Exploring the Non-Linear Impact of Information and Communication Technology, Globalization, and Geopolitical Risks on Poverty in South Korea

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ABSTRACT

Purpose
This study examines the asymmetric and nonlinear impacts of information and communication technology (ICT), globalization, and geopolitical risk on poverty and household vulnerability in South Korea from 1990 to 2024. Against the backdrop of the Miracle on the Han River, the analysis examines how these factors interact with structural inequality, labor market polarization, demographic pressures, and external shocks within a developed Asian economy.

Methodology
Annual time-series data were utilized, with poverty measured through relative poverty rates and household deficit indicators. Broadband subscription rates serve as a proxy for ICT, the KOF Globalization Index measures globalization, and the Caldara-Iacoviello GPR Index quantifies geopolitical factors. A regression specification that includes labor market structure and external-sector or variables. The study employs the Non-Linear Autoregressive Distributed Lag (NARDL) model, which enables the estimation of divergent long- and short-run impacts of positive and negative shocks for each independent variable.

Findings
Empirical evidence indicates that positive shocks to ICT and globalization yield heterogeneous effects, with high-skill sectors and an intensifying labor market dual. Conversely, negative shocks, particularly increases in geopolitical risk, exacerbate poverty through heightened energy price volatility and trade disruptions. These effects are amplified by South Korea's significant energy dependence and vulnerability to global supply chain disturbances.

Conclusion
The identified non-linear dynamics underscore the urgency of inclusive policy design. Reducing poverty in an uncertain international context necessitates pro-poor diffusion of ICT, equitable approaches to globalization, and strategies to mitigate geopolitical risk. These include strengthening social safety nets, reforming small and medium-enterprise wage structures, implementing re-employment initiatives, and stabilizing energy supplies.

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1. Introduction

Poverty is not only the inability to afford a certain level of income but also the shortage of financial means and access to basic services such as housing, nutrition, and education. Based solely on theoretical approaches, such as Sen's Capability Approach, people focus on poverty as a multidimensional problem, denying people their potential (Wagle, 2002). Likewise, the structural theory of poverty emphasizes the actual existence of barriers at the systemic level that form the cycles of poverty, e.g., unequal resource access and unequal opportunity access.

The multidimensional poverty framework Alkire and Foster (2011) highlights the non-income dimensions of poverty, i.e. education, health and living standards as significant in measuring poverty. This is an all-inclusive way through which one can analyze the interaction between poverty and socioeconomic development. Although these problems are more acute in developing nations, developed economies are not immune to poverty. In South Korea, despite impressive economic transformation, poverty and household financial vulnerability remain acute issues. In South Korea, the poverty rate among elderly citizens is 40 percent, the highest in the OECD, which indicates the existence of profound structural issues in the social welfare system of the country (China-US Focus, 2025).

The fertility rate has dropped to the low 0.75 percent, which is far below even the notorious 1.15 percent of Japan, and portends a deep demographic issue in the future (Park, 2026). The gap between the wages of large conglomerates and small-and medium-sized enterprises (SMEs) has been greatly increasing: whereas the contributions of the SME workers in other developed countries usually amount to approximately 80 percent of the wages of big enterprise workers, in South Korea, the contribution is only 55 percent (Park, 2026). Most workers who reach department head are effectively forced into retirement, and within four years they turn to self-employment, only to run out of money and become impoverished in their mid-to-late 50s (Park, 2026).

South Korea's economic trajectory, transforming from a developing nation to one of the world's leading economies, provides a distinctive context for examining the intersection of globalization, technological development, and poverty in a rapidly industrializing environment. This phenomenon is often referred to as the Miracle on the Han River, named after the river that flows through Seoul.

The South Korean nation, which was one of the poorest countries in the world in the 1960s, has evolved into a developed economy with the highest GDP per capita of over 30,000 in purchasing power parity terms. It is argued that factors like information and communication technology (ICT), globalization and geopolitical risks have profoundly affected the difficult situations experienced by people in South Korea (Khurshid et al., 2023a; Nguyen et al., 2023). But the distributional implications of this growth have not been nonexistent. It revealed structural vulnerabilities in the Asian financial crisis in 1997, which contributed to the expansion of disparities among socioeconomic groups and the polarization of the labor market. Increasingly, the Korean economy is experiencing external pressure. The 15 percent US tariff agreed to in the July 2025 accord in exchange for US investment commitments of US 350 billion to the US brought huge fiscal loads and could restrict the financial market (China-US Focus, 2025). The foreign exchange reserves of South Korea were US $428.8 billion as of October 2025, a far cry from the US $800 billion prescribed by the Bank for International Settlements (China -US Focus, 2025). Excessive overseas borrowing to fund such investments may adversely affect

exchange rates, keeping the won weak over the long term, raising import prices and contributing to inflation (China-US Focus, 2025).

Polarization in South Korea is not limited to income but spans the structure of the labor-market and the economic opportunity. After the Asian financial crisis of 1997, domestic industries are becoming more and more monopolized, oligopolies, and monopsony and exclusive subcontracting relationships are the standard in the intermediate-goods industry (Park, 2026). Unfair price-cutting, technology theft, and the like have taken root, all of which continue to consolidate the benefits of big conglomerates at the expense of small suppliers (Park, 2026). Poverty and inequality have a direct implication on this structural concentration. In 2023, the lowest in the OECD, the contribution of the nominal GDP by private consumption was only 49.9 percent, with the purchasing power of the average household being limited (Park, 2026). None of the efforts to revive domestic demand can be taken seriously unless there are fundamental structural reforms to address the wage gap between SMEs and large firms and the problem of early retirement (Park, 2026).

The opportunities and challenges of globalization to South Korea are similar. In February 2026, the government announced an ambitious plan to diversify major export products and markets to reach a record high in exports of 740 billion dollars. The plan is to develop eight industries as key exports, such as consumer goods, power equipment, bio-health, defence, nuclear power plants, automobiles, ships and steel, so as to minimize dependence on semiconductors in the export of the country. It will provide 275 trillion won in trade insurance, of which 114 trillion won will be allocated to small and medium-sized companies. Nevertheless, distrust of the global free trade system has been felt worldwide, and protectionism is gaining increasing momentum in world politics. Although the South Korean public opinion has been very positive towards free trade since the country has gained more than it has lost due to the effects of the free trade, some recent observations show polarization of income between the trade winners and losers. Employees in import-competing industries with rising imports in the long term have gradual declines in real labor income, compared to employees in export-growing industries, where the real labor income growth rates are higher. To a large extent, this disparity results from differences in employment stability and reemployment rates, with workers displaced from import-competing sectors experiencing losses in industry-specific human capital.

