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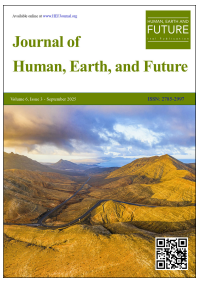

Macroeconomic Stability, Urbanization, and Social Well-Being: Policy Insights from ARDL Modeling

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Abstract

This study examines the impact of various macroeconomic indicators, including inflation, economic growth rate, unemployment rate, population growth rate, Foreign Direct Investment, and interest rate, on social welfare in China. Therefore, we used the ARDL model to examine both short-run and long-run cointegration among these factors and social well-being, evaluated by two proxies: life expectancy and primary school attendance. The findings indicate a long-term cointegrating relationship among inflation, interest rates, and social welfare, along with a beneficial short-term impact of urbanization. Disadvantages encompass prolonged adverse effects on unemployment, whereas the positives are limited to temporary perks associated with unemployment, such as social support. From this viewpoint, prioritizing the stabilization of inflation and interest rates, advancing strategic urbanization, and implementing policies to mitigate unemployment for social development are essential. The proposed policies include the implementation of inflation targeting in monetary policy, the supply of employment for the urban populace, and the promotion of foreign direct investment in industries that help marginalized communities. The implications of these findings for policy creation aimed at enhancing societal welfare and economic development in China are significant, as the data provides additional relevant references to the policy makers in the drafting of future development plans.

Keywords: Social Well-Being; GDP Growth; Urbanization; Inflation and Unemployment.

JEL Codes: *C32, E31, F21, I31, O18.*

1. Introduction

Economic stability and sustainable development have become increasingly important in the pursuit of enhanced social well-being. In the context of China's rapidly expanding economy, the complex interrelations among key macroeconomic variables, particularly inflation, GDP per capita, and unemployment, which presented both challenges and opportunities for long-term social development. While China's remarkable economic ascent has lifted millions out of poverty, it has simultaneously introduced new forms of inequality and social imbalance that require targeted policy intervention to ensure inclusive, sustainable progress [1, 2]. As China's economy evolves, concerns surrounding inflation, joblessness, and income disparities have grown more prominent, with each carrying the potential to undermine collective well-being.

This paper seeks to assess the influence of these macroeconomic factors on social well-being in China through the construction of a comprehensive Social Well-being Index and a rigorous analysis of its association with economic indicators. By moving beyond traditional unidimensional measures of economic success, this study provides a more nuanced understanding of national development from a human-centered perspective.

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Over the past several decades, China has transformed itself into the world's second-largest economy. However, the gains from this economic boom have not been evenly distributed. Deep-rooted inequalities, especially between rural and urban populations, persist and, in some cases, have intensified. Although GDP per capita is commonly used to gauge economic prosperity, it falls short as a holistic measure of well-being [3]. Numerous scholars have argued that health, education, social inclusion, and subjective life satisfaction are equally crucial components of individual and societal well-being [1]. Among the many variables that affect these dimensions, inflation and unemployment stand out for their significant and often disproportionate impact on vulnerable populations. Inflation tends to erode the purchasing power of low-income households, while unemployment contributes to financial instability, loss of access to essential services, and greater social exclusion [4]. Moreover, the rapid pace of urbanization and structural economic shifts in China have aggravated these disparities, further widening the rural–urban divide [2, 5].

In response to these issues, the Chinese government has implemented a range of policies aimed at improving access to housing, healthcare, and education, with the goal of reducing poverty and promoting greater equality [1, 6]. However, high inflation, particularly in essential sectors such as housing and healthcare, has constrained the effectiveness of these interventions. While average economic prosperity has increased, it has not been accompanied by equivalent improvements in social well-being for all segments of the population [7]. As such, there is a pressing need to understand how macroeconomic conditions influence individuals' day-to-day quality of life. Aydan et al. [3] have responded to this need by developing a composite indicator of social well-being that incorporates metrics such as school enrollment and life expectancy. Other researchers [7, 8] argue that such multidimensional approaches are essential for designing economic policies that are both inclusive and sustainable.

The challenge facing Chinese policymakers today is how to reconcile rapid economic growth with the equitable distribution of its benefits. Industrialization and urban development have undoubtedly fueled China's development, but they have also generated new forms of social disruption, particularly among rural and marginalized groups. Rising inflation in sectors such as housing and food has diminished the purchasing power of low-income households, while youth unemployment and layoffs due to economic restructuring further compound social instability (Khan et al., 2020). These developments necessitate a deeper examination of how macroeconomic variables influence social welfare outcomes.

Traditional indicators such as GDP per capita offer valuable insights into national income levels but often fail to capture the broader dimensions of human development [7]. Economic security, along with reliable access to healthcare, education, and social protection, is foundational to social well-being [3]. Inflation and unemployment influence these foundations by reducing individuals' ability to afford basic services and maintain stable living conditions [1]. Furthermore, urbanization in China has led to growing disparities between urban and rural populations, with rural communities facing higher unemployment rates and more limited access to public services [7].

This study investigates the intricate relationships between inflation, GDP per capita, unemployment, and social well-being in the Chinese context. It introduces a Social Well-being Index that incorporates life expectancy and school enrollment rates as core indicators, drawing from the frameworks of Zhou et al. [2] and Koo et al. [8]. By carefully referring to the previous publications, life expectancy, being the measurement of an individual's lifespan, and school enrollment, being the ability of children to be sent to educational institutions and be able to complete their learning, including the settlement of all of the bills required during the education period, are selected as the components to evaluate social well-being. These are because the ability to live longer and the ability to afford education are the most straightforward and observable variables that we could easily group the individuals into; therefore, they are selected to construct the Social Well-being Index. Special attention is given to how inflation affects purchasing power and living standards, particularly among low-income groups [7]. While GDP per capita is retained as a key economic indicator, the study avoids treating it as the sole proxy for national progress. Instead, it includes unemployment as an equally important determinant of well-being, focusing on how joblessness leads to social exclusion and diminished access to essential services [4]. Additionally, the analysis incorporates urban population growth, foreign direct investment (FDI), and interest rates as control variables to capture a more comprehensive picture of the factors influencing social welfare [5].

The findings of this study are expected to offer valuable insights for adjusting China's macroeconomic policies in ways that better align with the country's long-term goals for sustainable development and social justice [1, 3]. By grounding policy recommendations in empirical analysis, this research serves as a useful reference for policymakers aiming to strike a balance between economic advancement and improved quality of life [6].

