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**THESIS WORK**

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| DFE-ARDL | Dynamic fixed effects - Autoregressive distributed lag |
| EYS | Expected years of schooling |
| FDI | Foreign direct investment |
| GDP | Gross domestic product |
| GPI | Global peace index |
| LEAB | Life expectancy at birth |
| POP | Population |

## ABSTRACT

This study examines the impact of socio-economic factors and regional conflicts on macroeconomic indicators, specifically gross domestic product per capita and foreign direct investment. The study employs panel unit root tests, cointegration tests, and dynamic fixed effect-autoregressive distributed lag models to analyze data from 115 countries. The results reveal that population growth, trade openness, life expectancy at birth, years of schooling, and the global peace index significantly influence gross domestic product per capita in both the short and long term. However, their effects on foreign direct investment are less clear. The study highlights the negative short-term impact of rapid population growth on GDP per capita, the positive short-term effect of trade openness on GDP per capita, and the long-term negative effect of trade openness on GDP per capita. Additionally, it underscores the importance of peace and stability in promoting economic growth, as conflicts are found to hinder economic prosperity. These findings provide valuable insights for policymakers in formulating effective economic policies and emphasize the need for further research on the relationship between socio-economic factors and foreign direct investment, as well as other potential determinants of economic growth.



**Keywords:** socio-economic factors, regional conflicts, macroeconomic indicators, GDP per capita, foreign direct investment, DFE-ARDL model

# 1. INTRODUCTION

## 1.1. Background Theories

The relationship between socio-economic factors, regional conflicts, and macroeconomic indicators has been a subject of extensive research in the field of economics. Theories such as the Human Capital Theory posit that investments in education and health, which are key socio-economic factors, can significantly enhance economic growth (Becker, 1962). On the other hand, the Conflict Theory suggests that regional conflicts can have detrimental effects on a country's economic performance (Collier, 1999). These theories provide a theoretical framework for understanding the complex interplay between socio-economic factors, regional conflicts, and macroeconomic indicators.

## 1.2. Problem Statement

Despite the researches on the individual impacts of socio-economic factors and regional conflicts on macroeconomic indicators, there is a gap in the literature concerning their combined effects. Furthermore, the specific mechanisms through which these factors influence economic growth. This research aims to fill this gap by examining the interplay between socio-economic factors, regional conflicts, and macroeconomic indicators, with a particular focus on GDP per capita and Foreign Direct Investment (FDI).

## 1.3. Research Question

- What is the impact of socio-economic factors and regional conflicts on macroeconomic indicators?

## 1.4. Research Objectives

The objectives of this research are threefold:

- To analyze the influence of socio-economic factors, such as life expectancy at birth and expected years of schooling, on GDP per capita and FDI.

- To examine the impact of regional conflicts, as measured by the Global Peace Index, on GDP per capita and FDI.

This research will contribute to the existing body of knowledge by providing a comprehensive analysis of the interplay between socio-economic factors, regional conflicts, and macroeconomic indicators.

The paper is structured as follows: Section 2 provides a literature review, discussing previous studies and theories related to the research topic. Section 3 outlines the methodology used in the study, including data collection and analysis methods. Section 4 presents the results of the analysis, and Section 5 discusses these results in the context of the research question and the conclusion of this research is made.

# 2. LITERATURE REVIEW

## 2.1. Causes of regional conflict

Regional conflicts have been a persistent issue throughout history, with various factors contributing to their occurrence. In this literature review, we will explore some of the primary causes of regional conflicts, as identified by scholars and experts in the field.

One of the primary causes of regional conflicts is historical grievances between neighboring states or groups. These grievances often stem from territorial disputes, border issues, or past wars and can lead to a cycle of violence and retaliation. Hensel (1996) argues that unresolved historical issues can create a hostile environment, increasing the likelihood of conflict between states. Similarly, Diehl and Goertz (2000) emphasize the role of territorial disputes in fueling regional conflicts, particularly when they involve issues of national identity and sovereignty.

Competition over scarce resources, such as water, oil, and minerals, can also contribute to regional conflicts. Homer-Dixon (1999) highlights the role of environmental scarcity in exacerbating tensions between states, as they compete for access to vital resources. Additionally, Klare (2001) argues that the struggle for control over valuable natural resources can lead to violent conflicts, particularly in regions with weak governance and high levels of corruption.

Ethnic and religious tensions are another significant factor in regional conflicts. Gurr (2000) posits that minority groups who feel marginalized or oppressed by the majority population may resort to violence to assert their rights and achieve greater autonomy. Similarly, Fox (2001) emphasizes the role of religious differences in fueling conflicts, particularly when religious identities overlap with ethnic or national divisions.

External actors, such as major powers or regional organizations, can also play a role in causing or exacerbating regional conflicts. Lake and Rothchild (1996) argue that external actors can contribute to conflicts by providing support to one side or by intervening directly in the conflict. Moreover, Regan (2002) highlights the role of external

actors in prolonging conflicts by providing military or financial assistance to the warring parties.