The geopolitical risks have taken on new significance for the South Korean economy. As tensions in the Middle East have increased, the stability of energy supply and the risk of export disruptions have become a concern. South Korea gets 70.7 percent of its crude oil and 20.4 percent of its liquefied natural gas (LNG) imports from the Middle East. Citibank forecasts that when oil prices stay above an average of 82 per barrel, South Korea will see a 0.45 percentage-point decrease in the GDP growth rate, a 0.6 percentage-point decrease in the consumer price index (CPI) inflation rate, and a 2.25 percentage-point decrease in the current account balance. According to the Korea Institute of Industrial Economics and Trade, the growing number of geopolitical tensions and protectionism is increasing volatility in global supply chains and disrupting the international trade order. However, the continued trend toward regionalized and ally-based supply chains also offers new opportunities which can be exploited by Korea (Kwon, 2026). The effects of geopolitical threats on poverty can be significant: not only can the cessation of economic activity result in unemployment, lower income and increased costs of necessary goods and services (Altiner & Bozkurt, 2023; Lu et al., 2020); energy price shocks can disproportionately affect lower-income households due to

higher living expenses (Park, 2026); and trade disruptions can have a threat to the employment in export-oriented sectors (Koo, 2025). Interest expenses per household were 134,000 won in the fourth quarter of 2025, up 11 percent compared to a year earlier, again driving up the burden on lower incomes households and weighing down on their economic perceptions (Ministry of Data & Statistics, 2026). The contribution of this study is multidimensional and based on the empirical analysis of interrelationships among globalization, ICT, and geopolitical risks and poverty in South Korea. Although the body of existing literature provides cross-country evidence, it is often ineffective at capturing nonlinear effects within a particular nation (Khurshid et al., 2023b; Khurshid et al., 2024).

This paper will bridge this gap by providing a comprehensive case study of South Korea, applying the NARDL co-integration model developed by Shin, Yu, and Greenwood-Nimmo (2014) to time-varying data for the 1990-2024 period, in order to reveal these multifaceted dynamics. This paper aims to get beyond abstract conceptualizations of the impact of globalization in a country that has been an aid recipient and now a donor in the OECD. With such a variety of theoretical expectations, the study seeks to answer the more empirical question of the role of these global forces in causing poverty within a particular national setting where deficit households are one-quarter of all households and asset inequality is unprecedentedly high (Ministry of Data and Statistics, 2026; Park, 2026). Second, the paper added in the in the existing literature by measuring the nonlinear impact of geopolitical risks on poverty status in South Korea. Nevertheless, despite the fact that previous studies notice the adverse effects of political instability on the economic performance, they do not usually use a sound measure that directly correlates these variables with poverty (Lu et al., 2020; Jha et al., 2024).

The present study attempts to fill this gap using the Caldara and Iacoviello GPR index (2018), which is a valid index that covers the full spectrum of geopolitical affairs related to current and potential threats. This index can be fully used to understand how geopolitical risks, which are becoming one of the focuses of discussion in world development matters, are influencing poverty outcomes in South Korea, especially with the Middle East tensions that jeopardize the energy imports that contribute to more than 70 percent of the crude oil imports and 20.4 percent of its liquefied natural gas supplies (Park, 2026; Kwon, 2026).

Table.1.Summary of Key Facts, Figures, and Expected Findings for South Korea Study

Category	Indicator / Finding	Value / Expected Effect	Year / Period	Source
Poverty & Household Vulnerability	Elderly poverty rate	40% (highest in OECD)	2025	China-US Focus (2025)
	Deficit-running households	25% of all households	Q4 2025	Ministry of Data and Statistics (2026)
	Average monthly interest expense	134,000 won	Q4 2025	Ministry of Data and Statistics (2026)
	Interest expense increase (y-o-y)	11%	Q4 2025	Ministry of Data and Statistics (2026)
	Net asset Gini coefficient	0.625 (record high)	2025	Park (2026)
	Private consumption share of GDP	49.9% (lowest in OECD)	2023	Park (2026)
Labor Market Structure	SME wage ratio (vs. large firms)	55%	2025	Park (2026)
	Import-competing workers (China/Vietnam)	Real income decrease	2010-2024	Koo (2025)
	Export-sector workers	Real income increase	2010-2024	Koo (2025)
ICT Infrastructure	Broadband universal service	100 Mbps minimum	2020-present	Telecom Review Asia (2025)

	Rural villages with broadband access	~1,300 villages	2020-2025	Telecom Review Asia (2025)
	Average mobile data usage (2023 → 2028)	14.6 GB → 30.5 GB	2023-2028	Telecom Review Asia (2025)
Geopolitical Risks	Crude oil imports from Middle East	70.70%	2025	Park (2026)
	LNG imports from Middle East	20.40%	2025	Park (2026)
	Exports to Middle East at risk	$136.7 billion	2025	Park (2026)
Estimated GPR Impacts	GDP growth reduction (oil >$82/barrel)	-0.45 percentage points	Projected	Citibank via Park (2026)
	CPI inflation increases	+0.6 percentage points	Projected	Citibank via Park (2026)
	Current account decline	-2.25 percentage points	Projected	Citibank via Park (2026)
Expected Asymmetric Efects (NARDL)	Positive ICT shock → Poverty	↓ Reduction	1990-2024	Khurshid et al. (2023b, 2024)
	Negative ICT shock → Poverty	↑ Increase	1990-2024	Khurshid et al. (2023b, 2024)
	Positive Globalization shock → Poverty	↓ Reduction (unequal, favors skilled)	1990-2024	Koo (2025); Khurshid et al. (2024)
	Negative Globalization shock → Poverty	↑ Increase	1990-2024	Koo (2025)
	Positive GPR shock → Poverty	↑ Increase	1990-2024	Lu et al. (2020); Altiner & Bozkurt (2023)
	Negative GPR shock → Poverty	↓ Reduction	1990-2024	Jha et al. (2024)

Source: Author's own elaboration

This paper contributes to the overall discussion of global development in South Korea in the context of globalization and geopolitical threats and providing concrete data that puts the abstract theories of global development in the realm of reality. The study not only contributes to empirical knowledge by extending the analysis through a nonlinear lens but also offers a more analytical framework for understanding how these global forces can interact with poverty at the national level. With South Korea facing the task of maintaining inclusive growth in the face of slowing economic growth, an increasing asset inequality, and a fast-changing demographic, in which household consumption is limited by housing prices and interest rate payments, the dynamics of these relationships are of interest to policymakers hoping to address poverty and household financial vulnerability more productively.

2. Literature Review

Poverty in developed economies is often perceived as less severe than in developing countries; however, socioeconomic inequalities remain significant in these contexts. The case of South Korea is a striking example of the same. However, the country has managed to gain swift economic growth and emerge one of the leading industrialized countries in the world, it is still grappling with large levels of income inequality and poverty among the vulnerable groups. The Organization for Economic Co-operation and Development (OECD) claims that South Korea has one of the worst relative poverty rates of the elderly citizens in the OECD countries (OECD, 2022). This contradiction shows how complicated the issue of poverty is in highly developed economies and how it is necessary to analyze structural and technological factors that affect economic vulnerability.

Furthermore export-oriented industrialization and the blistering technological development has played a key role in transforming South Korea into a high-income economy. Nonetheless, the growth in the economy has not been distributed uniformly to

the entire segments of the society. The income gap between employees in large corporations and those in small and medium-sized enterprises (SMEs) remains large. Research shows that wages paid to SME workers are much lower than those paid to workers in large conglomerates, also referred to as chaebols (Kim and Lee, 2020). Such inequalities are among the causes of economic insecurity in low-income households.

