

**T.C.
SAKARYA UNIVERSITY
INSTITUTE OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS**

**A COMPARATIVE ECONOMIC GROWTH ANALYSIS:
DEVELOPING AND DEVELOPED COUNTRIES**

Sheikh Abdul KADER

PhD THESIS

Thesis Supervisor: Prof. Dr. Ali KABASAKAL

JULY- 2024

**T.C.
SAKARYA UNIVERSITY
SOCIAL SCIENCES INSTITUTE**

**A COMPARATIVE ECONOMIC GROWTH ANALYSIS:
DEVELOPING AND DEVELOPED COUNTRIES**

PhD THESIS

Sheikh Abdul KADER

Department: Economics

**“This thesis was defended face to face on 24/07/2024 and was unanimously
accepted by the jury members whose names are listed below.”**

JURY MEMBER	APPROVAL
Prof. Dr. Ali KABASAKAL	Successful
Prof. Dr. Mustafa AKAL	Successful
Prof. Dr. Şakir GÖRMÜŞ	Successful
Assoc. Prof. İbrahim DEMİR	Successful
Assoc. Prof. Murat GÜVEN	Successful

ETHICS STATEMENT

According to the Similarity Report received by your institute within the framework of the Implementation Principles, the similarity rate of the thesis work, whose information is given above, does not contain any plagiarism; I declare that I accept all kinds of legal responsibility that may arise in a possible situation where the opposite is determined and that I have received the approval document if Ethics Committee Approval is required.

Is an ethics committee approval document needed?

Yes ☐

No ☒

(The studies that require the approval of the Ethics Committee are as follows:

- All kinds of research conducted with qualitative or quantitative approaches that require data collection from the participants by using surveys, interviews, focus group work, observation, experiment, interview techniques,
- The use of humans and animals (including material/data) for experimental or other scientific purposes,
- Clinical studies on humans,
- Research on animals,
- Retrospective studies in accordance with the personal data protection law.)

Sheikh Abdul KADER

24/07/2024

THE PREFACE

This thesis, titled "A Comparative Economic Growth Analysis: Developing and Developed Countries," aims to delve into the nuanced dynamics of economic growth across diverse global landscapes. The exploration is grounded in comprehensive research, utilizing many economic indicators and statistical analyses to elucidate the intricate development patterns within developing and developed nations.

I express my sincere gratitude to all those who contributed to the completion of this study. Special thanks to my academic supervisor, Prof. Dr. Ali KABASAKAL, for his valuable guidance in shaping the direction of this project and for supporting me during the ups and downs of this research journey, Prof. Dr. Mustafa AKAL for his valuable support in many ways over the last four years, and Assoc. Prof. Dr. Murat GÜVEN gave me vital advice on economic modeling. Their insights and feedback have significantly enriched the quality of this work.

Furthermore, I appreciate the support of my family, especially my wife, Afroja Akter, Daughters Azeemah & Azveena, my mother, Syeda Zahida Haque, and my elder sister Asma Siddiqua Nitu. Their encouragement and understanding have been instrumental in sustaining my motivation.

Lastly, I extend my thanks to the academic community and all those who indirectly contributed to this study, especially the Türkiye Bursları scholarship program and my workplace, Jagannath University, Bangladesh.

The journey of crafting this project has been a scholarly endeavor that owes its completeness to various contributions and supports. I extend my heartfelt gratitude to all those who have played roles in this academic pursuit.

The interconnectedness of economic growth with multifaceted factors necessitated a rigorous examination, and the insights gained from this study are indebted to the robust methodologies employed. The preparation of this thesis adheres to the highest standards of academic writing.

As the author, Sheikh Abdul Kader, I present this thesis on July 2024, marking the culmination of an intellectual voyage that I trust will contribute meaningfully to the discourse on economic growth. Exploring developmental nuances across diverse economies seeks to shed light on the intricacies that shape our global economic landscape.

This preface serves as a gesture of acknowledgment and a testament to the collaborative spirit that underpins the pursuit of knowledge. May this thesis be a valuable contribution to the field, fostering continued dialogue and exploration in economic growth.

Sheikh Abdul KADER

24/07/2024



TABLE OF CONTENTS

ABBREVIATION.....	iv
LIST OF TABLES.....	vi
LIST OF FIGURES.....	vii
ABSTRACT	viii
ÖZET	ix
INTRODUCTION	1
1. CHAPTER: REVIEW OF LITERATURE.....	11
1.1. Introduction	11
1.2. Theoretical Literature	11
1.2.1. Economic Growth Theories.....	13
1.2.2. Supply-Side	15
1.2.2.1. The Classical Approach (Population, Natural Resources)	15
1.2.2.2. Limitations of the Classical Growth Model	16
1.2.2.3. David Ricardo (Technological Improvements in Machinery).....	18
1.2.2.4. Malthus's Growth Theory (Population Growth).....	18
1.2.2.5. Malthus, T, R; (1798). "An Essay on the Principle of Population"..	19
1.2.2.6. Short-Run Economic Growth (Labor and Capital, Technological Change).....	19
1.2.2.7. Long-Run Economic Growth (Capital Stock, Labor, Demographic Changes)	19
1.2.2.8. Intertemporal Model of Growth (Public Expenditures & Externalities, Government Spending, Investment)	20
1.2.2.9. Neoclassical Growth Model (Labor, Capital & Technology)	20
1.2.2.10. Solow Growth Model (Population Growth Rate, Savings Rate, and Technology)	21
1.2.2.11. Endogenous Growth Model: (Human Capital, Education & Technology)	22
1.2.3. Examples of Endogenous Growth Models	23
1.2.3.1. Lucas Model: (Human Capital, Education)	23

1.2.3.2. Romer Model: (Technological Change)	24
1.2.3.3. The Endogenous Growth Model Theory's Limitations.....	25
1.2.3.4. Ramsey Growth Model (Physical Capital, Human Capital, Technology, Population):.....	26
1.3. Empirical Literature.....	26
1.4. Conclusion	58
2. CHAPTER: METHODOLOGY	59
2.1 Introduction... ..	59
2.2. Overall Method.....	59
2.3. Variables and Model Overview	61
2.3.1. Variable and Developed-Developing Countries Justification and Hypothesis	62
2.3.2. Panel Data Model Specifications.....	67
2.3.2.1. Cross-Sectional Dependence Test	67
2.3.2.2. Panel Unit-Root Test	68
2.3.2.3. Panel Cointegration Test	69
2.3.2.4. Slope Homogeneity Test.....	70
2.3.2.5. Model.....	70
2.3.2.6. Panel Causality	76
2.4. Data Management and Analysis	71
2.5. Sample Size and Sampling	72
2.6. Conclusion	76
3.CHAPTER: ANALYSIS AND DISCUSSION OF RESULTS	77
3.1. Empirical Results.....	77
3.1.1. For Developing Countries	77
3.1.1.1. Descriptive Statistics.....	77
3.1.1.2. Multicollinearity and Cross-Sectional Dependence Test.....	80
3.1.1.3. Panel Unit-Root Test.....	82
3.1.1.4. Panel Cointegration Test.....	83
3.1.1.5. Slope Homogeneity Test.....	85
3.1.1.6. CCEMG and AMG Model	85

3.1.1.7. Pairwise Dumitrescu-Hurlin Panel Causality Test (For Future Researcher)	87
3.1.2. For Developed Countries.....	90
3.1.2.1. Descriptive Statistics	90
3.1.2.2. Multicollinearity and Cross-Sectional Dependence Test	93
3.1.2.3. Panel Unit-Root Test	95
3.1.2.4. Panel Cointegration Test	96
3.1.2.5. Slope Homogeneity Test.....	98
3.1.2.6. CCEMG and AMG Model.....	102
3.1.2.7. Pairwise Dumitrescu-Hurlin Panel Causality Test (For Future Researcher).....	99
4. CHAPTER: POLICY IMPLICATIONS	104
4.1. Targeted Investment Strategies for Developing Countries	104
4.2. Strengthening Institutional Capacities.....	104
4.3. Inclusive Policies for Sustainable Growth	104
4.4. Innovation and Technological Advancement	104
4.5. Fiscal and Monetary Policy Coordination	105
4.6. GLOBAL COLLABORATION FOR SUSTAINABLE DEVELOPMENT	105
CONCLUSION	106
BIBLIOGRAPHY.....	108
CURRICULUM VITAE	118

ABBREVIATION

ACS	: Association of Caribbean States
ADF	: Augmented Dickey-Fuller
ARDL	: Autoregressive Distributed Lag
ASEM	: Asia-Europe Meeting
ASIAN	: Asian Strategic Investment Alliance Network
BCBS	: Basel Committee on Banking Supervision
BRICS	: Brazil, Russia, India, China, South Africa
CADF	: Cross-sectionally Augmented Dickey-Fuller
CARE	: Cooperative for Assistance and Relief Everywhere
CARICOM	: Caribbean Community
CED	: Centre for European Dialogue
CEE	: Central and Eastern Europe
CIPS	: Cross-sectional Independence
COMESA	: Common Market for Eastern and Southern Africa
CRS	: Central Reservation System
CRTS	: Chronic Renal Tubulointerstitial Disease Survey
CSD	: Cross-sectional Dependence
DOI	: Digital Object Identifier
EAAE	: European Association of Agricultural Economists
ECM	: Error Correction Model
ECOWAS	: Economic Community of West African States
EXP	: Exports
FDI	: Foreign Direct Investment
GCC	: Gulf Cooperation Council
GDP	: Gross Domestic Product
HUMANE	: Heads of University Management and Administration Network in Europe
ICT	: Information and Communication Technology
IMF	: International Monetary Fund
IPS	: Institute for Policy Studies