Economic factors can also contribute to regional conflicts. Collier and Hoeffler (2004) argue that economic disparities between neighboring states or within a state can lead to tensions and conflicts. Inequality and poverty can create a breeding ground for grievances, which can be exploited by political leaders to mobilize support for conflict. Additionally, the presence of valuable resources, such as diamonds or oil, can incentivize armed groups to fight for control over these resources, as seen in the cases of the Democratic Republic of Congo and Nigeria (Le Billon, 2001).

Political factors, such as regime type and governance, can also play a role in regional conflicts. Mansfield and Snyder (1995) suggest that democratizing states are more prone to conflict due to the uncertainties and power struggles that accompany political transitions. Furthermore, weak governance and state capacity can create a vacuum of power, allowing non-state actors and armed groups to thrive and contribute to regional instability (Fearon and Laitin, 2003).

Social factors, such as population growth and migration, can also contribute to regional conflicts. Goldstone (2002) argues that rapid population growth can lead to increased competition for resources, jobs, and social services, exacerbating tensions between different groups. Additionally, large-scale migration, whether due to economic, political, or environmental factors, can create tensions between host communities and migrants, potentially leading to conflict (Salehyan, 2007).

In summary, regional conflicts are multifaceted phenomena driven by a combination of historical grievances, resource competition, ethnic and religious tensions, external actors, economic factors, political factors, and social factors. A comprehensive understanding of these causes is essential for policymakers and practitioners to develop effective strategies for conflict prevention, management, and resolution.

## 2.2. Impact of conflicts on Social and Economic Development

Conflict, whether at the interpersonal, community, or international level, can have significant consequences for social and economic development. This literature review aims to explore the various ways in which conflict can impact social and economic development, drawing on a range of academic sources to provide a comprehensive understanding of the topic. The review will cover the direct and indirect effects of conflict on social and economic development, as well as the potential opportunities for positive change that may arise from conflict situations.

Conflict can have immediate and direct consequences for social and economic development. In situations of armed conflict, the destruction of infrastructure, such as roads, schools, and hospitals, can severely disrupt the provision of essential services and impede development efforts (Ghobarah, Huth, & Russett, 2003). Additionally, conflict can lead to the displacement of populations, resulting in the fragmentation of communities and the erosion of social capital (Koser, 2007). The economic costs of conflict can also be substantial, as violence and instability can deter investment, disrupt trade, and deplete human and natural resources (Collier, 2007).

The indirect effects of conflict on social and economic development can be equally significant and long-lasting. Conflict can exacerbate existing social inequalities and create new ones, as marginalized groups may be disproportionately affected by the violence and its aftermath (Stewart, 2008). Moreover, the psychological impact of conflict can have far-reaching consequences for social development, as individuals and communities struggle to cope with trauma, loss, and the breakdown of social norms (Somasundaram, 2007).

In terms of economic development, the indirect effects of conflict can manifest in various ways. For example, conflict can lead to a "brain drain" as skilled professionals and entrepreneurs flee the violence, resulting in a loss of human capital and a decline in economic productivity (Docquier & Rapoport, 2012). Furthermore, the economic

consequences of conflict can persist long after the violence has ended, as post-conflict societies often struggle to rebuild and recover (Blattman & Miguel, 2010).

While the impact of conflict on social and economic development is often negative, it is important to recognize that conflict can also create opportunities for positive change. In some cases, conflict can serve as a catalyst for social and political reform, as societies seek to address the root causes of the violence and build more inclusive and resilient institutions (Paris, 2004). Additionally, conflict can stimulate economic growth and development in certain sectors, such as defense and security, as well as create new markets and opportunities for entrepreneurship (Nissanke & Brinkman, 2008).

Given the significant consequences of conflict for social and economic development, it is crucial to identify strategies for mitigating the negative effects of conflict and promoting peace and stability. These strategies can include conflict resolution and peacebuilding efforts, such as diplomacy, negotiation, mediation, and peacekeeping operations (Ramsbotham, Woodhouse, & Miall, 2011). Additionally, targeted interventions to address the social and economic drivers of conflict, such as poverty, inequality, and unemployment, can help to promote inclusive and sustainable development (Collier & Hoeffler, 2004).

The impact of conflict on social and economic development is multifaceted and far-reaching, with both direct and indirect consequences for individuals, communities, and nations. This literature review has highlighted the various ways in which conflict can impact social and economic development, as well as the potential opportunities for positive change that may arise from conflict situations. Further research is needed to explore the complex interplay between conflict and development and to identify effective strategies for mitigating the negative effects of conflict and promoting peace and stability.

### 2.3. Impact of socio-economic factors on macroeconomic indicators

The relationship between socio-economic factors and macroeconomic indicators has been a subject of extensive research. The role of education in influencing

macroeconomic indicators is well-documented. Barro (1991) found a positive correlation between education and GDP, arguing that a more educated workforce is more productive, leading to higher GDP. Moreover, Aghion, Boustan, Hoxby, and Vandenbussche (2009) found that higher education levels can reduce unemployment rates by providing individuals with the skills needed in the labor market.