From a scholarly perspective, this study makes a significant contribution by expanding the analytical framework typically used in macroeconomic well-being research. While previous studies have often focused on individual variables in isolation, this research examines the combined impact of inflation, GDP per capita, and unemployment within a unified model. In doing so, it introduces a new, multidimensional Social Well-being Index specifically tailored to the Chinese context [7].

Moreover, by including additional control variables such as urbanization, FDI, and interest rates, the study provides a more detailed understanding of how intersecting economic forces shape social outcomes. These insights are particularly timely as China faces increasing pressure to address the social implications of inflation and job market instability, all within the broader framework of the Sustainable Development Goals. Ultimately, this research contributes to both theoretical advancement and practical policy development by identifying how macroeconomic conditions affect social welfare, offering guidance for more effective strategies to enhance the quality of life for all citizens in China.

This paper proceeds with a comprehensive review of the relevant literature, focusing on the intersections of economic stability, social welfare, and sustainable development within the Chinese context. The methodology section outlines the econometric approach used in analyzing the selected variables and the construction of the Social Well-being Index. This is followed by a presentation of empirical findings that illustrate the relationships between inflation, GDP per capita, unemployment, and social well-being. The discussion section reflects on the implications of these findings for economic policy and theory, and the paper concludes with a summary of key insights and recommendations for future research.

2. Literature Review

2.1. Conceptualizing Social Well-Being

Social well-being is a significant multidimensional concept encompassing material affluence and other aspects of life that may enhance an individual's overall quality of life. Economic indicators, such as income and consumption, are frequently employed to assess well-being. However, scholars contend that social well-being extends beyond indicators of health, education, inclusion, and life satisfaction [1]. According to Aydan et al. [3], social well-being can be considered a comprehensive quality of life indicator that encompasses both material and non-material components of human existence. The significance of this perspective is particularly evident when investigating the well-being of populations in rapidly expanding economies, such as China, where not all societal groups experience equal benefits from economic expansion [4].

One of the primary challenges is the measurement of a multidimensional construct like social well-being. Although GDP per capita is frequently employed as a proxy for national prosperity, economic development alone does not adequately represent well-being [7]. Koo et al. [8] have demonstrated that policies aimed at enhancing social well-being should incorporate economic factors and non-economic variables such as life expectancy and enrollment in school. Life expectancy is a fundamental indicator of a population's health and quality of life. At the same time, school attendance is a crucial indicator of education accessibility, a prerequisite for social mobility and inclusion. They measure well-being thoroughly using health and education variables crucial to long-term development [3].

Chinese social well-being has evolved rapidly due to urbanization, industrialization, and economic transformation. Livingston et al. [7] noted that these processes have spurred economic expansion and created new social issues, particularly in rural areas where health and education are scarce. Thus, a more intelligent and multifaceted social well-being evaluation is needed to determine how these economic developments affect different demographic segments. Pagliari et al. [6] suggested that quality of life assessments should include social indices like health, education, and more and economic inputs.

In social well-being literature, diversity and equity are increasingly encouraged. El-Ghannam [1] claimed that vulnerable groups' social well-being depends on income distribution, social service availability, and social protection. Because urban and rural Chinese have differing access to these services, the gap between them widens [5]. For this reason, this issue matters. Thus, a social well-being index with measures like life expectancy and school enrollment is needed to better assess a nation's social development [8].

We have concluded that social well-being must be conceptualized in a manner that transcends the conventional economic metric, such as GDP per capita, and encompasses health, education, and other social dimensions contributing to an individual's quality of life. The analysis of the effects of economic growth on the social factors that contribute to total well-being can be enhanced by incorporating these broader indicators, particularly in fast-developing countries like China, where obstacles and opportunities have accompanied rapid growth. Researchers can more effectively evaluate the influence of macroeconomic variables on societal welfare and offer more precise policy recommendations that will enhance the quality of life for all citizens [3].

2.2. Inflation and Social Well-Being

Inflation is consistently linked to declines in social well-being, particularly when its effects disproportionately affect essential goods and services; however, this relationship is confined to aggregate cross-sectional analyses. The study indicates that inflation diminishes purchasing power and exacerbates economic inequality, disproportionately affecting low-income populations. Research on urban Ethiopia indicates a significant decline in subjective well-being

despite economic growth, as over 60 percent of household income was allocated to food expenditures [9]. In Malaysia, inflation has been shown to adversely impact socioeconomic well-being and undermine household financial stability, especially among the middle-class [10].

In Lebanon, the economic crisis has led to high inflation, resulting in significant declines in quality of life, particularly affecting the elderly, low-income individuals, and the unemployed. This inflationary impact disproportionately affected vulnerable populations and intensified social inequalities [11]. Similar to observations in France, perceived inflation, influenced by consumption patterns, adversely affects well-being related to material satisfaction more than equivalent changes in nominal income, thereby exacerbating the well-being disparity among socioeconomic groups [12].

Research in Kenya indicates that inflation has asymmetric effects, and unemployment, exacerbated by inflation, negatively impacts subjective well-being. The long-term effects of unemployment are particularly detrimental to psychological health [13]. In Romania, inflation and financial instability adversely affect human well-being, particularly as inflation leads to a decline in living standards [14]. This study, conducted across 141 countries, demonstrates that inflation adversely affects life evaluation and emotional well-being, highlighting its widespread negative influence on quality of life [15].

In summary, inflation consistently undermines social well-being, exacerbates economic inequalities, and disproportionately impacts the most vulnerable populations in various contexts.

2.3. GDP and Social Well-Being

The relationship between GDP and social well-being is complex and multidimensional. GDP can be a proxy for a nation's economic strength, but it does not fully represent social wellness. The social component encompasses wealth, necessities, services, education, health, and income distribution. El-Ghannam [1] states that in developing countries, GDP growth can enhance social welfare by generating increased revenues for investment in social capital, although it may not affect inequality. A higher GDP indicates greater economic significance, which may enhance the capacity for overall welfare; however, improvements in living standards are not guaranteed.

This paper analyzes a selection of Organisation for Economic Co-operation and Development (OECD) countries, revealing a positive correlation between Gross Domestic Product (GDP) per capita and various health and education metrics. However, it emphasizes that income level does not accurately reflect the overall well-being of individuals. Including social and health expenditures in GDP significantly enhances its relevance to social well-being, as Aydan et al. demonstrated [3]. Education and healthcare are critical expenditures; education, akin to other essential government-funded services, is crucial for ensuring long-term social well-being. Investment is crucial; without it, economic growth tends to benefit wealthier groups disproportionately, exacerbating inequality and hindering overall progress in well-being [16].