ISSN	: International Standard Serial Number
IZA	: Institute of Labor Economics
JEBS	: Journal of Economics and Business Studies
LIFE	: Life Expectancy
LLC	: Limited Liability Company
MIS	: Management Information System
MIT	: Massachusetts Institute of Technology
NAFTA	: North American Free Trade Agreement
OAI	: Open Archives Initiative
ODA	: Official Development Assistance
OECD	: Organisation for Economic Co-operation and Development
OIC	: Organisation of Islamic Cooperation
OLS	: Ordinary Least Squares
ORCID	: Open Researcher and Contributor ID
PEW	: Pew Research Center
REM	: Real Estate Management
RENT	: Resource Rent
RESC	: Research Ethics in Social Care
RGDP	: Real Gross Domestic Product
SAARC	: South Asian Association for Regional Cooperation
SADC	: Southern African Development Community
SAYI	: Serials: The Journal for the Serials Community
SICA	: Central American Integration System
TFP	: Total Factor Productivity
VAR	: Vector Autoregression
VIF	: Variance Inflation Factor
VIJIL	: Vermont Journal of International Law
WDI	: World Development Indicator
YAE	: Young Academy of Europe
YIL	: Year in Law
ZBW	: Leibniz Information Centre for Economics

LIST OF TABLES

Table 1: Approaches from the Supply and Demand Side.....	12
Table 2: Model and Determinant of Growth	12
Table 3: Main Macroeconomic Elements Affecting Developed and Developing Economies' Growth	59
Table 4: Initial and Follow-up Tests for The Panel Estimation.....	61
Table 5: Predicted Indicators, a Description, a Unit of Variables and Variables.....	66
Table 6: Geo Locations.....	73
Table 7: Typewise Total Countries and Sample Size.....	73
Table 8: Income Category Define.....	73
Table 9: Final List of Sample Countries.....	76
Table 10: Descriptive Statistics of the N-29 Developing Countries.....	78
Table 11: Pairwise Correlations in Developing Countries	80
Table 12: Variance Inflating Factor and CD tests	81
Table 13: Cross-sectional Dependence Test Result for N-20 Countries	81
Table 14: CIPS Panel Unit Root Test Result.....	82
Table 15: Panel Cointegration Test Results for Developing Countries.....	84
Table 16: Slope Homogeneity Test Result	85
Table 17: CCEMG and AMG Results for Developing Countries	86
Table 18: Pairwise Causality Test for Developing Countries	89
Table 19: Descriptive Statistics of the N-20 Developed Countries.....	91
Table 20: Pairwise Correlations in Developed Countries.....	94
Table 21: Variance Inflating Factor and CD Tests	94
Table 22: Cross-sectional Dependence Test Result for N-20 Countries	95
Table 23: CIPS Panel Unit Root Test Result.....	96
Table 24: Panel Cointegration Test Result for Developed Countries.....	97
Table 25: Slope Homogeneity Test Result	98
Table 26: CCEMG and AMG Results for Developed Countries	99
Table 27: Pairwise Causality Test for Developed Countries.....	102

LIST OF FIGURES

Figure 1: Causality Test Result for Developing Countries.	87
Figure 2: Causality Test Result for Developed Countries.....	102



ABSTRACT	
Title of Thesis: A Comparative Economic Growth Analysis: Developing and Developed -Countries	
Author of Thesis: Sheikh Abdul KADER	
Supervisor: Prof. Dr. Ali KABASAKAL	
Accepted Date: 24/07/2024	Number of Pages: ix (pre text) + 118 (main body)
This study delves into a comparative analysis of economic growth patterns between developing and developed countries. Leveraging up-to-date panel data spans the period from 1990 to 2020, the research scrutinizes key indicators such as per capita GDP (Real GDP), gross capital formation, labor force, export, resource rent, life expectancy, and net FDI (Foreign Direct Investment (FDI). Sector-wise performance is meticulously examined to determine the specialization index, offering insights into the homogeneity among countries with similar endogenous characteristics. The findings reveal that none of the countries exhibit specialization in any economic sector. The study extends its focus to developing (lower-middle-income and upper-middle-income) and developed (higher-income) countries, providing a nuanced understanding of developmental indicators. Through an econometric analysis of panel data, the research validates hypotheses related to the impact of various factors on economic growth in both developing and developed nations. Descriptive statistics, multicollinearity, cross-sectional dependence tests, and unit root tests contribute to a robust empirical foundation. The study's policy implications highlight the need for tailored strategies to strengthen specific developmental indicators, emphasizing the pivotal role of education and human knowledge in driving economic growth. Overall, the research aims to enrich the discourse on global economic dynamics, offering recommendations for informed policy decisions and future research directions.	
Keywords: Economic Growth, Developing Countries, Developed Countries, GDP, Panel Data	

ÖZET	
Başlık: Karşılaştırmalı Ekonomik Büyüme Analizi: Gelişmekte Olan ve Gelişmiş Ülkeler	
Yazar: Sheikh Abdul KADER	
Danışman: Prof. Dr. Ali KABASAKAL	
Kabul Tarihi: 24/07/2024	Sayfa Sayısı: ix (ön kısım) + 118 (ana kısım)
Bu çalışma, gelişmekte olan ve gelişmiş ülkeler arasındaki ekonomik büyüme modellerinin karşılaştırmalı bir analizini içermektedir. 1990'den 2020'ye kadar olan dönemi kapsayan güncel panel verilerden yararlanan araştırma, kişi başına düşen GSYİH (REEL GSYH), brüt sermaye oluşumu, işgücü, ihracat, kaynak kirası, yaşam beklentisi, net DYY (Doğrudan Yabancı Yatırım (DYY)) gibi temel göstergeleri mercek altına alıyor. Sektör bazında performans, uzmanlaşma endeksini belirlemek için titizlikle inceleniyor ve benzer içsel özelliklere sahip ülkeler arasındaki homojenliğe ışık tutuyor. Bulgular, hiçbir ülkenin herhangi bir ekonomik sektörde uzmanlaşma göstermediğini ortaya koyuyor. Çalışma, odağını gelişmekte olan (alt) sektörlerle genişletiyor. -orta gelirli ve üst-orta gelirli ve gelişmiş (yüksek gelirli) ülkeler, kalkınma göstergelerine ilişkin incelikli bir anlayış sağlar. Panel verilerin kapsamlı bir ekonometrik analizi yoluyla araştırma, hem gelişmekte olan hem de gelişmiş ülkelerde çeşitli faktörlerin ekonomik büyüme üzerindeki etkisine ilişkin hipotezleri doğrulamaktadır. Tanımlayıcı istatistikler, çoklu bağlantı, yatay kesit bağımlılığı testleri ve birim kök testleri sağlam bir ampirik temele katkıda bulunur. Çalışmanın politika sonuçları, belirli gelişimsel göstergeleri güçlendirmek için özel stratejilere duyulan ihtiyacı vurguluyor ve ekonomik büyümeyi yönlendirmede eğitimin ve insan bilgisinin önemli rolünü vurguluyor. Genel olarak araştırma, bilinçli politika kararları ve gelecekteki araştırma yönleri için öneriler sunarak küresel ekonomik dinamikler hakkındaki söylemi zenginleştirmeyi amaçlıyor.	
Anahtar Kelimeler: Ekonomik Büyüme, Gelişmekte Olan Ülkeler, Gelişmiş Ülkeler, GSYİH, Panel Veri	

INTRODUCTION

This research is rooted in an extensive examination of the economies of both advanced and emerging nations, utilizing current panel data that includes vital indicators such as per capita GDP (Real GDP), Gross capital stock formation, labor force, exports, resource rent, life expectancy, and net Foreign Direct Investment (FDI). Using a carefully designed sampling approach, the study concentrates on countries with similar inherent characteristics related to tropical attributes. The primary goal is to evaluate the economic scenarios of nations, particularly in the lower-middle-income, upper-middle-income, and higher-income brackets, shedding light on developmental markers and providing suggestions for improvement.

This investigation operates under the fundamental assumption that none of the examined countries specializes in any specific economic sector or activity. The recommendations derived from this study have practical implications for policy-making, underscoring the ongoing necessity for research in the realm of economic growth. The analysis of economic growth as an inherent evolutionary progression has been comprehensively investigated, utilizing diverse datasets that encompass both advanced and emerging economies.

The pursuit of stable economic growth stands as a global priority, given its association with heightened per capita income, expanded job opportunities, and increase and overall enhancements in the condition of life. Nevertheless, the attainment and sustainability of economic growth present inherent challenges, as highlighted by Higgins (2015).

Theoretical perspectives on economic growth offer a framework for comprehending this phenomenon. Economic growth, defined as the improvement in the quantity and quality of goods and services produced and consumed, is reflected in the increase of the national gross domestic product (GDP). Several economic theories and growth models find their basis in essential production factors, such as technology, capital, labor, and land. The neoclassical growth theory, as exemplified by the Solow-Swan model, underscores the efficiency of the relationship between labor and capital, facilitated by technological advancements, as pivotal to economic growth. On the flip side, the endogenous growth theory posits that internal factors, rather than external ones, play a predominant role in propelling economic growth. This encompasses government policies that encourage

market competition and private-sector investments in technological progress. The theory of growth, exemplified by the model provided by Harrod & Domar, posits that economic growth is contingent on capital and saving. In contemporary economies, diverse factors like social cohesion intricately, political stability, adherence to the rule of law, advancements in the elements of production, entrepreneurial initiatives, and substantial investments influence the trajectory of economic growth in complex ways. (Batrancea et al. 2012, 2019, 2020; Batrancea & Nichita 2015).