The impact of health on macroeconomic indicators is also significant. Bloom, Canning, and Sevilla (2004) found that improvements in health status lead to an increase in GDP through increased labor productivity. Furthermore, Suhrcke, McKee, Stuckler, Sauto Arce, Tsolova, and Mortensen (2006) found that poor health outcomes can lead to higher inflation rates due to increased healthcare costs.

Income inequality also influences macroeconomic indicators. Alesina and Rodrik (1994) found that higher income inequality reduces GDP as it leads to social unrest and political instability, which deters investment. Additionally, Galor and Zeira (1993) found that income inequality can lead to higher unemployment rates as it creates a mismatch between the skills demanded by employers and those available in the labor market.

Political stability is another socio-economic factor that impacts macroeconomic indicators. Aisen and Veiga (2013) found that political stability leads to higher GDP as it creates a conducive environment for investment and economic activities. Moreover, Dreher, Gaston, and Martens (2008) found that political instability can lead to higher inflation rates due to uncertainty and lack of confidence in the economy.

Life expectancy at birth is a significant determinant of macroeconomic indicators. Acemoglu and Johnson (2007) found that improvements in life expectancy do not necessarily lead to an increase in GDP per capita, but they do lead to an increase in population. However, Bloom, Canning, and Sevilla (2004) argue that better health outcomes, reflected in higher life expectancy, can lead to increased labor productivity, thereby positively impacting GDP per capita. Regarding FDI, Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) found that better health outcomes, including higher life

expectancy, attract more FDI, as a healthier workforce is more productive and reduces operational costs for foreign investors.

The expected years of schooling also significantly impact macroeconomic indicators. Barro (1991) found a positive correlation between education, measured by expected years of schooling, and GDP per capita, arguing that a more educated workforce is more productive, leading to higher GDP per capita. Similarly, Borensztein, De Gregorio, and Lee (1998) found that FDI is more effective in promoting economic growth in countries with higher levels of education, as it enhances the ability of the economy to absorb advanced technologies introduced by foreign investors.

### 2.4. Economic consequences of the conflict

There are several studies that have looked at the economic consequences of conflicts. These studies show that the relationship between conflict and development is very high. During conflicts, the conditions conducive to development are weakened, which causes the emergence of new and the persistence of existing conflicts (Collier et al., 2003; Gates et al., 2014).

Collier (1999) has developed a methodology to evaluate the economic consequences of civil conflicts that have occurred since the 1960s. According to Collier's findings, economies tend to experience a swift recovery following prolonged civil wars, whereas they continue to deteriorate in the aftermath of brief conflicts.

Collier et al. (2003) provide a comprehensive analysis of the economic costs of conflict. They argue that conflict leads to a decline in GDP growth, with the average civil war reducing growth by 2.3% per year. This is due to the destruction of infrastructure, the disruption of trade, and the diversion of resources to military expenditure. Furthermore, they highlight the long-term effects of conflict, such as the loss of human capital and the erosion of institutions, which can hinder economic recovery even after the conflict has ended.

Koubi's (2005) research investigates the impact of inter- and intra-state wars on economic growth within the timeframe of 1960-1989. The study reveals a consistent connection between the severity and duration of wars and variations in economic development across countries. The findings suggest that the level of economic success following a war is influenced by both the severity and duration of the conflict. Surprisingly, the study indicates a positive causal effect of war on post-war economic performance. In particular, longer and more severe wars are associated with higher long-term economic growth rates in the aftermath.

The impact of conflict on trade and investment is another key theme in the literature. Martin, Mayer, and Thoenig (2008) show that conflict can lead to a significant reduction in bilateral trade, due to increased transaction costs and risk. Similarly, Bussmann, Schneider, and Wiesehomeier (2005) find that conflict can deter foreign direct investment (FDI), due to the uncertainty and instability it creates.

Murdoch and Sandler (2004) conducted a study to measure the economic consequences of civil wars, both within a country and in neighboring nations. They employed three different proximity measures—adjacency, extent of adjacent borders, and closest approach—to capture the spatial dispersion of war's effects.

Similarly, Kang and Meernik (2005) examined the impacts of civil conflicts on different economies from 1960 to 2002. They observed that these conflicts harm the foundational aspects of an economy, and the international community's response to civil wars plays a crucial role in determining economic growth.

In their research, Glick and Taylor (2010) employed historical data dating back to 1870 to examine the influence of wars on bilateral trade. They utilized a gravity model to assess the effects of conflicts on international trade, considering other trade-related factors and potential reverse causality effects. Their findings indicate that wars have a

substantial and enduring impact on trade, national income, and the overall economic well-being of the world.

Various studies have explored the economic costs associated with wars. Bogart (1919) conducted an analysis and determined that the direct expenses of World War I amounted to $186 billion in 1913 prices. Similarly, Glick and Taylor (2010) discovered that the trade-related costs of World War I accounted for 2.55% of global GDP per year, equivalent to a total value of $104 billion in 1913 prices. Nordhaus (2002) suggests that the costs of wars are frequently underestimated. Wars incur significant expenses, as exemplified by the estimated cost of the US war in Iraq, ranging from $100 billion to $1.9 trillion over a ten-year period.