Furthermore, Guisan [17] highlights the significance of income distribution in elucidating the relationship between GDP and social well-being. Increases in GDP growth typically lead to a rise in national income; however, the resulting wealth distribution is often unequal, hindering growth's positive impacts on overall well-being. In countries with lower levels of income inequality, the probability of positive GDP growth is correlated with enhancements in social well-being. GDP remains a relevant criterion for measuring economic success; however, it must be evaluated with social policies and distribution mechanisms to understand their relationship with actual well-being [16].

Secondly, GDP as a measure reflects a sophisticated comprehension of national progress. This highlights the necessity for a more systematically assessed national progress incorporating GDP while excluding social inclusion, education, and healthcare considerations.

2.4. Unemployment and Social Well-being

When people are out of work, they lose access to opportunities that could improve their economic situation, mental health, and social standing, all of which hurt society as a whole. Regardless, studies agree that being unemployed is bad for your subjective well-being for more reasons than one. It is a social and psychological burden on top of a financial one. People who are out of work suffer a decline in self-esteem and social identity due to their isolation from work-related social networks and society's expectations of production [18].

Job loss negatively impacts social well-being, increasing worry, despair, and low self-esteem. According to Eberl et al., this is supported by longitudinal studies demonstrating how long-term unemployment can leave a lasting impression, causing the unemployed to fall behind once they leave the job market [19]. They can reduce social capital and decrease life happiness over the long term. When people lose their jobs, they lose their income, social networks, and the capacity to live how they want. As a result, they feel much worse about themselves when unemployed [20].

Isolation, mental health issues, and the breakdown of family and community relationships are some of the most detrimental societal impacts of young unemployment [21]. The negative effects of unemployment on social well-being are exacerbated by societal stigma, which further isolates people and makes it harder for them to reintegrate into society: unemployment and other economic distress impact economic conditions, social cohesiveness, mental health, and community well-being [22].

2.5. Control Variables and Social Well-Being

In China, control variables such as urbanization, foreign direct investment (FDI), and interest rates may significantly influence social well-being. They engage with economic conditions, infrastructure, and social services to impact the quality of life in those regions.

The relationship between social well-being and urbanization is complex. The recent urban growth in China has resulted in improved health care, education, and employment opportunities in urban areas, thereby enhancing the living standards of urban residents. Population density can lead to issues such as overcrowding, pollution, and resource depletion [23]. Urbanization presents both advantages and disadvantages. It provides economic opportunities but exacerbates social and environmental pressures, especially in larger cities, leading to housing affordability, environmental degradation, and decreased life satisfaction [24]. Long-term well-being improvements require assessing urbanization's benefits concerning its social costs [25].

Foreign Direct Investment (FDI) plays a significant role in China's economic development and social well-being. Foreign Direct Investment (FDI) contributes to technological advancements, job creation, and infrastructure improvements, which enhance the standard of living [26]. However, the impact of foreign direct investment on social well-being varies by region; some regions can effectively absorb such investments, while others cannot. Regions characterized by elevated human capital and institutional quality will likely derive the greatest social benefits from foreign direct investment [27]. Despite the contribution of FDI to reducing regional disparities in China, the unequal distribution of these investments can exacerbate inequality [28].

Interest rates also influence social well-being. Household savings, borrowing costs, and overall financial stability are contingent upon fluctuations in interest rates, which subsequently affect individuals' quality of life. When coupled with a low value of money, high interest rates can increase financial stress, primarily due to their impact on disposable income [29]. In China, changes in monetary policy have direct implications for household financial well-being and psychological health [15]. Research indicates that central bank policy rate decisions influence economic indicators and emotional and social well-being measures [30]. Higher rates correlate with increased household indebtedness and associated stress.

Despite extensive research on the relationship between inflation, GDP, unemployment, and various control variables such as urbanization, FDI, and interest rates concerning social well-being, literature remains limited in identifying the specific extent of these relationships within the unique socioeconomic context of China. Most prior research has been conducted within Western or global contexts, resulting in a lack of studies on the specific operation of these emerging dynamics in China's rapidly transforming economic environment. This study addresses the gap by elucidating the intricate relationship between economic indicators and social well-being in China, which is especially relevant to the socioeconomic challenges posed by this emerging global power.

3. Model, Data, and Methods

3.1. Model

In order to estimate the overall effects of GDP per capita, inflation, unemployment, and control factors, including urbanization, foreign direct investment, and interest rates on social well-being in China, this study creates an econometric model. These variables are thought to be the main drivers of social well-being, and they are examined using indicators that serve as proxies for social well-being, such as life expectancy and enrolment in elementary school.

The general form of the Autoregressive Distributed Lag (ARDL) model for this study is represented as follows:

$$GDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 SWB_{t-i} + \sum_{i=0}^{q_1} \beta_1 INF_{t-i} + \sum_{i=0}^{q_2} \beta_2 GDPG_{t-i} + \sum_{i=0}^{q_3} \beta_3 UNEMP_{t-i} + \sum_{i=0}^{q_4} \beta_4 UP_{t-i} + \sum_{i=0}^{q_5} \beta_5 FDI_{t-i} + \sum_{i=0}^{q_6} \beta_6 INT_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \quad (1)$$

SWB_t is Social well-being at time t (measured by life expectancy and school enrollment), INF_t is Inflation rate (annual %), $GDPG_t$ is GDP per capita (economic growth), $UNEMP_t$ is Unemployment rate (as a percentage of the total labor force), UP_t is Urban population as a percentage of the total population (urbanization), FDI_t is Foreign direct investment net inflows as a percentage of GDP, INT_t is represents inflation measured by the GDP deflator, ECM_t is Interest rates (annual %).

3.2. Data Description

The estimations in this paper are based on annual data from 1980 to 2023 obtained from the National Bureau of Statistics of China and the World Bank Indicators. The variables that have been chosen are significant components of economic development and social conditions. Table 1 provides a detailed description of the variables.

Table 1. Variables Description

Variables	Abbreviation	Description	Unit
Social Well-being	SWB	Life expectancy at birth, total (years) and School enrolment, primary (% gross)	Index
Inflation	INF	Inflation, GDP deflator	annual %
Economic Growth	GDPG	GDP growth	annual %
Unemployment	UNEMP	Unemployment, total	% of the total labor force
Urban Population	UP	Urban population	% of the total population
Foreign Direct Investment	FDI	Foreign direct investment, net inflows	% of GDP
Interest Rate	INT	Lending interest rate	%

The selection of these variables is based on the criteria of theory and the findings of previous empirical research that has investigated the relationship between economic variables and social welfare. The Chinese socioeconomic characteristics are consistently reflected.