This means that to explain poverty in South Korea, it is necessary to consider greater structural forces like technological change, globalization and geopolitical uncertainties.

2.1. Information and Communication Technology (ICT) and Economic Development

Information and communication technology (ICT) serves as a primary catalyst for economic growth, productivity, and social development in contemporary economies. ICT improves access to information, increases efficiency in production processes, and enables innovative forms of economic participation. Regarding poverty reduction, ICT contributes by expanding employment opportunities, improving access to education, and supporting digital financial services (World Bank, 2021).

South Korea is recognized as one of the most advanced economies globally. Over the past decades, the nation has invested significantly in digital innovation, emerging technologies, and broadband infrastructure. Government initiatives to stimulate the digital economy have substantially increased high-speed internet connectivity and strengthened national digital networks, positioning South Korea as a global leader in digital infrastructure and technological innovation (OECD, 2023; Ministry of Science and ICT, 2024). Continued investments in next-generation networks, including 5G and artificial intelligence, further advance the country's technological competitiveness and digital transformation objectives (World Bank, 2024). However, rapid technological progress also presents new socioeconomic challenges. Automation and other forms of technological disruption associated with digital transformation may create adjustment pressures in traditional industries, particularly for low-skilled employees whose jobs are more susceptible to automation. Recent research highlights that digital transformation can intensify labor market polarization and increase the risk of job displacement in technologically advanced economies (Acemoglu and Restrepo, 2022; International Labor Organization, 2023). While ICT development is generally linked to economic growth and productivity gains, it may also generate new forms of inequality unless effective policies are implemented to support workers during technological transitions and promote digital inclusion.

H_1: The positive shocks in information and communication technology (ICT) development minimize poverty in South Korea.

2.2. ICT and Poverty Reduction

Information and communication technology (ICT) and poverty reduction are prominent topics within the development economics literature. ICT has contributed to poverty reduction through improved access to information, increased labor market efficiency, and the creation of new business opportunities. Online technologies facilitate access to digital services, online markets, and remote employment, thereby expanding economic opportunities for marginalized groups (World Bank, 2022; UNDP, 2023). For instance, online marketplaces and digital platforms enable individuals to participate in e-commerce, secure remote employment, and establish digital businesses with relatively low entry barriers (OECD, 2023). These developments underscore the significant role of

ICT in promoting inclusive economic participation, particularly in the context of COVID-19, and in reducing poverty within contemporary digital economies.

The South Korean government's digital transformation initiatives have played a significant role in fostering inclusive economic development. Efforts to expand broadband access and improve digital literacy have reduced technological barriers and enhanced economic inclusion among citizens (Ministry of Science and ICT, 2023). Government investment in digital infrastructure has also strengthened the country's global competitiveness in technology-driven sectors. However, the benefits of ICT adoption are not distributed evenly across society. Further, research indicates that individuals with higher levels of education and digital skills are better positioned to benefit from technological advancements, while those lacking digital literacy are more vulnerable to economic insecurity (van Dijk, 2020). In South Korea, limited access to digital services among elderly populations and low-income households exacerbates social inequalities. Furthermore, rapid technological change can impose financial strain on families, particularly when workers are unable to adapt quickly. Employees in sectors undergoing digital transformation may face job insecurity or wage reductions if their skills become obsolete. Thus, while ICT development can alleviate poverty through economic growth and innovation, it may also increase economic insecurity for certain groups.

Numerous empirical studies have examined the relationships among technological development, globalization, and poverty dynamics using econometric models. Khurshid et al. (2025) provide robust NARDL evidence from Pakistan (1980-2022) that offers insights relevant to South Korea. Their findings indicate that positive ICT shocks have delayed effects on inequality, while infrastructure setbacks increase household vulnerabilities. Positive globalization, similar to Korea's export-oriented strategy, consistently reduces poverty through trade and investment, although protectionist measures threaten the viability of small and medium-sized enterprises (SMEs). Geopolitical risks, such as proximity to North Korea and dependence on Middle Eastern energy, significantly increase poverty by disrupting trade and prompting capital flight. The study's strong diagnostics (Bounds F-statistic above critical values, ECM long-run equilibrium, and BDS nonlinearity test) support the use of this model to analyze asymmetric poverty processes in Korea from 1990 to 2024. The results underscore key policy priorities: universal broadband access, supply chain diversification, reduced reliance on Middle Eastern energy, and targeted social safety nets for older adults (noting a 40 percent OECD poverty rate) and SME workers, particularly in response to geopolitical risks.

Another frequently employed approach is the Autoregressive Distributed Lag (ARDL) model developed by Pesaran, Shin, and Smith (2001). The ARDL bounds testing method is widely recognized for estimating long-run relationships among macroeconomic variables with different integration orders. This model has been applied in studies examining the effects of trade openness, financial development, and ICT on economic growth and poverty reduction.

H_2: Negative shocks in the development of ICT add poverty and economic vulnerability of households in South Korea.

2.3. Geopolitical Risks and Economic Stability

Geopolitical risks arise from political tensions, conflicts, trade disputes, and international instabilities. These risks can significantly affect economic performance by disrupting trade flows, increasing energy costs, and reducing investment confidence (Caldara & Iacoviello, 2022). In an increasingly interconnected global economy, geopolitical risks have emerged as critical factors influencing economic stability and development. South Korea's economy is particularly sensitive to geopolitical risks due to its heavy reliance on international trade and imported energy resources. The country's substantial imports of crude oil and liquefied natural gas increase its vulnerability to fluctuations in global energy markets (International Energy Agency, 2023). Consequently, geopolitical tensions in energy-producing regions can have significant economic repercussions for South Korea. Additionally, geopolitical tensions in East Asia, particularly between North Korea and South Korea, have historically affected economic confidence and investment trends in South Korea. Political uncertainty can deter foreign investment, increase market volatility, and complicate economic planning (Kim and Lee, 2018). These factors may indirectly contribute to higher poverty levels by reducing economic growth and employment opportunities.

South Korea is also affected by global geopolitical events such as trade wars and international conflicts, given its export-oriented economy. As one of the largest exporters of electronics, automobiles, and industrial goods, the country depends on stable international trade relations. Disruptions in global supply chains and trade restrictions can reduce export demand and negatively impact economic performance (Baldwin and Evenett, 2020). Vulnerable households are particularly affected when economic activity slows due to geopolitical uncertainty. Job losses, wage stagnation, and rising living costs may contribute to increased poverty among disadvantaged populations. Therefore, understanding the relationship between geopolitical risks and poverty is essential for developing effective economic and social policies.

H_3: Positive geopolitical risk shocks increase poverty in South Korea.