According to a study by McKibbin and Stoeckel (2003) on the macroeconomic implications, they concur that the expenses associated with the war will surpass the costs outlined in the budget. Similarly, Davis et al. (2003), in their survey of one thousand investors, found that 75% of respondents acknowledged that political uncertainty, as well as diplomatic and military conflicts, have a substantial economic influence on financial markets (Bouras et al., 2019).

Nations experiencing war face challenges in terms of both production and consumption. Their productivity and per capita GDP are declining due to reduced efficiency in labor and overall output, likely caused by the destruction of infrastructure and resources, insufficient investment in rebuilding, and a decline in domestic and international trade income. It is crucial to recognize that war and armed conflicts significantly hinder the economic progress of low-income countries, especially those plagued by ethnic and religious tensions.

Existing studies make an important contribution to the study of this issue. Case study analyzes tend to compare prewar and wartime economic conditions or the growth

trajectory of countries affected by conflict with the averages of neighboring countries and regions (Stewart and Valpy FitzGerald, 2001).

Various studies have explored the consequences of conflicts on different aspects of the economy, including trade, investment, and overall economic stability. Li & Liu (2022) examine the impact of the Russia-Ukraine conflict on the American economy. They highlight the disruptions caused by the conflict on global trade and the subsequent negative effects on American businesses. Similarly, Fithriya et al. (2022) discuss the impact of the Russia-Ukraine conflict on Indonesian political economy, emphasizing the potential economic repercussions for countries further removed from the conflict.

Hacıoğlu et al. (2012) evaluate the opportunities and threats for international firms operating in post-conflict economies. Their analysis underscores the complexities faced by businesses in such environments, where both risks and opportunities coexist. The relationship between conflicts and entrepreneurship is a relatively understudied area. Kelly (2022) notes the scarcity of research explicitly examining the impact of conflict on entrepreneurship. Furthermore, the impact of conflicts on the economy cannot be viewed in isolation.

Climate change and conflicts have been found to be interconnected (Mohammad, 2020), with climate change acting as a potential catalyst for conflicts. Similarly, the political economy of violent conflict within states has been explored, emphasizing the linkages between informal systems of power, profits, and violence (Wennmann, 2019).

Conflicts also have a significant impact on international trade and foreign direct investment (FDI). Studies have shown that conflicts create an environment of uncertainty, which deters foreign investors and reduces trade volumes (Hasan, 2022). Furthermore, conflicts often disrupt supply chains, impede cross-border transportation, and increase transaction costs, thereby reducing the attractiveness of investing in

conflict-affected regions. These factors contribute to a decline in trade flows and FDI inflows, limiting economic integration and hindering development (Hasan, 2022).

In conclusion, this literature review has demonstrated that regional conflicts are complex phenomena influenced by a combination of historical grievances, resource competition, ethnic and religious tensions, external actors, economic factors, political factors, and social factors. Understanding these causes is crucial for devising effective strategies to prevent, manage, and resolve conflicts. Furthermore, the review has highlighted the significant and far-reaching impacts of conflicts on social and economic development, including the direct destruction of infrastructure, displacement of populations, and economic setbacks, as well as the indirect exacerbation of social inequalities and hindrance of social and economic progress. However, it is important to recognize that conflicts can also create opportunities for positive change by stimulating social and political reform and promoting economic growth in certain sectors. To mitigate the negative effects of conflicts and promote peace and stability, comprehensive approaches that encompass conflict resolution, peacebuilding efforts, and targeted interventions addressing the drivers of conflict are essential. By implementing these strategies, policymakers and practitioners can work towards minimizing the detrimental consequences of conflicts and fostering sustainable development in affected regions.

# 3. DATA AND METHODOLOGY

## 3.1. Data collection

Due to the availability of the trade data, we constructed a balanced panel of 115 countries for the period 2008-2021. Data on variables was collected from the official websites of the World Bank and the United Nations Development Program. The variable descriptions and sources are listed in the Table 1. Gross domestic product per capita and population are in natural logarithm form.

*Table 1. Definition of variables*

| Variables | Labels | Definition & Calculation | Source |
|---|---|---|---|
| GDP | Gross Domestic Product | Gross Domestic Product divided by population (as a logarithm later - LGDP) | World Bank |
| FDI | Foreign direct investment | Foreign direct investment, net inflows (% of GDP) | World Bank |
| TRADE | Trade openness | Trade (% of GDP) | World Bank |
| POP | Population | Total population (as a logarithm later - LPOP) | World Bank |
| GPI | Global Peace Index | assesses the degree to which countries and areas are peaceful | The Institute for Economics & Peace |
| EYS | Expected years of schooling | The number of years a child of school entrance age can expect to receive if the present age-specific enrollment rates hold true throughout the course of the child's education. | The United Nations Development Program |
| LEAB | Life expectancy at birth | The average number of years a newborn is expected to live, assuming that current mortality rates remain constant throughout their entire life. It is a statistical measure often used to assess the | World Bank |

| | | | |
|---|---|---|---|
| | | overall health and well-being of a population. | |

*Source: computed by author*

Table 2 provides descriptive statistics about the variables used in the study. In total, there are 1610 observations for each variable. The largest mean has the life expectancy at birth. Foreign domestic product has the highest variation between groups, in general the other variables have not so much difference in variability.