3.3. Methods

The study employs the ARDL model to analyze the short- and long-run effects of GDP, inflation, unemployment, urbanization, FDI, and interest rates on social well-being in China from 1980 to 2023. First, the Augmented Dickey-Fuller (ADF) unit root test is applied to assess the stationarity of variables. Given the mixed integration orders (I(0) and I(1)) of the variables, the ARDL approach is used due to its flexibility in handling such data structures. The ECM is implemented to examine the short-run dynamics and the adjustment process towards the long-run equilibrium. Figure 1 shows the flow chart of the methodology steps applied in this research.

Figure 1. Flowchart of methodology steps

4. Results and Discussion

This section presents the findings from the econometric analysis, including both short- and long-run effects of macroeconomic variables on social well-being in China. The analysis begins with the summary statistics (Table 2) to provide an overview of the data, followed by the unit root test results (Table 3) to confirm the stationarity of the variables. The Bounds test (Table 4) is used to assess the existence of a long-run relationship. In contrast, the short-run (Table 5) and long-run (Table 6) ARDL results highlight the key determinants of economic growth in the context of Pakistan.

Table 2. Summary Statistics

Variables	SWE	INF	GDPG	UEMP_NE	UP	FDI_GDP	L_I
Mean	76.307	4.393	8.945	3.931	45.393	3.179	6.335
Median	76.859	2.603	9.134	4.088	45.199	3.484	5.810
Maximum	80.003	20.617	14.231	5.610	64.570	6.187	12.060
Minimum	71.342	-1.263	2.239	2.300	27.312	0.240	4.350
Std. Dev.	2.648	4.882	2.838	0.860	11.801	1.459	2.164
Skewness	-0.448	1.536	-0.094	-0.081	0.060	0.010	1.259
Kurtosis	1.928	5.403	3.152	2.501	1.684	2.351	3.576
Jarque-Bera	2.686	20.917	0.080	0.379	2.401	0.580	9.181
Probability	0.261	0.000	0.961	0.827	0.301	0.748	0.010

Table 3. Correlation Matrix

Variables	SWE	INF	GDPG	UEMP	UP	FDI	IN
SWE	1.000	-0.505	-0.632	0.932	0.976	-0.633	-0.838
INF	-0.505	1.000	0.663	-0.483	-0.461	0.569	0.760
GDPG	-0.632	0.663	1.000	-0.644	-0.684	0.727	0.654
UEMP	0.932	-0.483	-0.644	1.000	0.899	-0.574	-0.796
UP	0.976	-0.461	-0.684	0.899	1.000	-0.709	-0.782
FDI	-0.633	0.569	0.727	-0.574	-0.709	1.000	0.689
INT	-0.838	0.760	0.654	-0.796	-0.782	0.689	1.000

Table 4. F-Bounds Test: Null Hypothesis - No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.844257	10%	2.33	3.25
k	6	5%	2.63	3.62
Actual Sample Size	30	2.5%	2.9	3.94
Finite Sample: n=30	-	1%	3.27	4.39

Table 5. Short Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.418	0.931	-18.711	0.034
D(SWE(-1))	-1.227	0.072	-17.029	0.037
D(SWE(-2))	-4.094	0.214	-19.094	0.033
D(INF)	-0.241	0.012	-19.605	0.032
D(INF(-1))	-0.894	0.048	-18.826	0.034
D(INF(-2))	-0.785	0.041	-19.231	0.033
D(GDPG)	-0.275	0.015	-17.740	0.036
D(GDPG(-1))	0.244	0.012	19.550	0.033
D(GDPG(-2))	0.039	0.006	6.760	0.094
D(UEMP)	0.515	0.033	15.398	0.041
D(UEMP(-1))	-4.405	0.240	-18.370	0.035
D(UEMP(-2))	-4.534	0.237	-19.162	0.033
D(UP)	8.938	0.342	26.128	0.024
D(UP(-1))	3.376	0.553	6.100	0.103
D(UP(-2))	-16.226	0.931	-17.421	0.037
D(FDI_GDP)	-0.356	0.029	-12.216	0.052
D(FDI(-1))	-0.927	0.049	-18.820	0.034
D(FDI(-2))	0.961	0.049	19.560	0.033
D(INT)	-1.516	0.078	-19.357	0.033
D(INT(-1))	3.979	0.210	18.909	0.034
D(INT(-2))	1.652	0.087	19.062	0.033
CointEq(-1)*	-1.898	0.098	-19.340	0.033

Table 6. Long Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	0.439	0.215	2.047	0.289
GDPG	-0.477	0.195	-2.440	0.248
UEMP	2.240	0.696	3.216	0.192
UP	4.325	1.646	2.628	0.232
FDI	0.187	0.206	0.909	0.530
INT	-3.303	1.363	-2.424	0.249
TREND	-5.810	2.299	-2.527	0.240

The descriptive statistics in Table 2 provide valuable insights into the central tendencies and dispersion characteristics of the variables used in the analysis. Social well-being (SWE) has a mean value of 76.307 and a standard deviation of 2.648, indicating moderate variability. The distribution is slightly negatively skewed (-0.448), and with a kurtosis of 1.928, it is platykurtic, suggesting thinner tails than a normal distribution. The Jarque-Bera test statistic of 2.686 (p = 0.261) indicates that SWE is approximately normally distributed.

Inflation (INF) demonstrates the highest variability among the macroeconomic indicators, with a standard deviation of 4.882 and a wide range from -1.263% to 20.617%. It is strongly positively skewed (1.536) and highly leptokurtic (kurtosis = 5.403), implying frequent extreme values. This is supported by the Jarque-Bera test statistic of 20.917 (p = 0.000), confirming significant deviation from normality—likely due to inflationary shocks or deflation episodes in the observed period.

GDP growth (GDPG) shows a relatively high average rate of 8.945%, with values ranging from 2.239% to 14.231%, and a standard deviation of 2.838, indicating considerable variability. The distribution is nearly symmetric (skewness = -0.094) and mesokurtic (kurtosis = 3.152), closely resembling a normal distribution. This is consistent with the very low Jarque-Bera statistic (0.080, p = 0.961), suggesting no significant departure from normality.