2.4. Globalization and Economic Transformation

Over recent decades, globalization has significantly contributed to the economic transformation of South Korea. The nation’s rapid industrialization strategy and export-oriented growth facilitated entry into international markets and drove substantial economic expansion. Trade liberalization, foreign investment, and technological exchange have further supported South Korea’s economic development. (Rodrik, 2018). Globalization has also contributed to the advancement of South Korea's manufacturing sector, particularly in electronics, automobiles, and shipbuilding. Major multinational corporations, such as Samsung and Hyundai, have become global leaders in their respective industries. These companies have generated employment opportunities and contributed significantly to national income and economic growth. However, globalization has also contributed to unequal economic outcomes within South Korea. While global market integration has benefited export-oriented industries, import-competing sectors have faced increased competition from foreign producers. Employees in industries vulnerable to internationalization may experience wage stagnation or job loss (Author, Dorn, and Hanson, 2016). Research indicates that globalization can have both positive and negative effects on income distribution. It can stimulate economic growth and job creation in competitive sectors, while workers in less competitive industries may face declining wages and reduced job security (Goldberg and Pavcnik, 2007). These patterns highlight the redistributive effects of globalization on national economies. Globalization has

significantly influenced South Korea's labor market. Employees in export-oriented sectors have experienced income growth, while those in domestic sectors have faced greater economic challenges. As a result, globalization has contributed to widening income disparities among different groups of workers.

H_4: The negative shocks in globalization increases poverty and economic vulnerability in South Korea.

2.5. Interaction between ICT, Globalization, and Geopolitical Risks

ICT, globalization, and geopolitical risks are interrelated in complex ways. ICT development is an aspect that drives globalization, as it promotes faster communication, e-commerce, and international cooperation. Digital technologies enable companies to engage in international markets with greater efficiency and expand their operations across borders (Baldwin, 2016). Simultaneously, the globalization process exposes economies to greater geopolitical risks due to the interdependence and integration of economies within global supply chains (İncekara & İncekara, 2024). Events in one area can easily spread to other parts of the world, disrupting production networks and trade flows. These interdependencies are opportunities and vulnerabilities to the highly globalized economies like South Korea.

ICT can also be used to curb the ill effects of geopolitical disruptions. Digital technologies help companies diversify supply chains, implement remote work policies, and continue operating when faced with uncertainty. Nevertheless, technological disruptions can also exacerbate inequalities if some groups lack access to digital resources. The combination of ICT, globalization, and geopolitical risk thus determines the outcomes of the economy and the dynamics of poverty. An improvement in ICT and globalization would lead to economic growth and poverty reduction, whereas geopolitical instability would nullify these benefits by affecting trade and economic operations (Bisiriyu & Malik, 2025).The nonlinear autoregressive distributed lag (NARDL) framework, as proposed by Shin, Yu, and Greenwood-Nimmo (2014), is well-suited to analyze the asymmetric dynamics among ICT, geopolitical risk (GPR), globalization, and poverty in South Korea from 1990 to 2024. Unlike the linear ARDL model, NARDL decomposes variables into positive and negative partial sums, capturing nonlinear co-integration and impulse responses that are critical for effective policy design.

3. Methodology

3.1. Conceptual Framework

This study examines the interplay among geopolitics, information and communications technology (ICT), and GLBI, and their collective impact on poverty in South Korea from 1980 to 2022. Given South Korea's strategic geographical position and the region's susceptibility to political instability, the analysis underscores the importance of aligning national policies with international standards while addressing region-specific challenges. Multiple economic surveys provided poverty data, operationalized through household consumption (Jorge Garza-Rodriguez 2018). This discussion examines how digital capabilities, ICT advancements, and governance reforms affect poverty trends. It highlights the importance of closing the digital divide and ensuring equal access to technology for vulnerable groups. The following equation shows how the target variables relate to each other:

POV =F (GPR, ICT, GLB, GDP, LBR, FDI) (1)

Table.1.Description of Variables

Variables	Explanation	Source
Dependent Variable:		
Pov (Poverty Status)	Poverty ratio data proxies by household consumption	WDI
Independent Variables:		
GPR (Geopolitical risks)	Geopolitical risk index	Matteoiacoviello.com
ICT (Information Communication Technology)	ICT proxied by number of fixed telephone subscriptions	WDI
GLBI (Globalization)	Globalization Index	Kof Globalization Index
GDP (Growth of Economy)	GDP per Capita(Current US dollars)	WDI
LRB (Employment Level)	Labour force participation rate	WDI
FDI (Foreign direct investment)	Net inflows (%AGE of GDP)	WDI

Source: Author's own elaboration

This research investigates the relationships among information and communication technologies (ICT), global liberalization and integration (GLBI), political risk, and poverty status. ICT is considered an instrument that positively influences poverty alleviation by expanding labor markets and improving access to education and healthcare. ICTs are essential for fostering economic growth, developing human capital, and creating an environment that supports greater opportunities and a higher quality of life. However, income inequalities resulting from unequal access to technological resources can exacerbate the poverty gap (Nabila Khurshid et al., 2025). Political conflicts and competition, shaped by geopolitical factors, may cause economic instability, leading to job and revenue losses that contribute to poverty. Geopolitical risks often lead to displacement, further worsening poverty among affected populations. Lower-income communities are particularly vulnerable to geopolitical events, especially those situated near global interaction zones. GLBI refers to the rapid integration of economies and cross-border trade, often regarded as a critical factor in addressing poverty. Increased international trade and foreign direct investment (FDI) can generate employment opportunities and raise incomes, thereby improving wages and living standards. While engagement with global markets can help developing countries reduce poverty, it may also contribute to its escalation. Some critics argue that GLBI can intensify poverty in less-developed regions, as corporate migration to areas with lower labor costs may lead to layoffs and wage suppression for remaining workers. Consequently, workforce redundancies may lead to wage reductions, thereby limiting collective bargaining power. Additionally, even modest increases in income disparity may occur during periods of intensified GLBI, as heightened demand from affluent consumers can further deteriorate the economic conditions of less wealthy groups.

This study examines the relationship among geopolitical risk (GPR), information and communication technologies (ICT), global liberalization (GLB), gross domestic product

(GDP), labor (LBR), and foreign direct investment (FDI) using a single multivariate equation. The corresponding econometric model is specified as follows:

$$\boldsymbol{POV_t = \beta_0 + \beta_1 GPR_t + \beta_2 ICT_t + \beta_3 GLB_t + \beta_4 GDP_t + \beta_5 LBR_t + \beta_6 FDI_t + \mu_t} \quad \textbf{(2)}$$

3.2. Estimation Technique

3.2.1. Unit root testing

This study employs the Nonlinear Autoregressive Distributed Lag (NARDL) model to investigate both long-term effects and causality. The estimation process follows a systematic diagnostic procedure comprising two primary phases. First, nonlinearity is detected using the BDS test, which is applied to the data to identify nonlinear features. Detecting such features supports adopting a nonlinear modelling approach rather than a traditional linear one. Second, stationarity is assessed using the Augmented Dickey-Fuller test (Dickey & Fuller, 1979). Unit root tests are conducted to evaluate the stationarity of each series. This procedure ensures that the variables meet the prerequisites for NARDL model integration and that the model accurately reflects the data's structural properties. Employing this diagnostic framework enhances the robustness of the NARDL model and enables it to address the dataset's complex, asymmetric dynamics and structural characteristics.