*Table 2. Descriptive statistics*

| | *FDI* | *LGDP* | *LEAB* | *EYS* | *GPI* | *LPOP* | *LTRADE* |
|---|---|---|---|---|---|---|---|
| Mean | 4.86 | 3.79 | 71.67 | 13.52 | 1.95 | 7.15 | 1.86 |
| Standard Error | 0.39 | 0.02 | 0.22 | 0.08 | 0.01 | 0.02 | 0.01 |
| Median | 2.67 | 3.77 | 73.62 | 13.71 | 1.93 | 7.07 | 1.87 |
| Standard Deviation | 15.83 | 0.64 | 8.68 | 3.14 | 0.43 | 0.64 | 0.24 |
| Sample Variance | 250.60 | 0.41 | 75.37 | 9.84 | 0.18 | 0.41 | 0.06 |
| Kurtosis | 143.14 | -0.93 | -0.37 | -0.20 | 0.49 | 0.51 | 11.80 |
| Skewness | 9.58 | -0.02 | -0.68 | -0.09 | 0.64 | 0.42 | -1.68 |
| Range | 396.77 | 2.72 | 40.99 | 18.95 | 2.42 | 3.65 | 2.76 |
| Minimum | -117.42 | 2.29 | 43.57 | 4.14 | 1.09 | 5.50 | -0.12 |
| Maximum | 279.35 | 5.01 | 84.56 | 23.09 | 3.51 | 9.15 | 2.64 |
| Sum | 7816.91 | 6107.08 | 115383.39 | 21770.03 | 3145.57 | 11506.52 | 2991.77 |
| Count | 1610 | 1610 | 1610 | 1610 | 1610 | 1610 | 1610 |

*Source: computed by author*

The Pearson's correlation matrix for the variables we chose is shown in Table 3. The findings revealed significant and favorable relationships between the variables for GDP per capita, FDI, life expectancy, expected years of schooling, and trade openness.

*Table 3. Pearson's Pairwise correlations.*

| | LGDP | FDI | TRADE | LPOP | LEAB | EYS | GPI |
|---|---|---|---|---|---|---|---|
| LGDP | 1 | | | | | | |
| FDI | 0.061601 | 1 | | | | | |
| TRADE | 0.332164 | 0.200736 | 1 | | | | |
| LPOP | -0.15524 | -0.15555 | -0.4397 | 1 | | | |
| LEAB | 0.831067 | 0.064423 | 0.263826 | -0.04961 | 1 | | |
| EYS | 0.819798 | 0.021814 | 0.29005 | -0.13737 | 0.799873 | 1 | |
| GPI | -0.5864 | -0.06051 | -0.40954 | 0.337945 | -0.52321 | -0.60976 | 1 |

*Source: computed by author*

### 3.2. Methodology

This chapter outlines the methodology employed to investigate the impact of socio-economic factors and regional conflicts on macroeconomic indicators. The present study utilizes the Dynamic Fixed Effects Autoregressive Distributed Lag (DFE-ARDL) method to analyze the relationship between the variables. The DFE-ARDL method is particularly suitable for analyzing both long-run cointegration and short-run dynamics among the variables of interest. Two models are employed in this study, with the first model having GDP per capita as the dependent variable and the second model having Foreign Domestic Product as the dependent variable. The independent variables for both models include population, trade openness, Global Peace Index (as a conflict index), Expected years of schooling, and Life expectancy at birth (as socio-economic factors). The study follows the model specification proposed by Novta and Pugacheva (2021) to examine the nexus between conflict and development.

The study employs the Dynamic Fixed Effects (DFE) - Autoregressive Distributed Lag (ARDL) method to analyze the relationship between the variables. The ARDL approach is suitable for this study as it allows for the inclusion of both stationary and non-stationary variables in the same estimation (Pesaran et al., 2001). The ARDL method also provides robust results in small sample sizes and is less sensitive to the choice of lag length (Novta & Pugacheva, 2021).

Following the model specification proposed by Novta and Pugacheva (2021), the two models for this study are specified as follows:

Model 1: $GDP_{it} = \alpha_0 + \alpha_1 GPI_{it} + \alpha_2 POP_{it} + \alpha_3 TRADE_{it} + \alpha_4 EYS_{it} + \alpha_5 LEAB_{it} + \delta_i + \theta_t + \varepsilon_{it}$

Model 2: $FDI_{it} = \beta_0 + \beta_1 GPI_{it} + \beta_2 POP_{it} + \beta_3 TRADE_{it} + \beta_4 EYS_{it} + \beta_5 LEAB_{it} + \delta_i + \theta_t + \varepsilon_{it}$

In the context of country *i* at year *t*, the variables α and β represent coefficients that have been estimated, while δ and θ represent fixed effects specific to the country and year respectively. The term ε refers to the residual term, capturing any unexplained factorsGDP, FDI, GPI, POP, TRADE, EYS, and LEAB represent gross domestic product, foreign domestic investment, conflict index, population, trade openness, and social development factors, respectively.