Theoretical Background

The theoretical framework underpinning this study involves a thorough examination of economic growth, with a focus on both developed and developing nations. Through the analysis of current panel data, this study meticulously scrutinizes essential indicators such as per capita GDP (Real GDP), gross capital stock formation, labor force, exports, resource rent, life expectancy, and net Foreign Direct Investment (FDI). The research integrates three prominent economic growth theories- Keynesian, endogenous, and neo-classical to comprehend the intricate factors shaping economic growth.

The Solow-Swan model, a fundamental component of neoclassical growth theory, underscores the importance of an effective relationship between technology with capital and technology playing a pivotal role in both long-term and short-term growth. In contrast, the endogenous growth theory emphasizes internal factors, including government policies supporting market competition and private sector investment in technological progress. Furthermore, the growth theories proposed by Harrod-Domar and Keynes emphasize the pivotal role of capital and saving as essential factors in fostering economic growth.

As illuminated by the study, contemporary economies undergo growth propelled by progress in production factors, significant investment, and governmental backing. Political infrastructure and rules of government regulations are very important here. The research acknowledges economic growth as a complex process, acknowledging both its challenges and benefits, thereby offering valuable insights into academic discussions and the formulation of policies.

Furthermore, the study delves into detailed statistics concerning the economies of both developed and developing nations, utilizing current panel data to analyze crucial indicators such as per capita GDP (Real GDP), Gross capital stock formation, labor force,

exports, resource rent, life expectancy, and net Foreign Direct Investment (FDI). The examination of sector-wise performance aims to ascertain the specialization index of countries, with a specific focus on identifying homogeneous endogenous characteristics related to tropical features. The study endeavors to discern the uniformity among countries, particularly within lower-middle-income, upper-middle-income, and higher-income categories. The recommendations derived from these findings are intended to inform policy decisions and guide future research endeavors.

The understanding of economic growth as an intrinsic evolutionary process has undergone detailed examination through comprehensive analyses of datasets that include developing and developed economies. The pursuit of stable economic growth remains a global priority, given its association with elevated per capita income, expanded job opportunities, increased foreign direct investment, and overall improvements in living standards. Nonetheless, the challenges inherent in achieving and sustaining economic growth are underscored, as emphasized by Higgins (2015). The study acknowledges economic growth as a multifaceted process, recognizing both its challenges and benefits, thereby offering valuable insights into academic discourse and policymaking.

Theoretically, a rise in both the quality and quantity of goods and services, encompassing aspects of their production and consumption, is defined as economic growth. This increase is often reflected in the national gross domestic product (GDP) (Basani & Scarpetta, 2001; Batrancea et al., 2020; Helpman, 2004). The four essential production factors form the foundation of various theories and growth models in economic literature, investigating the diverse fusing of these elements (Keita, 2018). Thus, economic growth is intricately connected to a myriad of factors that shape and influence its trajectory.

Global Economic Growth

Global economic growth refers to the broad expansion of the world's economic output, typically measured by the increase in the Gross World Product (GWP) or the combined Gross Domestic Product (GDP) of entire nations. This term serves as a comprehensive indicator of the overall economic performance and development at a global level. It captures the collective performance of national economies and offers insights into the health and advancement of the global economic system. Several factors contribute to global economic growth, including:

1. Trade and Commerce: International trade fosters economic interdependence, allowing countries to gain from trade through specialization and comparative advantage. Robust trade relationships contribute to global growth.
2. Technological Advancements: Innovations and advancements in technology can drive productivity improvements, efficiency gains, and the development of new industries, all of which contribute to economic growth.
3. Investment: Capital flows and investments, both domestic and foreign, play a crucial role in stimulating economic activity. Investments in infrastructure, technology, and human capital contribute to growth.
4. Labor Force and Human Capital: The presence of a skilled and productive workforce is crucial for fostering economic growth. Strategic investments in education and training play a pivotal role in the development of human capital, thereby exerting a positive influence on overall economic performance.
5. Government Policies: Fiscal and monetary policies implemented by governments can influence economic growth. Policies that encourage stability, investment, and entrepreneurship contribute to overall economic development.
6. Global Cooperation: Collaborative efforts among countries, international organizations, and institutions can create a conducive environment for economic growth. Agreements, treaties, and partnerships promote stability and economic development on a global scale.
7. Natural Resources: The access to and effective utilization of natural sources of wealth are pivotal in contributing to economic growth. However, the sustainability of these practices has gained increasing importance to ensure long-term growth without depleting valuable resources. Striking a balance between economic development and environmental conservation is essential for fostering enduring and responsible growth.

Global economic growth is commonly measured as the percentage change in Gross World Product (GWP) or the combined Gross Domestic Product (GDP) of all countries within a specified time frame. This metric serves as a fundamental indicator for evaluating the overall expansion of the world's economic output and provides valuable insights into the trajectory of the global economy. While positive growth is generally desirable, considerations such as the distribution of growth across countries and regions, as well as its sustainability in the face of challenges like environmental concerns, inequality, and

geopolitical tensions, are crucial for achieving a balanced and inclusive global economy. Policymakers, economists, and international organizations closely monitor these global economic indicators to discern trends, identify challenges, and formulate strategies for promoting sustainable and equitable growth on a global scale.

Subject of the Study

Economic growth plays a pivotal role in shaping a nation's prosperity and overall societal well-being, influencing diverse facets of its functioning. Despite extensive research into the factors influencing economic growth, a significant gap exists in comprehending the intricate dynamics distinguishing developing and developed countries. Prevailing literature predominantly concentrates on either category in isolation, limiting our holistic understanding of the comparative elements driving or hindering economic growth. Additionally, the inherent diversity within each group and the evolving global economic interdependencies call for a more nuanced analysis. This study aims to bridge these gaps by undertaking a comprehensive and comparative exploration of the key determinants of economic growth in both developing and developed countries. Through the identification of distinctive challenges and opportunities within each group and the examination of the interplay of various factors, this research seeks to provide valuable insights for both academic discourse and policymaking. The overarching goal is to foster a more holistic comprehension of global economic dynamics.

Aim of the Study

The goal of this research is to have a comprehensive understanding of the economic variables that influence the growth paths of both industrialized and emerging nations. The following is an outline of the precise goals:

1. Comparative Analysis: Determine and contrast the economic drivers influencing the development of established and emerging nations and look for relationships between these components.
2. Differential Factor Indication: Investigate variations in factor indications between developed and developing countries concerning economic growth and its influencing factors.
3. Root Cause Analysis: Uncover the root causes of economic disparities and statuses in both developed and developing countries, providing insights into the foundational factors shaping their economic landscapes.

4. Homogeneity Identification: Assess and identify the degree of homogeneity among different countries, with a particular focus on distinguishing characteristics between lower-income and upper-income nations.

5. Data Analysis: Utilize advanced analytical techniques to examine time-series and cross-sectional data of diverse countries, offering a comprehensive perspective on the economic dynamics influencing growth. Utilizing these goals, the study aims to provide refined perspectives on the complex economic environments of developed and developing countries, promoting a more profound comprehension of the diverse elements propelling their economic expansion.

Importance of the Study

The research is important as it can provide insights into economic policy and a more profound understanding of the dynamics of the global economy. By comparing industrialized and developing nations, the study offers insightful information to decision-makers that helps them create focused and successful economic policies. The investigation into the root causes of economic statuses contributes to a nuanced understanding, enabling the design of interventions that address fundamental issues underlying economic disparities. The assessment of homogeneity among countries within different income brackets offers a basis for tailored development strategies. Beyond its policy implications, the study contributes to academic discourse by employing advanced analytical techniques, addressing gaps in the understanding of factors influencing economic growth. The findings serve as a valuable resource for scholars and researchers, enriching the empirical evidence supporting economic theories. Moreover, businesses, international organizations, and investors can leverage the study's insights for strategic planning, making informed decisions regarding investments, market expansion, and risk management. Overall, the study's significance extends to practical implications for various stakeholders involved in shaping economic strategies and interventions on a global scale. This research holds substantial significance in the realm of economic studies and policy formulation due to several key aspects:

1. Policy Implications: The insights garnered from this study can offer valuable guidance to policymakers in both developed and developing nations. By comprehending the distinct economic factors influencing growth, policymakers can formulate targeted and effective strategies to improve economic performance.

2. **Global Comparative Analysis:** The comparative analysis between developed and developing countries contributes to a broader understanding of global economic dynamics. Insights derived from such a comparative study can inform international economic strategies and collaborations.
3. **Root Cause Understanding:** By delving into the root causes of economic statuses, the study offers a nuanced understanding of the factors shaping economic trajectories. This understanding is crucial for designing interventions that address fundamental issues contributing to economic disparities.
4. **Homogeneity Assessment:** The identification of homogeneity among countries, particularly in different income brackets, provides a basis for tailored development strategies. Policymakers can benefit from insights into shared characteristics and challenges within specific groups of nations.
5. **Academic Contribution:** The study contributes to the academic discourse on economic growth by employing advanced analytical techniques and addressing gaps in the understanding of factors influencing growth trajectories. It serves as a valuable resource for scholars and researchers in the field.
6. **Strategic Planning:** Businesses, international organizations, and investors can leverage the study's insights for strategic planning. Making wise choices about risk management, market expansion, and investments requires an understanding of the economic conditions in both developing and developed nations.
7. **Empirical Evidence:** The robustness of economic theories is strengthened by the empirical evidence produced by the examination of cross-sectional and time series. The study's findings provide tangible evidence that can be used to validate or refine existing economic models.

Method of the Study

Using a variety of country categories and a long-time span from 1990 to 2020, the study's approach attempted to perform a thorough cross-country growth analysis. Using a variety of country categories and a long-time span from 1990 to 2020, the study's approach attempted to perform a thorough cross-country growth analysis. The central focus was on aligning with the research question, seeking to unveil patterns and relationships influencing economic growth. To achieve this, a robust econometric approach was adopted, incorporating various methods and scrutinizing specific indicators. Panel data

analysis played a pivotal role, allowing for a nuanced examination of economic growth patterns while addressing cross-section dependence among both developing and developed countries.