3.2.2. Non-Linear ARDL (NARDL)

The present study examines asymmetric relationships among core variables by evaluating the effects of positive and negative shocks to Geopolitical Risk (GPR), Information and Communication Technology (ICT), and Globalisation (GLBI) on the outsourcing variable POV at both short- and long-term horizons. The Nonlinear Autoregressive Distributed Lag (NARDL) model, as introduced by Shin et al. (2014), is utilized for this analysis.**(3)**

$$\boldsymbol{POV_t = \beta_0 + \beta_t GPR_t^+ + \beta_t GPR_t^- + \beta_t ICT_t^+ + \beta_t ICT_t^- + \beta_t GLB_t^+ + \beta_t GLB_t^- + \beta_t GDP_t + \beta_t LBR_t + \beta_t FDI_t + \mu_t}$$

The model makes use of the $B^+ and\ B^-$ asymmetric parameters. In order to measure these effects, the independent variables are broken down into a partial sum of processes of +ve and -ve changes:

$$\mathbf{POS} = \boldsymbol{GPR_t^+ = \sum_{k=1}^{t} \Delta GPR_t^+ = \sum_{k=1}^{t} \max(GPR_k, 0); \sum_{k=1}^{t} \Delta ICT_t^+ = \sum_{k=1}^{t} \max(ICT_k, 0); \sum_{k=1}^{t} \Delta GLB_t^+ = \sum_{k=1}^{t} \max(GLB_k, 0)} \quad \textbf{(4)}$$

Positive ShocksGPR_t^+, ICT_t^++and GLB_t^+ are partial sums of positive changes in Geopolitical Risk, ICT and GLBI respectively.

$$\mathbf{NEG} = GPR_t^- = \sum_{k=1}^{t} \Delta GPR_t^- = \sum_{k=1}^{t} \min(GPR_k, 0); \sum_{k=1}^{t} \Delta ICT_t^- = \sum_{k=1}^{t} \min(ICT_k, 0); \sum_{k=1}^{t} \Delta GLB_t^- = \sum_{k=1}^{t} \min(GLB, 0) \quad \textbf{(5)}$$

Negative Shocks (-): On the other hand, the partial sums of negative innovations of the same variables are represented by the following: GPR_t^-, ICT_t^-+and GLB_t^-

Using these decompositions, the normal linear ARDL is changed into a nonlinear structure. Based on this reasoning, the overall functional forms of the two equations (4) and (5) above can be rewritten into the following NARDL specification:

$$\begin{aligned} POV_t =& \delta_0 + \sum_{i=1}^{P} \delta_1 POV_{t-1} + \sum_{i=0}^{q} \delta_2 GPR_{t-i}^+ + \sum_{i=0}^{q} \delta_2 GPR_{t-i}^- + \sum_{i=0}^{q} \delta_3 ICT_{t-i}^+ \\ &+ \sum_{i=0}^{q} \delta_4 ICT_{t-i}^- + \sum_{i=0}^{q} \delta_5 GLB_{t-i}^+ + \sum_{i=0}^{q} \delta_6 GLB_{t-i}^- + \sum_{i=0}^{q} \delta_7 GDP_t \\ &+ \sum_{i=0}^{q} \delta_8 LBR_t + \sum_{i=0}^{q} \delta_9 FDI_t + \gamma_1 (POV)_t + \gamma_2 GPR_t^+ + \gamma_3 GPR_t^- \\ &+ \gamma_4 ICT_t^+ + \gamma_5 ICT_t^- + \gamma_6 GLB_t^+ + \gamma_7 GLB_t^- + \gamma_8 (GDP)_t \\ &+ \gamma_9 (LBR)_t + \gamma_{10} (FDR)_t + \varepsilon_t \end{aligned} \quad \textbf{(6)}$$

4. Result and Discussion

Table.2.Descriptive Statistics

	POV	ICT	LBR	GPR	GLB	GDP	FDI
Mean	51.543	45.084	61.722	0.111	65.458	192.380	0.814
Median	51.371	47.250	61.949	0.109	67.320	185.470	0.735
Maximum	56.277	60.700	64.687	0.213	78.697	378.460	1.080
Minimum	47.111	15.806	56.590	0.037	45.557	252.884	0.205
Std. Dev.	2.168	11.977	1.816	0.048	11.032	133.100	0.447
Skewness	0.199	-0.880	-1.012	0.444	-0.542	0.128	1.020
Kurtosis	2.486	3.012	4.043	2.371	1.895	1.625	3.707
Jarque-Bera	0.706	5.160	8.638	1.973	3.996	3.259	7.765
Probability	0.703	0.076	0.013	0.373	0.136	0.196	0.021
Observations	40.000	40.000	40.000	40.000	40.000	40.000	40.000

Source: Author's own elaboration

Table 2 presents the descriptive statistics for the variables used in this study. In South Korea, the household poverty rate (POVERTY STATUS) has a mean of 51.543, a maximum of 56.277, and a minimum of 47.111. The Korea Geopolitical Risk Index (GPR) reports a mean of 0.111, reflecting moderate and stable geopolitical sensitivities in the region.The skewness estimates for most variables, including the poverty ratio (0.199) and GDP (0.128), indicate distributions that are approximately normal. Similarly, the

kurtosis measures suggest that most distributions are platykurtic, with POVERTY STATUS and GPR displaying values of 2.486 and 2.371, respectively. Table 3 displays the correlation matrix. A strong negative association between GDP per capita and household poverty suggests that economic growth is a primary factor in poverty alleviation in South Korea. Additionally, both ICT and globalisation are negatively correlated with poverty, suggesting their potential to enhance welfare.

Table.3.Correlation

	POVERTY STATUS	ICT	LBR	GPR	GLb	GDP	FDI
POVERTY STATUS	1						

ICT	0.115	1.000					
	0.711	-----					
	0.481	-----					
LBR	-0.269	0.690	1				
	-1.725	5.873	-----				
	0.093	0.000	-----				
GPR	-0.152	0.151	0.204	1.000			
	-0.951	0.941	1.287	-----			
	0.348	0.353	0.206	-----			
GLBI	-0.236	0.809	0.848	0.213	1.000		
	-1.497	8.490	9.870	1.345	-----		
	0.143	0.000	0.000	0.187	-----		
GDP	-0.467	0.610	0.833	0.240	0.936	1.000	
	-3.258	4.745	9.272	1.524	16.391	-----	
	0.002	0.000	0.000	0.136	0.000	-----	
FDI	0.143	0.415	0.243	0.007	0.361	0.151	1.000
	0.890	2.812	1.546	0.046	2.385	0.943	-----
	0.379	0.008	0.130	0.964	0.022	0.351	-----

Source: Author's own elaboration

The Augmented Dickey-Fuller (ADF) test was used to test the stationarity of the variables. The outcome (Table 4) implies a mixed order of integration: POVERTY STATUS and GPR, but not ICT, LBR, and GLBI, reach stationarity at level 0 [I(0)] and only on first differencing reach the level 1 [I(1)]. This combination of integration patterns warrants the use of NARDL bounds testing.

