management, 82*. https://doi.org/10.1016/j.tourman.2020.104181

Deng, Y. (2024). Do domestic and external geopolitical risks matter for food availability: implications for global food security. *Applied Economics, 56*(60), 9211-9218.

Gbadegesin, T. K. (2024). Defense Expenditure and National Well-Being: Evidence from the G7 Countries. *Defence and Peace Economics*. https://doi.org/10.1080/10242694.2024.2413232

Gewehr, L. L., & Guerr, J. B. (2022). Geopolitics of hunger: Geopolitics, human security and fragile states. *Geoforum, 137*, 88-93. https://doi.org/10.1016/j.geoforum.2022.10.015

Himounet, N. (2022). Searching the nature of uncertainty: Macroeconomic and financial risks VS geopolitical and pandemic risks. *International Economics, 170*, 1-31. https://doi.org/10.1016/j.inteco.2022.02.010

Jha, S., Bhushan, S., & Nirola, N. (2024). Is geopolitical risk always detrimental to economic growth? *Economic Change and Restructuring*, *57*. https://doi.org/10.1007/s10644-024-09585-1

Khan, K. (2025). How do supply chain and geopolitical risks threaten energy security? A time and frequency analysis. *Energy, 316*. https://doi.org/10.1016/j.energy.2025.134501

Khan, K., Khurshid, A., & Faura, J. C. (2024). Impact of Defence Expenditure on Total Factor Productivity: New Insights from Panel Bootstrap Granger Causality. *Defence and Peace Economics*. https://doi.org/10.1080/10242694.2024.2367410

Khurshid, N., Akram, N., & Rashid, M. (2025). Exploring the non-linear impact of information and communication technology, globalization, and geopolitical risks on poverty in Pakistan. *Research in Globalization, 10*. https://doi.org/10.1016/j.resglo.2025.100272

Kouadio, M., & Mom, A. N. (2025). Health Expenditure, Governance Quality, and Health Outcomes in West African Countries. *The International Journal of Health Planning and Management, 40*(2), 427-441.

Kyriazis, N. A., & Economou, E. M. (2025). Unveiling the Impacts of Geopolitical Risk on the Transition to the Decentralized Financial Landscape. *Peace Economics, Peace Science and Public Policy, 31*(1), 57-89.

Lang, N. D., & Vo, D. H. (2024). Guns vs health: unraveling the interplay between geopolitical risk, arms race and health expenditure. *Defence and Peace Economics*. https://doi.org/10.1080/10242694.2024.2443893

Morse, S. (2023). Quality of Life, Well-Being and the Human Development Index: A Media Narrative for the Developed World? *Social Indicators Research, 170,* 1035–1058. https://doi.org/10.1007/s11205-023-03230-6

Palaios, P., & Chatzimichailidou, A. (2024). Migration Preferences Under Economic and Geopolitical Uncertainty: An Asymmetric Approach. *Peace Economics, Peace Science and Public Policy, 30*(3), 307-339.

Pandey, D. K., Kumari, V., Palma, A., & Goodell, J. W. (2024). Are markets in happier countries less affected by tragic events? Evidence from market reaction to the Israel–Hamas conflict. *Finance Research Letters, 60*. https://doi.org/10.1016/j.frl.2023.104893

Paramati, S. R., Safiullah, M., & Soytas, U. (2025). Does geopolitical risk increase carbon emissions and public health risk? *Energy Economics, 143*. https://doi.org/10.1016/j.eneco.2025.108235

Persaud, A., Day, G., Gupta, S., Ventriglio, A., Ruiz, R., Chumakov, E., ... & Bhugra, D. (2018). Geopolitical factors and mental health I. *International journal of social psychiatry*, *64*(8), 778-785.

Sohail, H. M., Ullah, M., Nazir, M. S., & Tang, C. (2025). Unveiling the financial pathway to human development: insights from non-linear ARDL and Granger causality analysis. *Humanities and Social Sciences Communications, 12*(1). https://doi.org/10.1057/s41599-025-05290-0

Sohail, M. T., Qayum, M., & Khan, M. K. (2024). Does Foreign Direct Investment and Institutional Quality Promote Welfare in Pakistan? Evidence from Non-Linear Autoregressive Distributed Lag Co-Integration. *Sustainability, 16*(23). https://doi.org/10.3390/su162310434

Sun, T. T., & Su, C. W. (2024). How is geopolitical risk associated with food prices? *International Journal of Emerging Markets*. https://doi.org/10.1108/IJOEM-01-2023-0004

Sweidan, O. D. (2023). The effect of geopolitical risk on environmental stress: evidence from a panel analysis. *Environmental Science and Pollution Research, 30,* 25712–25727. https://doi.org/10.1007/s11356-022-23909-6

Tripathi, S. (2021). How does urbanization affect the human development index? A cross-country analysis. *Asia-Pacific Journal of Regional Science, 5,* 1053–1080. https://doi.org/10.1007/s41685-021-00211-w

Tutuncu, A., Bayraktar, Y., & Khan, K. (2024). Is Geopolitical Risk a Reason or Excuse for Bigger Military Expenditures? *Peace Economics, Peace Science and Public Policy, 30*(4), 455-476.