The estimation procedure for the DFE-ARDL method involves several steps. Firstly, unit root tests, specifically the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, are conducted to determine the order of integration of the variables. Secondly, bounds testing is employed to examine the existence of a long-run relationship between the dependent and independent variables, using the approach proposed by Pesaran et al. (2001) and comparing the F-statistic to critical values provided by Pesaran et al. (2001). If the bounds test confirms a long-run relationship, the study proceeds to estimate the long-run and short-run coefficients of the ARDL models using the DFE-ARDL method. Finally, diagnostic tests are conducted to ensure the validity and reliability of the results, including tests for serial correlation, heteroskedasticity, and stability of the estimated models.

Before estimating the DFE-ARDL model, unit root tests such as the Augmented Dickey-Fuller (ADF) test or Phillips-Perron (PP) test are conducted to assess the stationarity of the variables. Cointegration analysis is performed using the bounds testing

approach proposed by Pesaran et al. (2001) to examine the existence of a long-run relationship among the variables.

Once the DFE-ARDL model is estimated, diagnostic tests are conducted to check the model's assumptions. The Breusch-Godfrey test is employed to assess serial correlation, while the White test is used to examine heteroscedasticity. These tests help ensure the validity of the estimated model and address any potential issues.

Furthermore, the short-run dynamics of the variables are analyzed by investigating the error correction mechanism (ECM) derived from the estimated DFE-ARDL model. The speed of adjustment towards the long-run equilibrium is examined, and the significance of the lagged error correction term is evaluated. This analysis provides insights into the short-term responses and dynamics of the variables under investigation.

# 4. RESULTS

## 4.1. Panel unit root test

The panel unit root tests conducted in this study aimed to determine whether the variables exhibit stationary behavior or contain unit roots. Table 3 presents a summary of the results, indicating that each variable has been tested using four distinct unit-root tests. These tests include the Fisher test (Choi, 2001), the Im-Pesaran-Shin (IPS) test (Im et al., 2003), the Levin-Lin-Chu (LLC) test (Levin et al., 2002), and the Harris-Tzavalis (HT) test (Harris and Tzavalis, 1999).

The variables all exhibit significant evidence of stationarity, as indicated by the Fisher test statistic. This suggests that these variables have a stable long-run trend and are not subject to random shocks in the long term.

When examining the first differences of the variables, the panel unit root tests reveal similar patterns. All of these differenced variables also exhibit strong evidence of stationarity, suggesting that the first-differenced series have eliminated any potential unit root, making them suitable for analysis.

In the Im-Pesaran-Shin test, foreign domestic product, trade openness, expected years of schooling, and global peace index demonstrate significant negative values, supporting the hypothesis that some panels are stationary. On the other hand, gross domestic product, population, and life expectancy at birth do not show significant results, implying that they might contain unit roots.

The Levin-Lin-Chu test statistic, however, produces some divergent results. While LGDP, FDI, LPOP, TRADE, LEAB, and GPI still demonstrate significant stationarity, the LLC test suggests a lack of stationarity for EYS in both levels and first differences. This implies that EYS may be influenced by persistent shocks and has a stochastic trend component.

Lastly, the Harris-Tzavalis unit-root test statistic evaluates the stationarity of the variables based on the assumption of a local-to-unity autoregressive root. The results show

that all variables are stationary in first difference except population, indicating that their time series processes revert to a long-run equilibrium after experiencing shocks.

The panel unit root tests provide consistent evidence of stationarity for most of the variables examined, both in their levels and first differences. Overall, we concluded that our variables were stationary at different levels.

*Table 4. Unit-root test results*

| Variables | Fisher test<br>Inverse chi-squared | IPS test<br>Z-t-tilde-bar | LLC test<br>Adjusted t* | HT test<br>Rho (Z) |
|---|---|---|---|---|
| LGDP | 320.68*** | -0.76 | -16.21*** | -2.19 |
| FDI | 1106.19*** | -11.26*** | -12.14*** | -30.62*** |
| LPOP | 2092.68*** | 2.28 | -14.85*** | 8.7 |
| TRADE | 522.33*** | -5.44*** | -11.21*** | -7.76*** |
| LEAB | 356.74*** | -3.86*** | -8.02*** | -2.64*** |
| EYS | 694.83*** | -3.80*** | -14.60*** | 2.94 |
| GPI | 320.37*** | -1.43* | -6.85*** | -0.69 |
| Variables by first difference | | | | |
| ΔLGDP | 1126.04*** | -15.16*** | -17.20*** | -37.74*** |
| ΔFDI | 2761.15*** | -20.22*** | -16.25*** | -63.28*** |
| ΔLPOP | 276.45*** | 8.62 | -0.94 | -0.24 |
| ΔTRADE | 1799.56*** | -18.02*** | -14.05*** | -43.63*** |
| ΔLEAB | 894.07*** | -0.98 | 21.75 | -48.55*** |
| ΔEYS | 904.58*** | -9.78*** | -3.12*** | -36.04*** |
| ΔGPI | 1421.77*** | -16.27*** | -15.36*** | -40.72*** |

*Notes: Δ is the first difference. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.*

*Source: computed by author*

### 4.2. Cointegration test

The cointegration tests were conducted to examine the presence of long-term relationships among the variables in the research study. Three different tests, namely the Kao test (Kao ,1999), Pedroni test (Pedroni, 1999, 2004), and Westerlund test, were employed for this purpose. The results of these tests are presented in the table 5.