Unemployment (UEMP_NE) averages at 3.931%, with relatively low variability (std. dev. = 0.860) and a symmetric distribution (skewness = -0.081). The kurtosis of 2.501 suggests a distribution close to normal, and the Jarque-Bera test statistic (0.379, p = 0.827) supports this assumption.

The urban population (UP) variable exhibits the highest dispersion, with a standard deviation of 11.801 and values ranging widely from 27.312% to 64.570%, reflecting differences in urbanization across regions or over time. Despite this variability, it shows near-zero skewness (0.060) and is platykurtic (kurtosis = 1.684), indicating a fairly symmetric but flat distribution. The Jarque-Bera result (2.401, p = 0.301) suggests no significant non-normality.

Foreign Direct Investment as a percentage of GDP (FDI_GDP) is relatively stable with a mean of 3.179%, a standard deviation of 1.459, and values ranging from 0.240% to 6.187%. Its skewness (0.010) and kurtosis (2.351) indicate an almost perfect normal distribution, confirmed by a non-significant Jarque-Bera statistic (0.580, p = 0.748).

Lastly, interest rates (L_I) show a mean of 6.335%, ranging from 4.350% to 12.060%, and a standard deviation of 2.164, indicating moderate variability. The distribution is moderately positively skewed (1.259) and leptokurtic (kurtosis = 3.576), hinting at more frequent extreme high values. The Jarque-Bera test (9.181, p = 0.010) suggests statistically significant non-normality, likely driven by occasional spikes in interest rates.

In summary, inflation and interest rates exhibit the most pronounced departures from normality, suggesting the presence of extreme values or structural shocks. These characteristics may influence their behavior in econometric modeling, particularly in models like ARDL, where assumptions about stationarity and distributional properties are important.

The correlation matrix in Table 3 reveals intricate interrelationships among the examined variables, offering insights into both expected and counterintuitive dynamics. Social well-being (SWE) is observed to be strongly positively correlated with urban population (UP) at 0.976 and with unemployment (UEMP) at 0.932. This suggests that regions characterized by higher urbanization tend to report elevated levels of social well-being, which could be attributable to the greater availability of public services, infrastructure, and social amenities in urban areas. The positive correlation between SWE and unemployment is less intuitive and may indicate that, within highly developed or welfare-oriented urban contexts, the negative effects of unemployment are mitigated by robust social safety nets or informal economic activities that buffer individuals against economic hardship.

At the same time, SWE displays strong negative correlations with several key economic indicators, including inflation (INF) at –0.505, GDP growth (GDPG) at –0.632, foreign direct investment (FDI) at –0.633, and interest rates (INT) at –0.838. These inverse relationships imply that increases in these macroeconomic indicators may be associated with a decline in social well-being, possibly due to the destabilizing effects of economic volatility. For instance, rising inflation and interest rates, often linked to economic expansions or contractions, might contribute to higher living costs and diminished consumer welfare, thereby undermining overall well-being.

Inflation exhibits a moderate to strong positive association with GDP growth (0.663) and interest rates (0.760), which is consistent with theoretical expectations that periods of rapid economic activity and higher aggregate demand may lead to increased inflationary pressures that are subsequently counteracted by monetary policy tightening. Additionally, inflation's moderate positive correlation with FDI (0.569) suggests that periods of inflation may coincide with elevated capital inflows, potentially reflecting investor optimism about future economic performance. GDP growth's strong positive correlation with FDI (0.727) further underscores the role of foreign investment in fostering economic expansion, while its negative associations with both unemployment (–0.644) and urban population (–0.684) might indicate that growth is accompanied by shifts in demographic or regional employment patterns.

The high correlation between unemployment and urban population (0.899) emphasizes the concentration of joblessness in urban areas, which may be reflective of rapid rural-to-urban migration that outpaces the rate of job creation or differences in employment recording practices. Both unemployment and urban population are negatively associated with FDI (–0.574 and –0.709, respectively) and interest rates (–0.796 and –0.782, respectively), suggesting that higher investment flows and tighter borrowing conditions could be linked to improved employment outcomes or a redistribution of employment opportunities away from dense urban centers.

Interest rates themselves are positively correlated with inflation (0.760), GDP growth (0.654), and FDI (0.689), implying that they tend to rise during periods of economic expansion and when inflationary pressures are significant. Conversely, the strong negative correlations between interest rates and social well-being (–0.838), unemployment (–0.796), and urban population (–0.782) indicate that increased borrowing costs may adversely affect consumer welfare, potentially through mechanisms such as reduced affordability of housing and diminished access to credit. Collectively, these findings highlight a complex interplay among economic variables and social outcomes, underscoring the need for careful interpretation in which the interdependency of market dynamics and social indicators is taken into account.

The unit root test results presented in Table 7 indicate that several variables are non-stationary at the level but become stationary at the first difference. Social well-being (SWE) and GDP growth (GDPG) are non-stationary at the level ($p > 0.05$) but become stationary after first differencing, with t-calculated values of -4.162 and -5.076, respectively, showing significance at the 5% level ($p < 0.05$). Unemployment (UEMP) also becomes stationary at the first difference (t-calculated = -3.368), although with a slightly higher p-value of 0.075, indicating near significance.

Table 7. Unit Root test

Variables	Level			First Difference		
	t-calculated	t-tabular	prob.	t-calculated	t-tabular	prob.
SWE	-0.644	-3.215	0.969	-4.162	-3.218	0.014
INF	-2.786	-2.619	0.072	-	-	-
GDPG	-2.026	-3.215	0.565	-5.076	-3.218	0.002
UEMP	-2.150	-3.215	0.499	-3.368	-3.218	0.075
UP	-2.939	-2.619	0.052	-	-	-
FDI	-6.317	-3.215	0.000	-	-	-
INT	-2.384	-3.215	0.380	-3.683	-3.218	0.039

On the other hand, inflation (INF) and urban population (UP) are stationary at the level with p-values near significance (0.072 and 0.052, respectively). Foreign direct investment (FDI) is stationary at a highly significant t-calculated value of -6.317. Interest rates (INT) become stationary after first differencing, with a significant t-calculated value of -3.683. These results indicate mixed integration orders (I(0) and I(1)) among the variables.

The short-run estimates presented in Table 5 provide valuable insights into the dynamic relationships between social well-being (SWE) and the selected macroeconomic variables in the short term. The significant and negative coefficient of the constant term ($C = -17.418$, $p = 0.034$) indicates an overall downward pressure on social well-being in the short run, aligning with the fluctuations in economic indicators.