Uche, E., Ngepah, N., & Nwakanma, C. H. (2025). Geopolitical Tensions, Policy Uncertainties, and Human Misery in Developing Countries: Exploring Sustainable Development Paths in 17 Emerging Economies. *Journal of International Commerce, Economics and Policy*. https://doi.org/10.1142/S1793993325500103

Wang, Q., Ren, F., & Li, R. (2024). Does geopolitical risk impact sustainable development? A perspective on linkage between geopolitical risk and sustainable development research. *Journal of Cleaner Production, 451*. https://doi.org/10.1016/j.jclepro.2024.141980

Wang, Z., Zhang, B., & Wang, B. (2018). Renewable energy consumption, economic growth and human development index in Pakistan: evidence form simultaneous equation model. Journal of cleaner production, 184, 1081-1090. https://doi.org/10.1016/j.jclepro.2018.02.260

Westerlund, J. (2007). Testing for error correction in panel data. *Oxford Bulletin of Economics and Statistics, 69*(6), 709–748. https://doi.org/10.1111/j.1468-0084.2007.00477.x

Wong, W. K., Cheng, Y., & Yue, M. (2024). Could regression of stationary series be spurious? Asia-Pacific Journal of Operational Research, 2440017.

Wong, W.-K., & Pham, M. T. (2022a). Could the test from the standard regression model could make significant regression with autoregressive noise become insignificant? The International Journal of Finance, 34, 1–18.

Wong, W.-K., & Pham, M. T. (2022b). Could the test from the standard regression model could make significant regression with autoregressive noise become insignificant – a note. The International Journal of Finance, 34, 19–39.

Wong, W.-K., & Pham, M. T. (2023a). Could the test from the standard regression model could make significant regression with autoregressive Yt and Xt become insignificant? The International Journal of Finance, 35, 1–19.

Wong, W.-K., & Pham, M. T. (2023b). Could the test from the standard regression model could make significant regression with autoregressive Yt and Xt become insignificant – a note. The International Journal of Finance, 35, 20–41.

Wong, W.-K., & Pham, M. T. (2025a). Could the correlation of a stationary series with a non-stationary series obtain meaningful outcomes? Annals of Financial Economics, forthcoming.

Wong, W.-K., & Pham, M. T. (2025b). How to model a simple stationary series with a non-stationary series? The International Journal of Finance, 37, 1–19.

Wong, W.-K., & Pham, M. T. (2026a). Could the panel regression be used to examine the relationship between I(0) and I(1) series? Advances in Decision Sciences, 30(2), forthcoming.

Wong, W.-K., & Pham, M. T. (2026b). Could we use correlation to examine panel data with I(0) and I(1) variables? The International Journal of Finance, 38, forthcoming.

Wong, W.-K., Pham, M. T., & Yue, M. (2024). Could regressing a stationary series on a non-stationary series obtain meaningful outcomes – a remedy. The International Journal of Finance, 36, 1–20.

Wong, W. K., & Yue, M. (2024). Could regressing a stationary series on a non-stationary series obtain meaningful outcomes? Annals of Financial Economics, 19(03), 2450011.

Wu, W., Wang, L., Erzurumlu, Y. O., Gozgor, G., & Yang, G. (2022). Effects of Country and Geopolitical Risks on Income Inequality: Evidence from Emerging Economies. *Emerging Markets Finance and Trade, 58*(15), 4218-4230.

Appendix

Table A1: Ramsey RESET Test

Diagnostic	Statistic	Probability
Ramsey RESET (F-statistic)	1.284	0.281

Note: The Ramsey RESET test is employed to assess the adequacy of the linear functional form. The null hypothesis states that the model is correctly specified, with no omitted nonlinear terms. A statistically insignificant probability value indicates that the null hypothesis cannot be rejected**.** ***Source:*** *Authors' estimation.*

Table A2: Country-Year Observations Excluded from the Estimation Sample

Country	Year	Inflation Rate (%)	Reason for Exclusion
South Africa	1991	15.335	Inflation > 15%
China	1994	24.257	Inflation > 15%
China	1995	16.791	Inflation > 15%
Brazil	1996	15.758	Inflation > 15%
Russia	1998	27.686	Inflation > 15%
Russia	2000	20.799	Inflation > 15%
Russia	2001	21.477	Inflation > 15%
Russia	2002	15.789	Inflation > 15%
India	2015	15.534	Inflation > 15%

Note: Country-year observations with an annual inflation rate exceeding 15% were excluded from the estimation sample to minimize the influence of exceptionally high inflation episodes. The criterion was applied consistently across the panel. Source: Authors' compilation based on World Development Indicators. **Source:** Authors' estimation.