In assessing variable stationarity within the model, the panel unit root test by Pesaran (2007) was applied, providing a thorough examination while considering cross-section dependence among nations. Furthermore, the causality test developed by Dumitrescu & Hurlin (2012), called the pairwise panel causality test, was instrumental in elucidating the intricate relationships between dependent and independent variables.

Tests, including the Shapiro–Wilk test for normality, skewness and kurtosis tests, variance inflating factor (VIF) for multicollinearity, and cross-sectional dependence (CSD) test, were crucial for ensuring the robustness and reliability of the analysis

Motivation of the Study

A fundamental component of economic discourse has been the analysis of the forces driving economic growth, which has sparked the synthesis of theoretical frameworks and empirical studies. Esteemed economists such as Solow, Swann, and Romer have forged theoretical frameworks that continue to shape subsequent inquiries. Their contributions laid the foundation upon which subsequent economists, notably Barro and Sala-i-Martin, built, dedicating themselves to empirical scrutiny of established hypotheses. Against this backdrop, the current study emerges with a resolute purpose: to unravel the dynamics of economic growth by employing Barro's pragmatic growth model of 1996. This study stands poised to infuse new vigor by assessing the durability of the growth theory across a different contextual milieu, specifically within developing countries. It aspires to transcend the boundaries set by historical precedent, addressing a noticeable dearth of contemporary empirical investigations that delve into the critical factors shaping growth within the dynamic landscape of the modern economy.

The motivation propelling this study is grounded in the need to recalibrate our understanding of economic growth in light of contemporary dynamics. As we delve into the intricate web of growth determinants, the study not only responds to the exigencies of the present but also endeavors to guide future researchers toward refining and expanding this framework. By unraveling the intertwined factors that underlie economic growth, this study harbors the potential to effect profound policy changes that could, in turn, reshape the trajectory of growth in developing economies.

Study Structure

This study is organized into six carefully thought-out chapters that allow for a thorough investigation of the mechanics of economic growth in both industrialized and emerging nations.

In Chapter One: Introduction, this study begins by presenting background data and exploring the theoretical underpinnings of economic growth. Subsequently, it examines global economic growth trends, articulates the problem statement, specifies research objectives, and underscores the study's significance. The chapter concludes by outlining the overall organization of the research and setting the stage for subsequent in-depth analyses and discussions in the following chapters.

Chapter Two: Literature Review initiates with an introduction and seamlessly transitions into a thorough review of existing literature on economic growth. It navigates through theoretical underpinnings, diverse economic growth theories, and the motivating factors driving such growth. The chapter also accentuates the unique contributions of this research to the existing body of knowledge.

In Chapter Three: Methodology, the study presents the selected research technique, giving a summary of the variables, general procedure, and strategy for management and analysis of data. It further details the panel data model specifications, including tests for cross-sectional dependence, panel unit roots, and causality. The sample size and sampling methods are also elucidated.

Chapter Four: Results Analysis and Discussions: This critical chapter delves into the empirical findings, conducting a meticulous dissection of results for developed and developing countries. Utilizing a systematic approach, this research encompasses a detailed descriptive examination, a thorough scrutiny of multicollinearity, an assessment of cross-sectional dependence, an investigation of panel unit roots, and a comprehensive exploration of causality within each distinct group of countries. Through this structured methodology, the chapter aims to unravel and interpret the intricacies of economic growth dynamics, providing valuable insights that contribute to the broader understanding of the subject matter.

Chapter Five: Policy Implications: This chapter serves as a seamless transition from empirical findings to actionable insights, offering practical implications for policymakers. It proposes targeted investment strategies tailored for developing countries, accentuates

the significance of institutional strengthening, advocates for inclusive policies and innovation, and underscores the importance of global collaboration for sustainable growth. Furthermore, the chapter articulates the necessity of fiscal and monetary policy coordination, weaving together theoretical insights and real-world applicability to guide policymakers in fostering economic development.

Chapter six: Conclusion: This comprehensive study delves into the intricate dynamics of economic growth, scrutinizing the impact of key indicators across 29 developing countries and 20 developed countries from 1990 to 2020 and providing a specific idea for economic growth.

The document concludes with a comprehensive References section, cataloging all sources cited throughout the study, and an Appendix followed by a brief Curriculum Vitae providing insight into the researcher's academic and professional background.

The concluding chapter synthesizes key insights derived from the study's exploration of economic growth dynamics in both developed and developing countries. Through meticulous analysis of economic factors, the research provides valuable perspectives on distinctive growth patterns observed in different economic contexts. The comparison between developed and developing nations underscores variations in factor indications and root causes shaping their respective economic statuses. Notably, the identification of homogeneity among countries within different income categories enriches our understanding of global economic trends.

The comprehensive analysis of data (cross-sectional and time series) data illuminates the multifaceted nature of economic growth, emphasizing the significance of factors such as education, human knowledge, and effective public policies in driving economic development. The implications of these findings extend to policymakers, businesses, and researchers, offering actionable insights for fostering growth, enhancing regional development, and improving living standards.

In conclusion, our research significantly enhances knowledge of economic growth, providing a nuanced examination of diverse factors influencing developed and developing countries. The insights generated aim to guide strategic decision-making, inspire further research endeavors, and contribute meaningfully to the ongoing discourse on global economic dynamics.

1. CHAPTER: REVIEW OF LITERATURE

1.1. Introduction

This section initiates a comprehensive literature review that provides an extensive overview of key studies and findings related to the determinants of economic growth in both developed and developing countries. Scholars have thoroughly explored a diverse array of factors, including FDI, education, health, natural resource abundance, and trade openness. The research spans various global regions, encompassing Asia, Europe, Africa, North America, South America, and Australia, thus offering valuable insights into the nuanced relationships between these factors and economic growth. Theoretical frameworks, such as the endogenous growth theory, neoclassical growth theory, and Keynesian economic growth theory, have been employed to interpret and analyze the intricate dynamics at play. The literature emphasizes the multifaceted nature of economic growth, shaped by a complex interplay of internal and external factors.

1.2. Theoretical Literature

Within the realm of economic theories, two prominent perspectives, namely supply-side economics and demand-side economics, offer distinct viewpoints on the drivers of economic growth. Supply-side economics posits that the pace of economic growth is primarily determined by producers and their willingness to generate goods and services. In contrast, demand-side economics contends that consumers and their demand for goods and services play pivotal roles as financial catalysts.

Supply-side economics focuses on influencing the productivity of labor and goods, employing measures such as tax cuts and benefit reductions to incentivize work and the production of goods. This approach was articulated by U.S. economist Arthur Laffer (b. 1940) and implemented by President Ronald Reagan in the 1980s. On the other hand, the demand-side proposition is grounded in the belief that economic growth is fueled by demand. Accordingly, proponents of this perspective advocate for empowering buyers, often achieved through government spending on areas like education and unemployment benefits, thereby enhancing the spending power of individual consumers.

The study adopted a comprehensive approach, incorporating both supply-side and demand-side considerations in its analytical model. The research followed an approach and model that addresses both supply and demand-side factors to provide a more holistic understanding of the dynamics influencing economic growth.

From The Supply Side	From The Demand Side
The classical approach (Ricardo, short-run, long-run growth theory, etc., under which we can find the classical method of growth)	Keynesian approach (Total expenditure model) $YAE=C+I+G+X-M$
Neoclassical growth (Solow, Lucas, etc., what we can find)	Intertemporal model
Endogenous growth (Different models we can find here)	Ramsey growth model and logarithm model

Table 1: Approaches from the Supply and Demand Side

Source: Created by the author.

Model Name	Determinant Of Growth
The Classical Approach	Population, natural resources
Adam Smith's Growth Theory	Population (labor), investment, land (natural resources), technological change
David Ricardo's Growth theory	Technological improvements in machinery
Malthus Growth Theory	Population growth
Short Run Economic Growth	Labor and capital, technological change
Long-Run Economic Growth	Capital stock, labor, demographic changes
Intertemporal Model of Growth	Public expenditures & externalities, government spending, investment
Neoclassical Growth Model	Labor, capital & technology
Solow Growth Model	Population growth rate, savings rate, and technology
Endogenous Growth Model	Human capital, education & technology
Lucas Model	Human capital, education
Romer Model	Technological change
Ramsey Growth Model	Physical capital, human capital, technology, population)

Table 2: Model and Determinant of Growth

Source: Created by the author.

1.2.1. Economic Growth Theories

The exploration of factors influencing the augmentation or hindrance of economic growth is a fundamental aspect of theoretical and empirical growth research, yet consensus on this matter remains elusive. Two crucial advancements within economic growth theory have played a significant role in shaping the ongoing discourse on this subject – neoclassical growth theory and endogenous growth theories. These theories primarily center on factors such as the accumulation of capital assets, distinguishing them from human resource development (Solow 1956; Romer 1986; Lucas 1988). Additionally, notable contributions in economic growth literature emphasize the impact of efficiency factors (Easterly & Wetzel, 1989; Barro, 1990; World Bank, 1990; Barro & Sala-i-Martin, 1992.) and the significance of essential resources for economic growth, including institutions, legal frameworks, demographics, geography, socioeconomic aspects, and political factors (Barro, 1999, 2003; Sachs & Warner, 1995; Burnside & Dollar, 2000; Radelet et al., 2001)

The neoclassical growth theory of Solow-Swan (1956), also known as the exogenous model of growth, assumes that the accumulation of physical assets is a central factor for economic growth in the short run, while technology plays a decisive role for growth in the long-term. A critical extension of the growth theory (neoclassical) involves integrating the stock of human resources as a factor contributing to economic growth, in addition to the accumulation of physical resources. (Mankiw et al., 1992; Islam, 1995). Endogenous growth theorists, on the other hand, contribute significantly by incorporating productivity elements such as learning-by-doing and functional technological abilities (research and development) as vital drivers of economic growth (Aghion & Howitt, 1992; Stokey et al., 1995; Grossman & Helpman, 1991; Romer 1986, 1990; Lucas, 1988).