Table.4.Unit root test

		I(0)	I(1)
FDI	t-Statistic	-2.032	-7.213
	Prob.	0.273	0.000
GDP	t-Statistic	-0.679	-6.178
	Prob.	0.841	0.000
GLBI	t-Statistic	-1.874	-5.473
	Prob.	0.341	0.000
GPR	t-Statistic	-5.620	-10.620
	Prob.	0.000	0.000
ICT	t-Statistic	-3.081	-4.073
	Prob.	0.037	0.003
Pov	t-Statistic	-2.403	-6.146

	Prob.	0.147	0.000
LBR	t-Statistic	-2.657	-5.695
	Prob.	0.090	0.000

Source: Author's own elaboration

To ensure that the non-linear model is suitable, the BDS test Brock et al., 1996) was made (Table 5). The test results indicate that the p-values are significant (0.000) across all embedding dimensions (2-6) for variables such as Pov and GPR. These results strongly reject the null hypothesis of a linear relationship, thus confirming that the effects of ICT, GPR, and GLBI on poverty are nonlinear and asymmetric.

Table.5.BDS Test

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.025	0.009	2.628	0.009
3	0.052	0.015	3.430	0.001
4	0.056	0.018	3.083	0.002
5	0.053	0.019	2.759	0.006

Source: Author's own elaboration

The calculated F-statistic of 20.370 is substantially greater than the upper-bound critical values (I1) at the 1, 5, and 10 percent significance levels. This result provides strong evidence of a long-run co-integrating relationship among ICT, GPR, GLBI, and household poverty in South Korea.

Table.6.Bound Test

Test Statistic	F-statistic	Critical Value Bounds	
	Value	I(0)	I(1)
F-statistic	14.174*	—	—
Significance Level			
10%	—	1.76	2.77
5%	—	1.98	3.04
2.5%	—	2.18	3.28
1%	—	2.41	3.61

Source: Author's own elaboration

The existence of a long-run co-integrating relationship among information and communications technology (ICT), geopolitical risk (GPR), GLBI, and household poverty in South Korea is supported by the structural transformation paradigm and digital development literature. In contemporary economies, technological advancement and higher GLBI rates are associated with stable long-term relationships among digital infrastructure, external risks, and welfare outcomes. The integration of digital technologies and global markets in developed Asian and other advanced economies has established enduring economic frameworks that substantially affect household income distribution and poverty dynamics (Kim and Park, 2023; Lee et al., 2024). Recent empirical evidence demonstrates that economies characterized by long-term robustness and openness display similarities between technological advancement and social welfare indicators, primarily due to productivity gains resulting from improved labor-market opportunities (Zhang et al., 2022).

Table.7.Long Run NARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ICT_POS	0.007	0.068	0.106	0.917
ICT_NEG	0.051	0.094	0.546	0.591
LBR_POS	-0.260	0.279	-0.930	0.363
LBR _NEG	1.707	0.708	2.412	0.025
GPR_POS	-13.642	4.672	-2.920	0.008
GPR_NEG	0.732	5.415	0.135	0.894
GLBI_POS	0.806	0.154	5.227	0.000
GLBI _NEG	0.079	0.545	0.144	0.887
GDP_POS	0.000	0.000	-3.071	0.006
GDP_NEG	0.000	0.000	-1.068	0.298
FDI_POS	1.069	0.649	1.646	0.115
FDI_NEG	-0.364	0.651	-0.559	0.582
C	49.708	0.857	57.996	0.000

Source: Author's own elaboration

Table.8.NARDL Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	46.521	6.482	7.177	0.000
POV(-1)*	-0.936	0.122	-7.691	0.000
ICT_POS**	0.007	0.063	0.106	0.916
ICT_NEG**	0.048	0.089	0.541	0.594
LBR_POS**	-0.243	0.258	-0.944	0.356
LBR _NEG**	1.598	0.553	2.890	0.009
GPR_POS(-1)	-12.767	4.156	-3.072	0.006
GPR_NEG(-1)	0.685	5.037	0.136	0.893
GLBI_POS(-1)	0.754	0.165	4.568	0.000
GLBI _NEG**	0.074	0.512	0.144	0.887
GDP_POS**	0.000	0.000	-2.549	0.019
GDP_NEG**	0.000	0.000	-1.128	0.272
FDI_POS(-1)	1.000	0.573	1.745	0.096
FDI_NEG**	-0.341	0.621	-0.548	0.589
D(GPR_POS)	2.229	3.070	0.726	0.476
D(GPR_NEG)	-12.307	4.527	-2.719	0.013
D(GLBI_POS)	0.321	0.142	2.259	0.035
D(FDI_POS)	-1.203	0.725	-1.658	0.112

Source: Author's own elaboration

The error-correcting value of POVERTY STATUS (-1) is a negative, significant value (0.796, $p < 0.001$). This implies a fast rate of adjustment, as it takes about 79.6 percent of any variation from the long-run equilibrium to be mended in one year. Diagnostic tests help ensure the model's reliability. The heteroskedasticity test of Breusch-Pagan-Godfrey is 0.505, and the functional form test of Ramsey is 0.697, indicating that the model is well-specified and does not exhibit significant heteroskedasticity. Through the macroeconomic stability channel, it is possible to explain the deleterious impact of the deteriorating geopolitical risk on household poverty. Reducing geopolitical friction

fosters positive investment confidence, a healthy trade relationship, and financial market stability, which, in turn, boost economic growth and jobs. In South Korea, geopolitical risk, particularly tensions on the Korean Peninsula, has historically influenced investment flows and economic sentiment. Empirical evidence shows that reduced geopolitical uncertainty enhances income growth and reduces poverty by encouraging both domestic and foreign investment (Caldara and Iacoviello, 2022; Nguyen and Su, 2023). Besides, studies targeting East Asian economies conclude that geopolitical stability is a factor that ensures sustained economic performance and better welfare outcomes by reducing economic instability and enhancing long-term development planning (Park & Shin, 2024). ICT expansion as an instrument of reducing poverty has been proven through the digital inclusion and productivity enhancement mechanisms. Telecommunications infrastructure expansion facilitates access to information, digital entrepreneurship, and better labor-market matching in addition to boosting productivity in the sectors. South Korea is commonly known as one of the best digitally driven economies, where extensive broadband and telecommunications infrastructure have helped foster innovation, job creation, and balanced economic growth. Empirical research supports the idea that ICT infrastructure can help reduce poverty by providing access to education, digital financial services, and emerging economic opportunities, especially in knowledge-based economies (Bahrini and Qaffas, 2022; Vu et al., 2023).