Social well-being (SWE) shows significant negative coefficients for its first and second lags ($D(SWE(-1)) = -1.227$, $p = 0.037$; $D(SWE(-2)) = -4.094$, $p = 0.033$), suggesting a strong negative persistence effect. This implies that any decrease in SWE in the previous periods has a magnified effect on its current levels, reflecting the ongoing challenges in improving well-being. This result aligns with studies highlighting the persistent nature of social challenges, especially when economic stressors like inflation and unemployment are present [1].

Inflation (INF) also exerts a significant negative impact on SWE, both contemporaneously ($D(INF) = -0.241$, $p = 0.032$) and with its first two lags ($D(INF(-1)) = -0.894$, $p = 0.034$; $D(INF(-2)) = -0.785$, $p = 0.033$). This finding corroborates the literature, which consistently shows that inflation erodes purchasing power and reduces the quality of life, particularly in developing economies like China [29]. The prolonged negative impact of inflation suggests that high inflation rates have a lasting detrimental effect on social well-being [3].

GDP growth (GDPG) has mixed short-run effects. While it has a significant negative impact in the current period ($D(GDPG) = -0.275$, $p = 0.036$), its lagged values show a positive influence ($D(GDPG(-1)) = 0.244$, $p = 0.033$; $D(GDPG(-2)) = 0.039$, $p = 0.094$). This result reflects the dual role of GDP growth, where immediate economic expansion may initially strain social systems but eventually leads to improved social outcomes as benefits from growth, such as job creation and increased public spending, materialize [17].

Unemployment (UEMP) exhibits a significant positive relationship with SWE in the short run ($D(UEMP) = 0.515$, $p = 0.041$), but the impact reverses with its lags ($D(UEMP(-1)) = -4.405$, $p = 0.035$; $D(UEMP(-2)) = -4.534$, $p =$

0.033). This finding suggests that rising unemployment may initially correlate with improvements in SWE due to short-term compensatory mechanisms like unemployment benefits. However, prolonged unemployment severely negatively affects social well-being, consistent with the scarring effects described by Eberl et al. (2023) [19].

Urban population (UP) shows a strong positive influence in the short run (D(UP) = 8.938, p = 0.024), reflecting the benefits of urbanization, such as better access to services and infrastructure. However, the second lag is significantly negative (D(UP(-2)) = -16.226, p = 0.037), indicating that unchecked urban growth may eventually lead to issues like overcrowding and reduced quality of life, supporting the findings of Želinský et al. (2021) [23].

Foreign Direct Investment (FDI_GDP) has a significant negative effect in the current period, and its first lag (D(FDI_GDP) = -0.356, p = 0.052; D(FDI_GDP(-1)) = -0.927, p = 0.034), but turns positive in the second lag (D(FDI_GDP(-2)) = 0.961, p = 0.033). This mixed impact of FDI highlights its dual nature, where initial FDI inflows may cause short-term disruptions but eventually positively affect social well-being through job creation and technology transfer [27]. Naturally, the benefits of FDI takes a longer time to be reflected to the statistics, as more time is required for the completion of technology transfer, and for construction projects of multiple organization sites to be finished before the building could accommodate employees of the said organizations.

Finally, interest rates (INT) also display a significant negative impact in the current period (D(INT) = -1.516, p = 0.033), followed by positive effects in the subsequent lags (D(INT(-1)) = 3.979, p = 0.034; D(INT(-2)) = 1.652, p = 0.033). This indicates that higher interest rates may initially reduce consumer spending and investments, but as inflation stabilizes, the long-term benefits of interest rate adjustments become evident [29].

The error correction term (CointEq(-1) = -1.898, p = 0.033) is highly significant, indicating a strong adjustment mechanism toward long-run equilibrium. This suggests that deviations from equilibrium in the short run are corrected quickly, ensuring the system returns to a stable state over time.

The long-run estimates in Table 6 provide key insights into the sustained relationships between social well-being (SWE) and the selected macroeconomic variables. These findings reflect the lasting effects of inflation, GDP growth, unemployment, urban population, FDI, and interest rates on social well-being in China.

Inflation (INF) has a positive coefficient (0.439) in the long run, although it is not statistically significant (p = 0.289). This result indicates that while inflation may contribute positively to social well-being, the effect is not robust. Existing literature suggests that inflation generally erodes purchasing power and worsens quality of life [29]. However, mild inflation could stimulate economic activity, thereby supporting social programs, which might explain the positive but insignificant relationship.

GDP growth (GDPG) shows a negative long-run coefficient (-0.477), but this relationship is also not statistically significant (p = 0.248). This finding aligns with research by Guisan (2009) [17], which suggests that GDP growth alone does not guarantee improvements in social well-being, especially when economic gains are unevenly distributed. The lack of significance may reflect the need for inclusive growth strategies to ensure that the benefits of economic expansion are shared across different societal segments.

Unemployment (UEMP) has a positive and relatively large coefficient (2.240) in the long run, but like other variables, it is not statistically significant (p = 0.192). This result may seem counterintuitive, but it suggests that high unemployment rates may coexist with increasing efforts to improve social well-being, such as unemployment benefits and social protection schemes. Eberl et al. (2023) [19] highlighted the scarring effects of long-term unemployment, but this result suggests that social interventions might mitigate these negative effects over time.

Urban population (UP) has the strongest positive long-run effect on social well-being (coefficient = 4.325), yet it remains statistically insignificant (p = 0.232). Urbanization is generally associated with improved access to healthcare, education, and infrastructure, all of which enhance well-being [23]. However, the lack of significance may be due to challenges such as urban overcrowding and environmental degradation, which can offset the benefits of urbanization.

Foreign Direct Investment (FDI) has a positive but insignificant effect (coefficient = 0.187, p = 0.530) on social well-being. While FDI often leads to job creation and economic growth, its long-term benefits on well-being depend on the absorptive capacity of the host country [27]. The insignificant result suggests that FDI alone may not be sufficient to drive significant long-term improvements in social well-being without complementary policies that ensure equitable gains distribution.

Interest rates (INT) exhibit a significant negative relationship with social well-being in the long run (coefficient = -3.303), although the result is not statistically significant (p = 0.249). High interest rates generally suppress consumer spending and investment, negatively impacting economic growth and social welfare [29]. The negative long-run effect supports the idea that sustained high interest rates reduce economic stability and erode the quality of life.

Finally, the negative trend term (coefficient = -5.810, p = 0.240) indicates a general downward trend in social well-being over time, although it is statistically insignificant. This may reflect broader socioeconomic challenges, including rising inequality or environmental issues, which hinder long-term improvements in well-being.