In various nations, the consistency of macroeconomic determinants, which include factors like the accumulation of physical capital (investment) and human capital stock, along with productivity factors such as technological growth, has been acknowledged as crucial for economic development (Grossman & Helpman, 1992; Aghion & Howitt, 1991; Mankiw et al., 1992; Romer, 1986, 1990; Lucas, 1988; Solow, 1956; Frankel, 1962). Nevertheless, there are proponents who argue that elements that influence the efficiency of investment and savings are impartially crucial in shaping economic growth. (Easterly & Wetzel 1989; World Bank 1990; Fischer 1992). These efficiency factors gained

prominence in the 1990s, focusing on the stability of the macroeconomic environment, the quality of the institutional framework related to political and economic governance, incentive structures, social infrastructure, and the establishment of appropriate pricing mechanisms and regulatory environments to facilitate market clearing (Snowdon & Vane 2005; World Bank 1990;).

Fischer (1992) asserts that macroeconomic stability is critical for economic growth due to the uncertainty it introduces regarding the future value of financial variables. This uncertainty can arise from policy-induced factors, impacting the efficiency of the pricing mechanism. For instance, expectations of increasing inflation, government spending, actual exchange rates, accurate interest rates, and population growth can adversely affect future economic growth rates. Another source of uncertainty is temporal, where investors withhold investments until the macroeconomic environment stabilizes, potentially leading to capital flight if not managed properly (World Bank 1990; Barro 1990; Pindyck 1988; Pindyck & Somalino 1993).

Examining the impact of government spending on economic growth, Barro and Sala-i-Martin (1992) identified a negative effect of high government expenditure. Conversely, factors like inflation, real exchange rate stability, foreign aid, economic development and repression, international trade, and population growth have undergone extensive research, yet a consensus on their correlation with economic growth remains elusive (Ciccone & Jarocinski, 2010; Sala-i-Martin, Doppelhofer, et al, 2004; Rodrik, 2008; Bruno & Easterly, 1998; Knight, Loayza et al, 1993; Dollar, 1992; Boserup, 1996; Burnside & Dollar, 2000; Riddell, 1987; Fischer, 1983; Stockman, 1981; McKinnon, 1973; Shaw, 1973; Sidrauski, 1967; Tobin, 1965; Mundell, 1963; Samuelson, 1964; Balassa, 1964; Chenery & Strout, 1966)

In-depth empirical inquiries have been undertaken to examine the factors that impact economic growth. Some economists advocate for a comprehensive approach, considering as many determinants as possible with sufficient pooled-country data and analytical confidence (Sala-i-Martin, Doppelhofer et al., 2004; Bayraktar, 2006). This approach suggests that ensuring the robustness of determinants involves incorporating a broader set of factors. However, it also highlights that certain factors may exhibit varied effects, cautioning against the adoption of one-size-fits-all economic strategies.

While data can offer a valuable analytical framework to identify usual determinants of growth, governments face challenges in pinpointing the precise drivers of economic expansion within their particular economic contexts. Contemporary theory on empirical growth underscores the importance of country-specific improvement strategies and economic changes, suggesting that these may lead to distinct stability and trajectories for income growth per capita (Durlauf & Johnson 1995; Azariadis & Drazen 1990;). Currently, the essential factors propelling economic growth remain unclear. Hence, this paper aims to provide a qualitative review of the current body of empirical theory concerning the elements influencing growth & focusing on assessing whether there is consent among growth economists regarding the main economic determinants that either promote or hamper the growth of the economy. The subsequent sections delve into a detailed discussion of these aspects.

1.2.2. Supply-Side

1.2.2.1. The Classical Approach (Population, Natural Resources)

The realm of economic growth theories is commonly divided into three categories: classical, neoclassical, and new growth theories. Originating during the Industrial Revolution and chiefly developed by British economists, the classical approach proposes a consistent and unchanging state of development. According to this theory, economic growth results from capital accumulation and reinvestment of profits obtained through specialization, division of labor, and the pursuit of comparative advantage.

The Classical Growth Theory posits that a nation's economic growth will decelerate in the face of a burgeoning population and finite resources. This proposition stems from the assumptions of classical growth theorists, who argue that rapid growth in real GDP per capita inevitably triggers a population explosion, putting constraints on a nation's resources and subsequently diminishing actual GDP. Consequently, the pace of economic growth in the country starts to slow down.

In the graphical representation, the y-axis represents total production, and the x-axis depicts labor. The OW curve outlines the overall subsistence level. When the population level (labor level) is ON, and the production level is OP, the per capita wage is denoted by NR, resulting in a surplus or profit of RG due to abundance. This initiates the capital formation process. While the total population remains constant at ON, wages exceed subsistence wages ($NG > NR$), and the labor force expands as the curve progresses toward

OM. Population growth generates a surplus, and this process continues until reaching point E, as indicated by the arrow. Point E denotes a stationary situation where wages and total output are equal, and no surplus is generated. Classical economists contend that, despite technological advancements shifting the production function upwards (illustrated by the TP2 curve), economic stagnation can be postponed but not ultimately averted, according to the growth theory of classical economists.

1.2.2.2. Limitations of the Classical Growth Model

1. Oversight of Technological Influence: One significant limitation of the classical growth model lies in its failure to acknowledge the potential impact of effective technological progress on an economy's functioning. The model neglects the considerable influence that technological innovation can wield over economic growth, a facet insufficiently addressed within the classical framework.

2. Inexact Computation of Total Wages: The classical growth model assumes that real wages persist within a range centered around the subsistence level. However, this assumption lacks complete precision. Alterations in the industrial structure and substantial economic developments can result in total wages being either above or below the subsistence level. Additionally, the model disregards the role of trade unions in the wage-setting process. The intricate dynamics of real-world wage fluctuations and the involvement of organized labor are dismissed in the classical growth theory.

The classical growth theory, pioneered by British economists like Adam Smith, Thomas Malthus, and David Ricardo, focused on analyzing the mechanisms of economic growth. While their contributions were foundational in the evolution of modern growth theory, the limitations of their model, such as overlooking technological advancements and imprecise wage determinations, highlight the necessity for more comprehensive frameworks in contemporary economic analyses.

Adam Smith (Population-Labor, Investment, Land-Natural Resources, Technological Change)

When Smith penned his renowned treatise in 1776, he labeled it as an exploration of permanency. Some scholars propose that it specifically delved into economic growth, deviating from the Cantillon-Physiocratic process that focused on the "natural equilibrium" of circular flows and reintroduced considerations significant to the Mercantilists.

This work, titled "An Inquiry into the Nature and Causes of the Wealth of Nations" (1776), introduced a model of economic growth driven by the supply side. Smith's departure from earlier economic theories and his emphasis on factors influencing growth constituted a noteworthy contribution, establishing the foundation for understanding wealth and prosperity from a supply-side perspective.

$$Y = f(L, K, T)$$

Place Y is output, L is labor, K is capital, and T is land, so output is associated with labor, land & capital inputs. Therefore, yield growth (g_Y) was pushed via population increase (g_L), investment (g_K), land increase (g_T), and increases in ordinary productiveness ($g_{1/2}$). Succinctly:

$$g_Y = f(g_L, g_K, g_T)$$

Smith asserted that population growth, following typical behavior patterns, was endogenous over time and contingent on available assets for accommodating expanding manpower. Indeed, he viewed investment as endogenous, primarily shaped by savings from capitalists. Territorial expansion relied on obtaining new lands (e.g., colonization) or making practical enhancements to existing lands. Smith argued that technological progress should contribute to overall growth, highlighting in his well-known dissertation that the labor division, especially specialization, played a crucial role in improving economic growth. Furthermore, he identified advancements in equipment and global trade as growth engines, facilitating increased specialization within the economy.

Smith also held the belief that the "division of labor is constrained by the amount of the market," presenting the economies of scale argument. According to him, the division of labor boosts output, enhancing "the content on the market," creating opportunities for additional specialization and labor division, leading to further growth. Consequently, he argued that this growth was exhibiting positive returns to scale.

Smith emphasized the role of savings in the hands of capitalists as a pivotal determinant of a nation's growth. He observed that income distribution was highly specific and considered it one of the most critical factors influencing a country's growth pace. However, Smith noted that the stockholder's income was affected by the savings. He theorized that income would decline, not due to diminishing marginal productivity but because capitalists, in their pursuit, would resist wage increases for workers. According to Smith, this could lead to a potential reduction in the standard of living conditions of

workers, serving as other avenues to sustain and enhance development, even though it would counter-effectively limit labor force growth.

Despite acknowledging the concept of increasing returns, Smith did not advocate perpetual growth. He envisioned a scenario called the "stationary state," where population increase and capital accumulation would be zero. In this conceptual state, Smith proposed a theoretical limit to continuous economic expansion.

1.2.2.3. David Ricardo (Technological Improvements in Machinery)

In 1817, David Ricardo introduced refinements to Adam's Classical Growth model, incorporating the concept of diminishing returns to land. Ricardo emphasized that while the development of factor inputs is crucial as output grows, land differs from labor in being "variable in quality and fixed in supply." As economic growth advances, the cultivation of enough land becomes necessary, but given that land may not be "created," two implications for growth arise: firstly, insufficient land supply leads to an increase in rents (land owner) over time, reducing capitalists' income; secondly, as more workers demand higher wages, wage costs (agriculture) will rise over time, cutting into profits. Ricardo introduced a faster constraint to growth than Adam Smith but acknowledged the potential counteraction of this trend by technological improvement in machinery (although with diminishing productivity) and specialization facilitated by business. Nevertheless, Ricardo also recognized the existence of stationary states.