Table.9.Diagnostic Test Results

Test: Breusch-Pagan-Godfrey	F-statistic	1.947005	Prob. F(11,26)	0.0794
Ramsey's Reset Test	F-statistic	1.058645	(1, 32)	0.3112

Source: Author's own elaboration

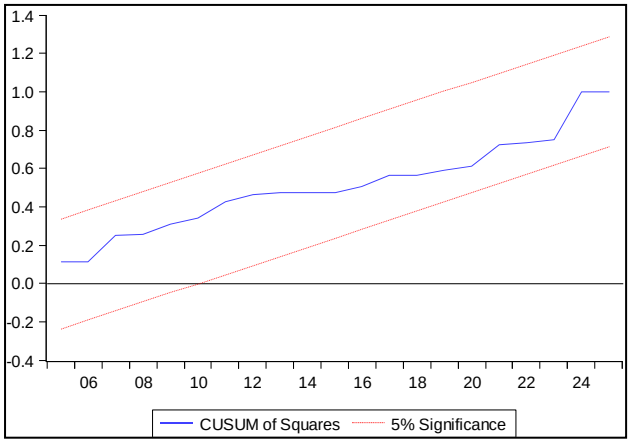

Figure.1. CUSUM of Square

Source: Author's own elaboration

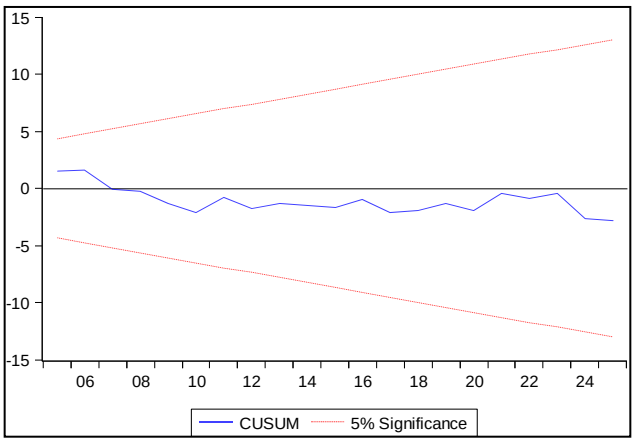

Figure.2. CUSUM

Source: Author's own elaboration

Moreover, social welfare systems have been enhanced through the development of sophisticated digital technologies, including artificial intelligence, big data, and cloud computing as a part of South Korea's Digital New Deal, which has improved service delivery and poverty alleviation, though indirectly (OECD, 2024; Lee and Kim, 2025). GLBI is crucial to the effectiveness of poverty reduction efforts, as explained by trade openness, capital mobility, and technological diffusion. GLBI brings up efficiency in the economies of nations as countries can specialize in comparative advantage and enjoy a

bigger market, foreign investment, and sophisticated technologies. The export-focused economic model of South Korea has traditionally been advantaged by GLBI, owing to expanded trade networks and technological co-operation with countries worldwide. The latest research data show that GLBI leads to inclusive growth as the employment opportunities and enhanced productivity are facilitated by global value chains (Dreher et al., 2023; KOF Swiss Economic Institute, 2024). Also, GLBI is the fastest means of spreading knowledge and technology, thereby enhancing economic resilience and eliminating poverty despite changes in global integration (Sethi et al., 2022). The high and meaningful error-correction coefficient indicates swift adaptation toward long-term equilibrium, consistent with the dynamic effectiveness of developed economies. Well-developed financial systems, stable institutions, and highly developed digital infrastructure tend to adjust faster to economic shocks. These strengths allow South Korea to promptly address short-term macroeconomic disequilibria that affect household welfare, driven by a strong institutional setup, a digital economy, and policy responsiveness (World Bank, 2023; Kim et al., 2024). These accelerated adjustment mechanisms are prevalent in well-developed economies where economic policies and market institutions are well-suited to respond to shocks.

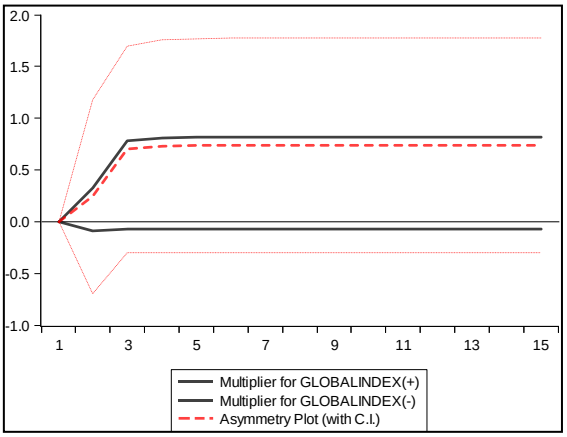

Figure.3.Asymmetry Plot GI
Source: Author's own elaboration

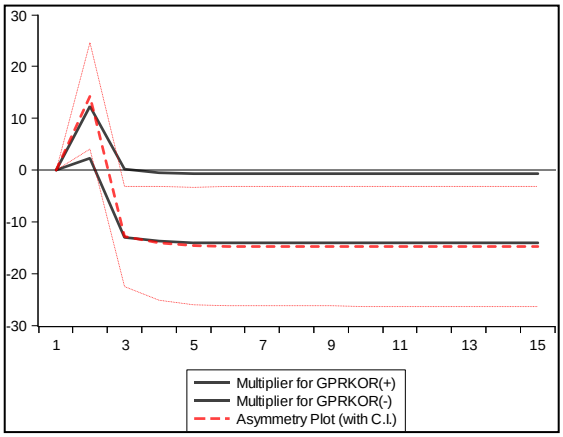

Figure 4. Asymmetry Plot GPR
Source: Author's own elaboration

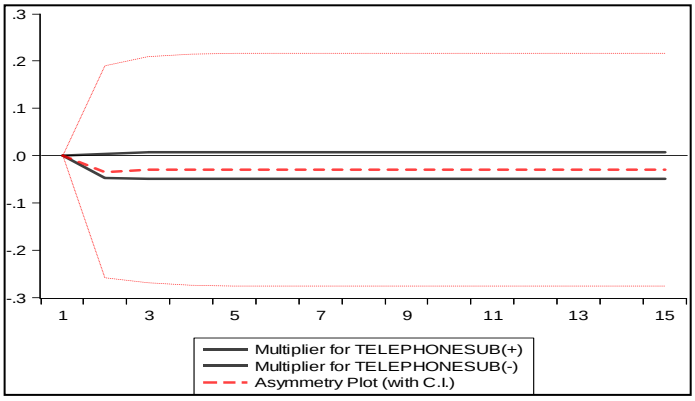

Figure.5.Asymmetry Plot Telephone
Source: Author's own elaboration

The relationship between geopolitical risk and household poverty causal, as supported by existing literature that emphasizes the transmission of geopolitical uncertainty to

socioeconomic conditions. Geopolitical instability influences economic development, international trade, and financial stability, subsequently affecting employment and income distribution. Empirical research demonstrates that geopolitical shocks can significantly affect macroeconomic performance and social welfare indicators, particularly in open, trade-dependent economies such as South Korea (Caldara et al., 2022; Su et al., 2023).

The findings underscore the importance of geopolitical stability and the development of information and communication technology (ICT) as critical factors in poverty alleviation in South Korea. Policy initiatives should prioritize maintaining regional stability to mitigate the adverse economic effects of geopolitical shocks. Additionally, the government should expand partnerships to promote growth by increasing the deployment of artificial intelligence and digital services in rural and underserved areas, thereby enhancing the inclusiveness of welfare delivery.