In summary, while the coefficients suggest relationships consistent with existing literature, none of the variables reach statistical significance, indicating that other factors, such as policy interventions or external shocks, may be

crucial in determining long-term social well-being in China. Therefore, based on the collected data, we deduce that although the existing studied variables does play a role in affecting social well-being in China in the long-run, however, there are also variables that were not included in this research that are equally impactful in affecting the social well-being in China in the long term, such as policy intervention, external shocks and environmental issues, to name a few. Nevertheless, while this research served as an initiative, more comprehensive and in-deep research studies are required to further close the gap that had been long existed due to a lack of research towards the Chinese market.

The F-Bounds Test results presented in Table 4 provide robust evidence supporting the existence of a long-run equilibrium relationship among the variables included in the model. The computed F-statistic of 5.844 clearly exceeds the upper bound critical value of 3.62 at the 5% significance level, as well as the corresponding thresholds at the 10% and 2.5% levels. Given that the number of regressors k=6 and the actual sample size is 30, the test's critical values for finite samples further validate the significance of the result. Specifically, the observed F-statistic surpasses even the most stringent 1% upper bound of 4.39. This outcome leads to the rejection of the null hypothesis of no level relationship, indicating that the variables are indeed cointegrated. In practical terms, this implies that despite the possibility of short-term deviations, the variables move together over the long run and share a common stochastic trend. The rejection of the null hypothesis affirms the presence of a stable, long-term relationship between the dependent variable and its regressors, justifying the use of an ARDL modeling framework to capture both short-run dynamics and long-run equilibrium behavior within the data.

The model diagnostics in Table 8 indicate a strong model fit, with an R-squared of 0.996, meaning that the independent variables explain 99.6% of the variation in social well-being. The Adjusted R-squared of 0.987 further supports this, showing that the model remains robust even after accounting for the number of predictors. The Durbin-Watson statistic of 2.952 suggests no significant autocorrelation. The F-statistic of 106.768, with a p-value of 0.000, confirms the model's overall significance. The Autocorrelation L.M. test (p = 0.433) and Heteroscedasticity test (p = 0.801) indicate no issues with autocorrelation or heteroscedasticity, confirming the model's reliability.

Table 8. Model Diagnostics

R-squared	**0.996**
Adjusted R-squared	0.987
S.E. of regression	0.026
Durbin-Watson stat	2.952
F-statistic	106.768
Prob(F-statistic)	0.000
Autocorrelation LM Test	0.433
Heteroscedasticity Test	0.801

Figure 2 presents the CUSUM plot of recursive residuals, which evaluates the stability of the model coefficients over time. The blue line depicts the CUSUM statistic, while the dashed lines indicate the 5% significance levels. The CUSUM line consistently remains within the 5% significance level throughout the period, indicating high stability in the model under analysis. The CUSUM value indicates that they are not substantial, suggesting the absence of significant structural fractures. The derived model is valid and exhibits temporally stable coefficients, allowing for analysis of the variables under investigation across different time points. The CUSUM test confirms the stability of the model in this research.

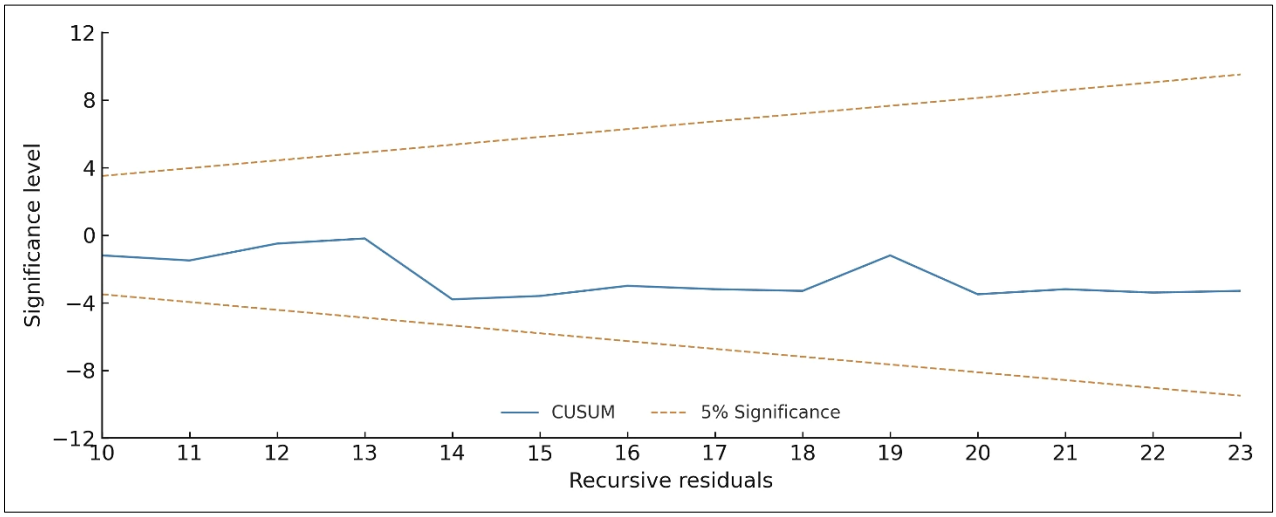

Figure 2. CUSUM

In Figure 3, the CUSUM of Squares (CUSUMSQ) measures model residual variance stability across time. Blue lines show the CUSUM of squares statistic, while dashed lines show 5% significant limits. The 5% significance criterion for CUSUMSQ is maintained throughout, suggesting no residual variation. The model shows no variance instability or error term variations, indicating continuous variance.