Nonetheless, in the 3rd edition of his principles, he modified his position regarding machinery. He contended that machinery displaces labor, and the labor "set free" cannot be absorbed elsewhere simultaneously, as capital is not released at the same time. This exerts downward pressure on wages, leading to a reduction in the income of labor. To reintegrate more people without this effect, the magnitude of asset accumulation might increase. However, there is no evidence for this, aligning partially with the described trend where income and savings decline over time.

1.2.2.4. Malthus's Growth Theory (Population Growth)

Thomas Robert Malthus, an important British economist of the 18th century, became famous for his theories on population growth, which he set out in his book of 1798. "An Essay on the Principle of Population." Malthus postulated that populations would persist in growing until the increase was impeded or reversed by factors such as disease, famine, war, or calamity. The Malthusian theory suggests that growth in human size surpasses the

growth of the food supply, resulting in famines, wars, and diseases that subsequently curtail the population. Malthus was of the belief that the human population had experienced significant growth over the past three centuries.

1.2.2.5. Malthus, T, R; (1798). "An Essay on the Principle of Population"

David Ricardo's portrayal is comparatively more pessimistic than Adam Smith's. However, an even more ominous perspective was put forth by T. R. Malthus in 1796 by his well-known assertion that human growth was challenging to restrain and would inevitably outstrip resources, resulting in increasing misery. John Stuart Mill, a follower of Ricardo, likely underscored the importance of population control to avert declining growth and perceived stationary states as undesirable conditions to be avoided.

1.2.2.6. Short-Run Economic Growth (Labor and Capital, Technological Change)

Short-term economic growth denotes the expansion of GDP within a brief timeframe. In instances where the economy operates below its potential (within the production possibility frontier), short-term growth can manifest without a concurrent increase in productive capacity; rather, it involves optimizing the utilization of existing resources.

The underlying principle of short-term growth posits that it arises from fluctuations in the levels of labor and capital input within the production function. Furthermore, the theory underscores the essential role of technological change, affirming that continuous economic growth is unachievable without ongoing advancements in technology.

1.2.2.7. Long-Run Economic Growth (Capital Stock, Labor, Demographic Changes)

Within the domain of long-term economic growth, three fundamental factors emerge as primary drivers of enduring expansion. Firstly, the accumulation of capital stock, encompassing tangible assets such as machinery and infrastructure, plays a pivotal role in nurturing economic growth over extended periods. This emphasis on continuous capital accumulation underscores the importance of sustained investments in productive resources.

Secondly, the augmentation of labor inputs, particularly the expansion of the labor force and increased working hours, constitutes another vital contributor to long-term economic development. A continually growing workforce and heightened labor input serve as essential elements propelling sustained economic expansion and prosperity.

Thirdly, technological advancement stands as a cornerstone of long-term economic growth. Innovations and enhancements in technology not only boost productivity but also contribute to overall economic efficiency. This highlights the transformative influence of technological progress in shaping the trajectory of economies over prolonged periods.

In addition to these primary factors, long-term growth is influenced by productivity development, demographic shifts, and labor force participation. These multifaceted elements collectively contribute to the intricate dynamics of sustained economic expansion. Furthermore, when economic growth aligns with the growth in the money supply, a synergistic relationship is established, creating an environment conducive to continued long-term growth and prosperity.

1.2.2.8. Intertemporal Model of Growth (Public Expenditures & Externalities, Government Spending, Investment)

The intertemporal growth model is centered on the concept of intertemporal choice, which entails decisions made in the short term that can impact future financial opportunities. Theoretically, decisions like spending habits can significantly influence future consumption levels, highlighting the inherent trade-offs between current and future well-being.

Within the framework of endogenous growth, the intertemporal model introduces the idea that investment is linked to the commitment to public consumption and externalities associated with public capital. Government spending, a pivotal aspect in this model, is broken down into various components, including maintenance, security, and funding across sectors such as education, health, and basic infrastructure. The intertemporal model acknowledges the intricate interplay between present decisions and future consequences, emphasizing the importance of carefully considering resource allocation and public investments to ensure sustained growth and well-being over time.

1.2.2.9. Neoclassical Growth Model (Labor, Capital & Technology)

The Neoclassical Growth Model, a fundamental economic growth theory, elucidates the dynamics of a stable economic growth rate through the interaction of three essential economic forces: labor, capital, and technology. At its core, this model posits that sustained economic growth is achieved by optimizing the utilization and augmentation of these three key factors. The widely recognized and straightforward version of the Neoclassical Growth Model is the Solow-Swan Growth Model. This framework serves

as a cornerstone for understanding how economies evolve, emphasizing the crucial role played by labor, capital accumulation, and technological progress in fostering long-term economic growth.

1.2.2.10. Solow Growth Model (Population Growth Rate, Savings Rate, and Technology)

The Solow Growth Model, crafted by the Nobel Prize-winning economist Robert Solow, represents an exogenous approach to understanding economic growth dynamics. This model scrutinizes alterations in an economy's output level over time, attributing variations to changes in the population growth rate, savings rate, and the pace of technological progress. Considered a cornerstone in the contemporary theory of economic growth, the Solow Growth Model operates under several key assumptions:

1. **Population Growth:** The model assumes a constant growth rate (g) for the population and establishes a link between the current population (N) and the future population (N') via the equation for population growth $N' = N(1+g)$.
2. **Consumption:** It is assumed that all consumers save a constant portion of their income (savings rate, s) and use the remaining portion for consumption. This relationship between consumption (C) and production (Y) is expressed by the consumption equation $C = (1-s)Y$.
3. **Production Technology:** Uniformity prevails in the production technology adopted by all firms in the economy. The output (Y), capital (K), and labor (L) are interlinked through the production function equation $Y = aF(K, L)$.
4. **Constant Returns to Scale (CRS):** The model assumes constant returns to scale in the production function. This implies that doubling the levels of capital stock and labor leads to a precise doubling of the output. The analysis often centers on output per worker and capital per worker.
5. **Capital Accumulation:** The present and future capital stock (K and K'), the depreciation rate (d), and the level of capital investment (I) are interconnected through the capital accumulation equation $K' = K(1-d) + I$.

Implications:

1. **Long-Term Growth:** According to the Solow Growth Model, no sustained long-term growth is predicted. If countries share the same savings rate, capital depreciation, and human growth rate, then those countries are anticipated to reach identical steady states

and converge. This phenomenon is termed conditional convergence, where less affluent countries are expected to experience faster growth.

2. **Saving Rate Impact:** Countries characterized by distinct saving rates may exhibit different steady states and might not necessarily converge. The model does not foresee absolute convergence. The growth of countries with lower initial capital stock may not always outpace others, contingent on their saving rates.

1.2.2.11. Endogenous Growth Model: (Human Capital, Education & Technology)

According to the Endogenous Growth Model, internal economic variables rather than outside forces are what propel economic growth. This viewpoint is based on the idea that innovations, knowledge, and human capital are critical components of productivity growth, which in turn has a favorable impact on the economy as a whole.

The inception of the Endogenous Growth theory was prompted by dissatisfaction with the notion that exogenous factors exclusively determined long-term economic growth. The projections of neoclassical exogenous growth models, which failed to sufficiently take technological development into account, are called into question by this method. Rather, the theory of Endogenous Growth highlights the importance of internal variables, namely developments in technology, in influencing economic growth.

Key Assumptions in the Endogenous Growth Theory:

1. **Government Involvement:** Advocates of the Endogenous Growth Theory highlight the need for government intervention in providing incentives and subsidies to businesses. This approach aims to encourage private-sector enterprises to invest in research and development, fostering a continuous drive for innovation.

2. **Human Capital Investment:** The theory asserts that investments in human capital, achieved through education and training programs, result in increasing returns to scale. Such investments enhance the quality of labor, leading to heightened productivity and economic growth.

3. **Entrepreneurial Support:** Government policies should be designed to support entrepreneurs, facilitating the creation of new businesses and job opportunities. This emphasis on entrepreneurship contributes to the dynamic growth of the economy.

4. **Strategic Infrastructure Investments:** The Endogenous Growth Model underscores the importance of strategic investments in infrastructure and manufacturing processes to

drive innovation in production. These investments are viewed as essential for sustained economic growth.

5. Intellectual Property Rights: Businesses are encouraged to grow when their copyrights and patents are recognized. Intellectual property protection encourages innovation and creativity, which further boosts economic growth.

In summary, the Endogenous Growth Model offers a holistic perspective on economic growth, emphasizing the internal factors of innovation, human capital development, and government policies to drive sustained and dynamic economic expansion.

1.2.3. Examples of Endogenous Growth Models

1.2.3.1. Lucas Model: (Human Capital, Education)

The Lucas Model stands as an exemplary representation of an Endogenous Growth Model, with a specific focus on the pivotal roles played by human capital and education in propelling economic growth. Developed by Robert Lucas within the framework laid out by Uzawa for endogenous growth, this model accentuates the significance of investing in human capital as a primary catalyst for the growth process.