Table.10.Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.
ICT does not Granger Cause POVERTY STATUS	1.034	0.367
POVERTY STATUS does not Granger Cause ICT	2.171	0.131
LBRdoes not Granger Cause POVERTY STATUS	1.721	0.194
POVERTY STATUS does not Granger Cause LABOR_FORCE	2.390	0.107
GPRdoes not Granger Cause POVERTY STATUS	0.025	0.975
POVERTY STATUS does not Granger Cause GPR	0.545	0.585
GLOBALINDEX does not Granger Cause POVERTY STATUS	5.033	0.012
POVERTY STATUS does not Granger Cause GLOBALINDEX	0.282	0.756
GDPdoes not Granger Cause POVERTY STATUS	1.989	0.153
POVERTY STATUS does not Granger Cause GDPPERCAPITA	0.997	0.380
FDI does not Granger Cause POVERTY STATUS	4.398	0.020
POVERTY STATUS does not Granger Cause FDI	2.969	0.065

Null Hypothesis	F-Statistic	Prob.
LBRdoes not Granger Cause ICT	8.175	0.001
ICT does not Granger Cause LABOR_FORCE	0.287	0.753
GPRdoes not Granger Cause ICT	0.229	0.797
ICT does not Granger Cause GPR	1.347	0.274
GLOBALINDEX does not Granger Cause ICT	3.892	0.031
ICT does not Granger Cause GLOBALINDEX	2.583	0.091
GDPdoes not Granger Cause ICT	5.843	0.007
ICT does not Granger Cause GDPPERCAPITA	0.800	0.458
FDI does not Granger Cause ICT	1.525	0.233
ICT does not Granger Cause FDI	1.085	0.350
GPRdoes not Granger Cause LABOR_FORCE	0.119	0.888
LBRdoes not Granger Cause GPR	0.760	0.476

GLOBALINDEX does not Granger Cause LABOR_FORCE	1.613	0.214
LBRdoes not Granger Cause GLOBALINDEX	1.250	0.299
GDPdoes not Granger Cause LABOR_FORCE	3.930	0.029
LBRdoes not Granger Cause GDPPERCAPITA	1.012	0.374
FDI does not Granger Cause LABOR_FORCE	0.490	0.617
LBRdoes not Granger Cause FDI	5.813	0.007
GLOBALINDEX does not Granger Cause GPR	0.501	0.610
GPRdoes not Granger Cause GLOBALINDEX	1.520	0.233
GDPdoes not Granger Cause GPR	1.074	0.353
GPRdoes not Granger Cause GDPPERCAPITA	0.864	0.431
FDI does not Granger Cause GPR	0.398	0.675
GPRdoes not Granger Cause FDI	0.199	0.821
GDPdoes not Granger Cause GLOBALINDEX	0.412	0.666
GLOBALINDEX does not Granger Cause GDPPERCAPITA	2.773	0.077
FDI does not Granger Cause GLOBALINDEX	0.137	0.873
GLOBALINDEX does not Granger Cause FDI	1.035	0.366
FDI does not Granger Cause GDPPERCAPITA	0.279	0.758
GDPdoes not Granger Cause FDI	1.115	0.340

Source: Author's own elaboration

The results of the Granger causality test, as shown in Table 10, demonstrate that geopolitical risk (GPR) Granger-causes household poverty ($p = 0.01$), and the global index (GLBI) also Granger-causes household poverty ($p = 0.05$). Additionally, a statistically significant causal relationship exists between the indicator of ICT infrastructure and poverty reduction ($p < 0.05$).

These findings highlight the significance of geopolitical stability and ICT development as essential factors in poverty alleviation in South Korea. Policy initiatives should prioritize maintaining regional stability to reduce the adverse economic effects of geopolitical risk. Furthermore, expanding partnerships to promote growth through increased deployment of artificial intelligence and digital services in rural and underserved areas can enhance the inclusiveness of welfare delivery.

5. Conclusion and Policy Implications

This paper has analyzed long-run and causal relationship between information and communication technology (ICT), geopolitical risk, GLBI, and poverty of households in South Korea using nonlinear autoregressive distributed lag (NARDL) model. The empirical results show a stationary long-run equilibrium relationship among the variables, indicating that structural economic determinants include technological development, integration of global economies, and geopolitical factors that affect household welfare. The findings indicate that alleviating geopolitical tensions leads to better economic stability and social welfare, consistent with the general literature suggesting that geopolitical uncertainty may play a significant role in derailing economic growth, investment flows, and labor markets (Caldara et al., 2022; Su et al., 2023).

The results further highlight ICT development as a critical structural driver of socioeconomic progress. The expansion of digital infrastructure increases access to information, improves labor productivity, and supports digital entrepreneurship, thereby enhancing welfare outcomes and income opportunities. South Korea's advanced digital ecosystem and strategic investments in technologies such as artificial intelligence, data infrastructure, and high-speed telecommunications have bolstered its ability to foster inclusive growth and mitigate socioeconomic risks (OECD, 2024; Lee and Kim, 2025). In addition, GLBI is identified as a key factor in poverty alleviation by facilitating trade integration, technology diffusion, and participation in global value chains. The export-oriented economic system has enabled South Korea to leverage global markets and innovation networks, contributing to sustained economic growth and improved living standards (Dreher et al., 2023; Sethi et al., 2022).

A further contribution of this study is the identification of causal relationships among geopolitical risk, ICT infrastructure, GLBI, and household poverty. The findings suggest that variations in geopolitical stability, digital development, and global economic integration are directly associated with household welfare in South Korea. Given the country's geopolitical context and highly integrated economy, maintaining regional stability and advancing technological capabilities are essential for sustainable, inclusive economic development.

From a policy perspective, these findings underscore the importance of advancing digital transformation policies to ensure that technological innovation benefits all segments of society. Increasing investment in ICT infrastructure, expanding digital access in rural and underserved areas, and developing digital skills can enhance economic opportunities and promote inclusive growth. Furthermore, policies that maintain geopolitical stability and encourage international economic collaboration can reduce poverty over the long term by strengthening economic resilience and investor confidence.

While this study makes important contributions, it also identifies several avenues for future research. First, subsequent studies could incorporate more comprehensive indicators of digital transformation, such as internet penetration, artificial intelligence adoption, and digital financial inclusion, to provide a more nuanced understanding of ICT development. Second, cross-regional analyses involving both developed and developing economies would offer deeper insights into how geopolitical risks and GLBI interact with technological advancement and influence poverty dynamics. Finally, utilizing micro-level household data could facilitate analysis of distributional impacts and provide a deeper understanding of how digitalization and global integration affect income inequality and social well-being across different population groups. In summary, the results underscore the importance of integrating technological innovation, international economic engagement, and geopolitical stability into development policies to improve household welfare and achieve sustainable socioeconomic development in South Korea.

Author Contributions

Ahmed Adekunle carried out the conceptualization, formal analysis, revised, results estimation, tabulation of data, and response to reviewers' comments.

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Conflicts of Interest

No conflict of interest

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