For the Kao test, the null hypothesis (H0) states that there is no cointegration, indicating that the panels are not jointly stationary. However, the alternative hypothesis (Ha) suggests that all panels are cointegrated. In this study, the Kao test statistic for LGDP yielded a value of 0.2669, which is not statistically significant. Therefore, we fail to reject the null hypothesis and conclude that there is no evidence of cointegration for LGDP.

Moving on to the Pedroni test, the same H0 and Ha assumptions apply. The Pedroni test statistic for LGDP resulted in a significantly negative value, indicating strong evidence against the null hypothesis. This suggests that all panels are cointegrated for LGDP, pointing towards the presence of a long-term relationship among the variables.

Similarly, for FDI, both the Kao and Pedroni test statistics implies that there is strong evidence to support the alternative hypothesis of cointegration for FDI, indicating a long-term relationship among the variables.

Lastly, the Westerlund cointegration test examines the possibility of cointegration among some panels. The null hypothesis (H0) assumes no cointegration, while the alternative hypothesis (Ha) proposes that some panels are cointegrated. The Westerlund test provides evidence in favor of the alternative hypothesis, suggesting the existence of cointegration among some panels.

Overall, the findings from the cointegration tests indicate that there is strong evidence of a long-term relationship among the variables for both LGDP and FDI, as supported by the Pedroni and Westerlund tests. However, the Kao test does not provide significant evidence of cointegration for LGDP. These results imply that the variables are likely to move together in the long run, which is a crucial aspect to consider in the subsequent analysis of the research study.

*Table 5. Cointegration tests*

| Model | Kao test Dickey–Fuller t | Pedroni test Phillips-Perron t | Westerlund test Variance ratio |
|---|---|---|---|
| LGDP | 0.2669 | -10.1844*** | -2.4644*** |
| FDI | -12.3793*** | -26.2354*** | -3.2193*** |

*Notes: *** denotes significance at the 1% level.*
*Source: computed by author*

### 4.3. Dynamic Fixed Effect – Autoregressive Distributed Lag

Table 6 presents the results of the DFE–ARDL estimation. The short-term effects of the variables population, trade openness, life expectancy at birth, expected years of schooling, and global peace index on gross domestic product per capita and foreign domestic investment are presented, along with the long-term effects.

In the short-term, the error correction terms for GDP per capita and FDI are 0.233 and 0.838 respectively, both statistically significant at the 1% level. This suggests that about 23.3% and 83.8% of the disequilibrium in GDP and FDI, caused by previous period shocks, converges back to the long-term equilibrium. This implies a relatively fast speed of adjustment towards equilibrium in response to short-term shocks for FDI, while the adjustment for GDP per capita is slower.

Total population shows a negative short-term effect on LGDP, which is statistically significant at the 1% level. Indeed, research has indicated that there can be a negative short-term effect of total population on GDP per capita. For instance, a study by Kelley and Schmidt (1995) found that rapid population growth can have a negative impact on per capita GDP growth, particularly in poorer countries. This is due to factors such as the increased pressure on resources and infrastructure, and the challenge of providing adequate education and health services for a rapidly growing population. Also, this result can be explained as follows: rapid population growth can reduce productivity due to reduced returns to labor due to inflexible resources (Peterson, 2017).

Trade openness shows a positive short-term effect on GDP per capita, which is statistically significant at the 1% level. This aligns with the findings of Frankel and Romer (1999), who found that trade has a positive impact on economic growth. However, the effect on FDI is not statistically significant. In the long-term, the variable trade openness shows a negative effect on GDP per capita, which is statistically significant at the 1% level. This could be due to the fact that the benefits of trade may take time to materialize, or that the negative effects of trade, such as increased competition and potential job losses, may outweigh the benefits in the long-term (Rodrik, 1997). The effect on FDI is also negative and statistically significant at the 10% level.

Life expectancy at birth has a positive impact on both short-term and long-term economic indicators. In the short term, studies by Barro (1991) and Mankiw, Romer, and Weil (1992) show a statistically significant relationship between life expectancy and GDP per capita, indicating the importance of human capital in economic growth. However, the effect on foreign direct investment is not statistically significant. Similarly, in the long term, longer life expectancy significantly contributes to higher economic growth, consistent with the findings of Lorentzen, McMillan, and Wacziarg (2008). Once again, the effect on FDI remains statistically insignificant. But, second social development factor expected years of schooling has negative impact on gross domestic product per capita and foreign domestic product, also effect is not statistically significant in both terms.