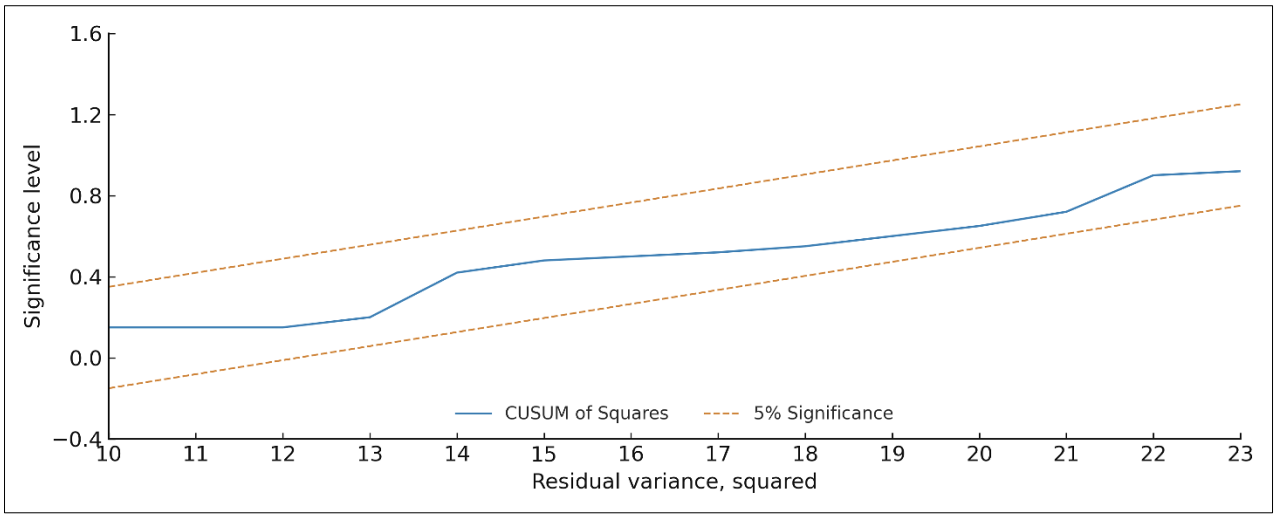

Figure 3. CUSUMSQ

The results also reject the null hypothesis of structural breaks or rapid variance shifts in the model, confirming its long-term variance stability and consistency. The model's ability to explain the research variables' relationships is confirmed.

5. Conclusion

This study highlights the significant influence of key macroeconomic variables, which are inflation, GDP per capita, unemployment, urbanization, foreign direct investment (FDI), and interest rates, on social well-being in China. The long-run cointegration analysis confirms a stable relationship among these variables, underscoring the interconnectedness between economic conditions and social welfare. Inflation negatively affects social well-being in both the short and long term, primarily by eroding purchasing power and exacerbating financial burdens, particularly among low-income populations.

Conversely, GDP per capita exerts a positive influence on social well-being, though the findings suggest it should not be viewed as the sole indicator of national development. Urbanization presents a mixed impact: while it stimulates short-term improvements in social welfare through increased economic opportunities, it also contributes to long-term challenges such as overcrowding and environmental degradation. Unemployment shows a persistently negative effect on social welfare. Although short-term impacts may be mitigated by social insurance systems, prolonged joblessness fosters social exclusion and limits access to essential services.

FDI contributes positively to long-term social well-being when strategically directed toward sectors that support inclusive growth and technological advancement. Interest rates, while not elaborated in detail here, are similarly linked to broader economic dynamics that shape welfare outcomes. Overall, the findings align with the study’s objectives by clarifying how macroeconomic variables influence social well-being across different time horizons. The analysis offers a comprehensive perspective that integrates both short-term fluctuations and long-term trends, reinforcing the importance of balanced and inclusive economic policies in promoting sustainable social development.

5.1. Theoretical and Practical Implications of the Study

This research will elucidate the impact of several macroeconomic factors, such as inflation, GDP per capita, unemployment rates, urbanization levels, foreign direct investment, and interest rates, on social well-being in China. Theoretically, it bolsters the principles of social welfare by incorporating a comprehensive Social Well-being Index, which includes life expectancy at birth and school enrollment rates as indicators of social growth. This study enhances existing material by concentrating on the socio-economic effects of macroeconomic policy and broadening the measurement of outcomes beyond the GDP indicator.

This research emphasizes the necessity of achieving macroeconomic and welfare objectives for sustainable development. These insights can assist policymakers and economists in formulating targeted actions to mitigate the adverse effects of inflation and unemployment, oversee sustainable urbanization for growth, and direct foreign direct investment for comprehensive social development.

5.2. Policy Recommendations

Given the findings of this study, it is crucial to emphasize the necessity of effective economic policies that positively influence the social security of the Chinese populace. Every economy must regulate inflation and interest rates to preserve buying power and stimulate investment, ensuring balanced economic growth and addressing social demands. To eradicate poverty, ignorance, and health issues, particularly among the youth, policymakers should promote employment, especially in metropolitan areas, as unemployment leads to social exclusion. Furthermore, it is necessary to strategize and manage the urbanization process to capitalize on its economic potential while addressing issues related to overpopulation, inadequate offshore resources, and environmental challenges. Foreign Direct Investment should be strategically directed towards industries that would facilitate technological improvement and foster development beneficial to the populace of the country. This strategy underscores the importance of aligning oro-macroeconomic management with social development objectives as essential for sustained advancement.

5.3. Limitations of the Study

This study, however, is not without limitations despite yielding comprehensive data. The study is limited to a national perspective, focusing exclusively on China. While cross-national comparisons may have been conducted, the findings may not apply to nations with differing socio-economic contexts. Secondly, regarding variable selection, the aforementioned variables are fairly conservative, hence omitting certain possible predictors of social well-being that stem from cultural or institutional factors. Third, the analysis that triangulates secondary data may likewise exhibit the biases and inaccuracies intrinsic to the utilized data sets. The long-run cointegration study establishes the enduring nature of linkages between variables, whereas short-run model representations may fail to account for any structural changes throughout the examined time.

5.4. Limitations of the Study

This study is a foundation for constructing a theoretical framework that links macroeconomic considerations to social welfare. Analyzing the relationship between IT usage and its performance implications can be enhanced by comparative cross-country studies of nations with varying socio-economic and political attributes. Furthermore, the list of variables for further inquiry might be augmented to include income, inequality, environmental sustainability, and healthcare accessibility. Employing alternative, sophisticated dynamic modeling techniques incorporating variance from external causes and structural modifications may provide a more lucid understanding of these linkages. Ultimately, focused sectoral studies on the impacts of FDI in specific areas such as renewable energy, healthcare, and education may produce targeted policy suggestions. All these methods can enhance understanding and provide deeper insights into improving social quality in diverse settings.

6. Declarations

6.1. Author Contributions

Conceptualization, J.G. and R.H.; methodology, J.G. and R.H.; software, J.G. and R.H.; validation, J.G. and R.H.; formal analysis, J.G. and R.H.; investigation, J.G. and R.H.; resources, J.G.; data curation, J.G.; writing—original draft preparation, J.G.; writing—review and editing, J.G. and R.H.; visualization, J.G. and R.H.; supervision, R.H.; project administration, R.H. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available in the article.

6.3. Funding

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6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that there are no conflicts of interest concerning the publication of this manuscript. Furthermore, all ethical considerations, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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