Key Features of the Lucas Model:

1. Investment in Human Capital: As per Lucas, investing in education and training results in the development of human capital, proving to be a crucial factor in fostering economic growth. This investment not only elevates the productivity of the workforce but also generates spillover effects, positively impacting the efficiency of capital and other workers throughout the economy.
2. Internal Effects of Human Capital: The model discerns between internal and external effects of capital (human). Internally, individual training witnesses an enhancement in productivity. Externally, these spillover effects contribute to the improved productivity of capital and other workers across the economy.
3. Production Function: Firms' output in the Lucas model is encapsulated by the production function $Y_i = A(K_i) * (H_i) * H_e$. Here, A represents the technical coefficient, K_i and H_i signify the inputs of physical and human capital, and H_e denotes the strength of external outcomes from human capital influencing each firm's productivity.
4. Returns to Scale: Each firm in the Lucas model contends with constant returns to scale while the entire economy experiences increasing returns. This underscores the model's

premise that learning through doing or on-the-job training, alongside spillover effects, are integral components of human capital.

5. Technology as a Public Good: In the Lucas model, technology is treated as a public good, emanating as a byproduct of firms' investment decisions. Firms are viewed as price takers, resulting in equilibrium with numerous firms operating under conditions of perfect competition.

6. Endogenous Technology: Notably, the model generates technology endogenously as an outcome of firms' investment choices. This highlights the dynamic interplay between investment in human capital, particularly through education and training, and the progression of technology as driving forces behind economic growth.

In essence, the Lucas Model elucidates how strategic investments in human capital, especially through education and training, exert both internal and external effects, shaping overall productivity and technological advancements within an economy.

1.2.3.2. Romer Model: (Technological Change)

The Romer Model, developed by Paul Romer, emphasizes the pivotal role of ideas and technological change in driving economic growth. Romer contends that ideas hold greater significance than natural resources in the growth of an economy. He illustrates this point by referencing Japan, a nation with limited natural resources that achieved remarkable growth by embracing new Western ideas and technology during the Meiji era.

Key Features of the Romer Model:

1. Primacy of Ideas: In the Romer Model, economic growth is propelled by the generation and dissemination of ideas. Romer argues that advanced designs for durable manufacturing items are crucial for final production, and these ideas drive technological change.

2. Three Ways of Knowledge Entry: There are three ways that new information enters the manufacturing process. First, a new design is applied to produce a new intermediate input in the intermediate products industry. There are three ways that new information enters the manufacturing process. First, a new design is applied to produce a new intermediate input in the intermediate products industry. Secondly, labor, human capital, and existing manufacturer durables produce the final product in the final sector. Thirdly, a new design improves the knowledge inventory as a whole, increasing the productivity of human resources working in the research industry.

Assumptions of the Romer Model:

The Romer Model operates on several key assumptions that elucidate its perspective on the sources and dynamics of economic growth:

1. Economic growth from Technological Change: The model posits that the impetus for economic growth lies in technological advancements.
2. Endogenous Technological Change: In the Romer Model, technological change is deemed an inherent and integral aspect of the overall growth process.
3. Crucial Role of Market Incentives: Market-driven incentives are fundamental in facilitating the accessibility of technological changes to the broader economy.
4. Human Capital Requirement for New Designs: The creation of a new design is contingent upon a specified quantity of human capital.
5. Fixed Aggregate Supply of Human Capital: The total supply of human capital available is considered constant.
6. Partially Excludable Knowledge: Knowledge or a new design is acknowledged as partially excludable and can be retained by the originating organization, often through mechanisms like patents.
7. Incentives via Patents: Patents are viewed as providing incentives for firms to engage in research and development, fostering innovation. Simultaneously, these patents allow other companies to benefit by learning from the protected designs.

The Romer Model, with its emphasis on the dynamic interplay of ideas and technology, highlights the pivotal role of innovation and knowledge creation in steering sustained economic growth. It accentuates how research and development, coupled with market incentives and knowledge dissemination, collectively shape the growth trajectory of an economy.

1.2.3.3. The Endogenous Growth Model Theory's Limitations

The Endogenous Growth Model, a significant framework in economic theory, is not immune to criticisms and limitations. One notable challenge is the difficulty in accurately assessing the assumptions upon which the model relies. The intricate nature of the variables involved makes it challenging to validate the model empirically. Moreover, critics argue that there is a lack of sufficient empirical evidence to support the model's theoretical constructs, raising concerns about its real-world applicability and predictive accuracy. Another point of contention lies in the potential ambiguity in classifying capital

within certain endogenous growth models, particularly in distinguishing between physical and human capital. Critics also emphasize that the model may overlook the role of organizations, placing excessive emphasis on human capital while neglecting factors like institutional frameworks, innovation strategies, and entrepreneurial activities. In summary, while the Endogenous Growth Model has made significant contributions to economic thought, careful consideration of its assumptions and potential limitations is essential for its effective application in understanding and guiding real-world economic dynamics.

1.2.3.4. Ramsey Growth Model (Physical Capital, Human Capital, Technology, Population):

The Ramsey Growth Model, originally proposed by Frank Ramsey in 1928 and gaining substantial recognition in the 1960s, presents a systematic alternative to the ad hoc elements inherent in Solow's growth theory. Its resurgence in the mid-1980s marked the inception of endogenous growth theory in macroeconomics.

In this model, the output is determined by the capital stock, which can be allocated to either investment or per capita consumption, establishing an intertemporal budget constraint. The decision to save is influenced by the trade-off between present and future consumption, considering the diminishing utility of current consumption in contrast to the potential for increased future marginal consumption through capital stock growth.

The closed economy in this model involves the production of a single composite good, utilizing labor and physical capital and employing a neoclassical production technology. Growth implications suggest a lack of long-run growth, with the ultimate level contingent on factors such as productivity, depreciation rate, time preference rate, and income share. The transitional dynamics are shaped by the interplay between the capital share in income and the intertemporal elasticity of substitution. Moreover, factors influencing economic growth encompass natural resources, physical capital, population or labor, human capital, technology, legal frameworks, poor health, low levels of education, and the absence of necessary infrastructure.

1.3. Empirical Literature

Özbey (2023) analyzed the causal relationship between the growth of Gross Fixed Capital Formation (GFCF) and economic growth in South Africa using Granger causality analysis. The study employed a frequency domain approach to provide a more

comprehensive examination of these causal links. This methodology involved decomposing time series data into weighted sinusoidal components and conducting separate Granger causality tests for each component. The results of the analysis revealed a bidirectional relationship between capital formation and economic growth in South Africa, with statistically significant results even at the 1% significance level. Furthermore, the study finds that the causality from fixed capital formation to economic growth is more pronounced at lower frequencies compared to the reverse causality. This suggested that the impact of economic growth on capital formation is stronger than the impact of capital formation on economic growth in South Africa.

Batrance et al. (2021) conducted an investigation spanning from 2001 to 2019. Utilizing a panel multimodal approach, the study identified crucial economic indicators such as gross domestic savings, gross capital formation, export, and import as influential factors impacting economic growth. The findings underscored the significant role of FDI inflows and outflows, which shape capital and savings, suggesting that effective policies in this regard could be implemented by national authorities to stimulate growth, particularly in countries in Africa.

Pasara & Garidzirai (2020) showed that South Africa is grappling with persistent macroeconomic challenges, including stagnant economic growth, declining investment, and high unemployment rates. To address these issues, policymakers are using Gross Capital Formation (GCF) as a tool to boost employment and stimulate economic growth (GDP). This study analyzes the causal relationships among these three variables using time series data from 1980 to 2018 and a Vector Autoregressive (VAR) framework. The first model indicates a positive long-term association between GCF and GDP. However, it suggests that unemployment (UNEMP) does not have an immediate impact on GDP. The second model reveals a significant and positive correlation between UNEMP and GCF, while the third model shows an inverse relationship between GDP and UNEMP. Based on these findings, the study recommends that fiscal authorities implement expansionary fiscal policies to promote economic growth, investment, and job creation. In a related study, Samsuddin & Amar (2020) concentrated on analyzing the factors of growth in G20 countries (developing nations). The variables considered included Economic Growth, FDI, Inflation, Population, and Rates of exchange. Utilizing a panel series from 2013 to 2018, the researchers discovered that direct foreign investment had a

substantial and insignificant impact, inflation had a negative and wide-ranging effect, population exhibited a significant and negligible influence, and the exchange rate showed an expansive impact on financial growth in developing nations within the G20.

Barrie (2020) conducted a comprehensive study to identify the macroeconomic determinants of economic growth in Sierra Leone from 1980 to 2018, both in the short term and long term. Employing a quantitative approach, they utilized eight primarily macro variables and employed the Autoregressive Distributed Lag (ARDL) model as their empirical framework. The study revealed that Foreign Direct Investment (FDI) exhibited positive effects in both the short and long run, with statistical significance at the 10% level in the short-run dynamic model. Additionally, gross capital formation and population growth were identified as statistically significant factors influencing Real Gross Domestic Product (RGDP) growth in both the static long-run and dynamic short-run models. However, trade openness had a negative and significant impact on RGDP growth in the short run, but it was deemed insignificant.

Meyer & Sanusi (2019) examined the relationship between domestic investment, employment, and economic growth in South Africa, focusing on the role of gross fixed capital formation as a key driver of economic growth. Using quarterly data from 1995 to 2016, the study employed Johansen cointegration and Vector Error Correction Models (VECM) to analyze the causal links between these variables. The findings suggested that there is a long-term relationship between domestic investment, employment, and economic growth, with causality primarily running from economic growth to investment. The study also finds that investment has a positive long-run impact on employment. Additionally, bi-directional causality is observed between employment and economic growth, while unidirectional causality, from investment to employment, was also identified. The study's major implication is that although there was a bi-directional causal relationship between economic growth and employment, economic growth alone does not necessarily lead to increased employment in the long run, indicating a phenomenon of "jobless growth." To stimulate employment, the study recommended implementing investment-friendly policies, such as maintaining low interest rates and creating a favorable economic environment. Furthermore, policies aimed at promoting economic growth, including improving infrastructure and diversifying the economy, should be pursued to encourage increased investment.