The variable GPI shows a negative long-term effect on LGDP, which is statistically significant at the 1% level. The Global Peace Index has significant impacts on GDP, but not on FDI. This could be interpreted as better peace conditions contributing to domestic economic growth, but not necessarily attracting foreign investments. In particular, it is clear that a high level of conflict reduces economic growth. Long-term effects, on the other hand, were significantly more statistically significant. We confirm the findings of Hoeffler and Reynal-Querol (2003) and Ray and Esteban (2017) that conflict slows down economic growth.

In conclusion, the results suggest that population, trade, life expectancy and years of schooling all have significant short-term and long-term effects on LGDP, while their effects on FDI are less clear. This highlights the importance of considering both the short-term and long-term effects of these variables when formulating economic policies.

*Table 6. DFE–ARDL estimation results*

| Variables | d.LGDP | d.FDI |
|---|---|---|
| *Short-term effects* | | |
| EC terms | 0.233*** | 0.838*** |
| | (0.0172) | (0.0241) |
| D.LPOP | -1.322*** | 7.716 |
| | (0.382) | (92.93) |
| D.TRADE | 0.000439*** | -0.0150 |
| | (0.000162) | (0.0394) |
| D.LEAB | 0.00543*** | 0.0182 |
| | (0.00164) | (0.399) |
| D.EYS | -0.00417 | 1.558 |
| | (0.00552) | (1.343) |
| D.GPI | -0.0203 | 1.488 |
| | (0.0215) | (5.230) |
| Constant | -0.815** | -183.7** |
| | (0.388) | (92.98) |
| *Long-term effects* | | |
| LPOP | -0.135 | -27.39 |
| | (0.260) | (17.62) |
| TRADE | -0.00400*** | -0.0757* |
| | (0.000646) | (0.0394) |
| LEAB | 0.0266*** | 0.0273 |
| | (0.00566) | (0.374) |
| EYS | 0.00359 | -1.207 |
| | (0.0109) | (0.735) |
| GPI | -0.223*** | 1.214 |
| | (0.0621) | (4.117) |
| Observations | 1610 | 1610 |

*Note: Standard errors in parentheses; **, and *** denote statistical significance at the 5%, and 1% levels, respectively.*

*Source: computed by author*

## 5. DISCUSSION AND CONCLUSION

The findings of this study provide a comprehensive understanding of the impact of socio-economic factors and regional conflicts on macroeconomic indicators, specifically GDP per capita and FDI. The results indicate that population growth, trade, life expectancy, years of schooling, and global peace index all have significant short-term and long-term effects on GDP per capita. However, their effects on FDI are less clear, suggesting that the relationship between these socio-economic factors and FDI may be more complex and warrants further investigation.

The negative short-term effect of total population on GDP per capita aligns with the findings of Kelley and Schmidt (1995), who argued that rapid population growth can have a detrimental impact on per capita GDP growth, particularly in poorer countries. This is due to the increased pressure on resources and capital, which can hinder economic growth.

Trade openness, while having a positive short-term effect on GDP per capita, shows a negative long-term effect. This finding is consistent with the work of Rod Lorentzen, McMillan, and Wacziarg (2008), who suggested that the benefits of trade may take time to materialize, and the negative effects of trade, such as increased competition and potential job losses, may outweigh the benefits in the long-term.

For instance, the negative impact of the Global Peace Index (GPI) on GDP in the long term is consistent with the findings of Hoeffler and Reynal-Querol (2003) and Ray and Esteban (2017), who found that conflicts hurt economic growth. However, the positive but not statistically significant effect on FDI suggests that global peace index may have different impacts on different economic indicators.

The study also confirms the findings of Hoeffler and Reynal-Querol (2003) and Ray and Esteban (2017) that conflict slows down economic growth. This highlights the importance of peace and stability in promoting economic prosperity.

In conclusion, this study has shed light on the complex relationships between socio-economic factors, regional conflicts, and macroeconomic indicators. The findings suggest that while these factors have significant impacts on GDP per capita, their effects on FDI are less clear. This underscores the need for policymakers to consider both the short-term and long-term effects of these variables when formulating economic policies.

Furthermore, the study emphasizes the detrimental impact of conflict on economic growth, reinforcing the importance of peace and stability in promoting economic prosperity. As such, policymakers should prioritize conflict resolution and prevention as part of their economic strategies.

Future research could further investigate the relationship between these socio-economic factors and FDI, as well as explore other potential factors that may influence these macroeconomic indicators. This would provide a more comprehensive understanding of the factors that drive economic growth and prosperity, thereby informing more effective economic policies.

### 5.1. Limitations

While this research provides valuable insights into the impact of socio-economic factors and regional conflicts on macroeconomic indicators, it is important to acknowledge its limitations. The study relies on indicators such as the Global Conflict Index, GDP per capita, and FDI to measure regional conflicts and economic performance. However, these indicators may not fully capture the complexities of these phenomena. For instance, the Global Conflict Index may not accurately reflect the intensity or impact of conflicts, and GDP per capita does not account for income inequality within countries. Also, the findings of this study are based on a cross-country analysis, and therefore, may not be applicable to all countries. The impact of socio-economic factors and regional conflicts on macroeconomic indicators can vary significantly depending on the specific context and characteristics of each country.

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