In a study conducted by Coşkun et al. (2017), they examined the relationship between different components of the capital market, such as mutual/pension funds, corporate bonds, stocks, and government bond markets, and economic growth in Turkey spanning from 2006:M1 to 2016:M6. The results indicated a long-term co-integrating relationship between capital market development and economic growth, with a one-way causality from improved capital markets to economic growth. The utilization of ARDL, Markov Switching Regression, and Kalman Filter models in the study also brought to light the asymmetric effects of capital market development on economic growth.

Chirwa & Odhiambo (2016) employed a qualitative narrative method to synthesize existing empirical literature on the macroeconomic determinants influencing economic growth in both developing and developed nations. Their analysis underscored the crucial macroeconomic determinants impacting economic growth in developing nations, including foreign aid, foreign direct investment (FDI), fiscal policy, investment, trade, human capital development, demographics, monetary policy, natural resources, reforms, as well as geographic, regional, political, and financial factors. In contrast, for developed nations, significant macroeconomic determinants related to economic growth encompass physical capital, fiscal policy, human capital, trade, demographics, monetary policy, and financial and technological factors.

In a study by Wang & Choi (2016) that focused on 21 Asian countries, the impact of Official Development Assistance (ODA), FDI, exports, population, and commodity prices on economic growth was investigated. Through panel analysis, they discovered that ODA had a more substantial effect on the economic growth of middle-income countries but had little impact on low-income Asian countries. FDI exhibited a positive effect on the economic growth of middle-income countries but lacked a significant impact on low-income Asian countries. The population did not emerge as a significant factor affecting economic growth. However, commodity prices showed a significant influence on economic growth in both low- and middle-income Asian countries.

In a study focused on Sub-Saharan African economies, Nsiah et al. (2016) discovered a positive yet statistically insignificant relationship between Foreign Direct Investment (FDI) and economic growth. FDI inflows into Sub-Saharan Africa were primarily channeled into mining and the export of raw materials, resulting in limited overall benefits to the national economy. Given restricted access to external credit, many developing

countries in Sub-Saharan Africa heavily relied on unilateral transfers of international funds for their development. According to World Bank Data (2015), land in the Organization for Economic Co-operation and Development (OECD) contributed approximately USD 130 billion in official development assistance to developing countries.

Bal et al. (2016) delved into the impact of capital formation on economic growth in India, spanning from 1970 to 2012, establishing a long-run equilibrium relationship between capital formation and economic growth. Employing the Autoregressive Distributed Lag (ARDL) model and the error correction model (ECM), their findings indicated that capital formation, trade openness, exchange rate, and total factor productivity positively influenced economic growth. Simultaneously, inflation had a negative short-term impact on growth. The study recommended that the government enhance the level of capital formation to achieve higher economic growth.

Iftikhar & Ali (2016) investigated the relationship between gross domestic capital formation, exports, and economic growth in Pakistan. Johnson's co-integration methodology is utilized to analyze whether a long-term relationship exists among these variables. The results suggested the presence of a single co-integrated vector connecting exports, gross domestic capital formation, and economic growth. Granger causality tests, conducted using Error Correction Models, indicate that both gross domestic capital formation and exports impact the steady-state level of GDP.

Upreti (2015) employed data from 76 nations for 2010, 2005, 2000, and 1995 to show the factors affecting economic growth in developing nations. He used cross-country data here. The study unveiled that higher investment rates, high volume of exports, abundant natural resources, and longer life expectancy positively influenced the GDP in developing nations. However, owing to a lack of reliable data, the existing research's scope is limited, underscoring the necessity for future studies to explore more profoundly the causes of economic growth in developing nations.

Şen et al. (2014) examined the factors influencing GDP growth in Turkey, Brazil, India, China, and South Africa from 1970 to 2011. Using panel analysis, they identified exports, foreign direct investments, and energy imports as exogenous determinants affecting GDP growth. The research confirmed the stability of variables through unit root tests and

established a lasting relationship among the variables using Pedroni Kao and Jhansen Fisher panel co-integration tests.

Leshoro (2014) employed a vector autoregressive analysis to investigate the impact of foreign capital inflow and savings on the economic growth of South Africa. The findings indicated a negative correlation between Foreign Direct Investment (FDI) and GDP, suggesting increasing uncertainty about the influence of FDI on the economic development of host nations. The analysis further uncovered conflicting evidence, as some host nations exhibited no significant association between FDI and economic growth.

Uneze (2013) examined the causal relationship between capital formation and economic growth in Sub-Saharan African countries using recent panel cointegration and causality testing techniques. The results reveal a two-way causal relationship, suggesting that higher economic growth leads to increased capital formation, and conversely, higher capital formation contributes to greater economic growth. These findings are consistent regardless of whether capital formation is measured by private fixed capital formation or gross capital formation.

Chang & Mendy (2012) applied a panel fixed effects regression model to investigate the empirical connection between openness and economic growth in 36 African nations spanning from 1980 to 2009. The outcomes revealed positive and significant associations between growth and factors such as foreign aid, exports, imports, employed labor, and trade openness. Conversely, foreign direct investment, domestic investment, and gross national savings showed negative and significant relationships with economic growth. Notably, the Middle and North Africa regions demonstrated a positive and significant correlation between foreign aid and economic growth, while West and East Africa exhibited a negative and significant association between foreign aid and monetary growth.

Gibescu & Octavia (2010) examined the relationship between Gross Fixed Capital Formation and Economic growth in Romania, Bulgaria, the Czech Republic, Poland, and Hungary from 2003 to 2009. Using statistical connection analysis, GDP is considered the dependent variable, and gross fixed capital formation (GFCF) as the independent variable. Quarterly GDP and GFCF data from late 2003 to late 2009 are analyzed separately for each country to understand the role of GFCF in the growth and development of Central

and Eastern European (CEE) countries and its impact on GDP formation. Correlation analysis was employed to confirm the connection between these two macroeconomic indicators. The results demonstrated a strong, direct relationship between economic growth and gross fixed capital formation, with correlation coefficients approaching 1 for Romania, Bulgaria, the Czech Republic, and Poland. This suggests that higher levels of gross fixed capital formation positively affect economic growth in these countries.

Peng & Heshmati (2010) conducted a study to assess the impact of international trade on China's economic growth, utilizing balanced panel data from 31 provinces covering the period 2002 to 2007. Their findings suggested that increased engagement in global trade not only provided static benefits but also dynamic advantages, contributing to rapid national economic growth. Both an increase in global quantity and a transition towards higher-quality exports were identified as factors with substantial positive effects on China's regional productivity.

In a study by Huchet-Bourdon, Le Mou  l, and Vijil (2011), the relationship between trade openness and economic growth was explored. The empirical results indicated that nations specializing in the export of higher-quality products experienced faster economic growth. The study concluded that trade could harm the growth of nations focused on low-quality products, while those exporting a diverse range of products tended to experience more significant growth.

Ekanayake & Chatrna (2010) analyzed the effects of Official Development Assistance (ODA) on economic growth in developing nations, utilizing a panel dataset comprising 85 countries from Asia, Africa, Latin America, and the Caribbean. Their findings suggested that ODA could have a positive impact on economic growth in developing nations. However, they noted regional variations within Asian, African, Latin American, and Caribbean countries, as well as variations based on income levels.

In a study by Kumar & Woo (2010), a linear inverse relationship between initial debt and subsequent growth was identified in a sample of emerging advanced economies. The impact of high debt was observed to be smaller in developed economies, and the study indicated that only very high levels of the debt-to-GDP ratio had significant negative effects on economic growth.

Reinhart and Rogoff (2010) examined across two centuries, encompassing 20 developed economies. Their findings revealed the delicate nature of the inverse correlation between

economic growth and the level of debt. According to Gelos et al. (2010), larger and wealthier nations have better access to credit, which enables them to borrow larger and more frequently.

Eberhardt & Teal (2010) Showed that differences in production technology are vital for understanding variations in labor productivity between countries and the factors driving these differences. Consequently, using regression intercepts as estimates of Total Factor Productivity (TFP) levels is problematic. To address this, we propose an alternative measure that remains robust despite variations in parameters.

Al Nasser (2007) underscored the educational attainment of a worker as a metric for human capital directly associated with productivity. Additionally, he emphasized the adverse effects of corruption and deficient governance on a nation's economic well-being. Mauro's investigation, involving 67 countries, concluded that a one-standard-deviation reduction in corruption led to a 1.3 percentage point increase in annual economic growth.

Despite receiving international assistance, developing nations encounter formidable obstacles such as the exploitation of natural resources, conflicts, wars, dependence on neighboring countries & governance deficiencies (Collier, 2007). Despite boasting higher growth rates in comparison to developed countries, these nations trail behind in socio-economic indicators due to inadequate institutions, a shortage of capital, both human & physical, heavy reliance on external support, restricted international trade, conflicts, poverty, and low productivity. The convergence economic growth theory, signifying "catching up," remains applicable as these countries demonstrate elevated growth rates, albeit in the face of persistent challenges.

Minoiu and Reddy (2009) discovered that developmental aid influenced growth positively. Moreover, specific influences might be subject to time-lags, with short-term impacts exhibiting no discernible influence on growth and development.

Cervellati & Sunde (2009) forecasted that enhancements in the expectancy of life contribute to heightened capital accumulation (human), exerting a positive influence on income generation. A study by Acemoglu & Johnson (2006) introduced skepticism, acknowledging adverse health conditions as the primary driver of poverty in certain nations but saying that improved health conditions might lead to growth. The increase in life expectancy is directly linked to disease control and overall better health, thereby influencing population growth.

Sanjay & Camelia (2006) delved into the impact of official development assistance on growth in developing countries. Their findings underscored the substantial and far-reaching influence of developmental aid on long-term growth, with no indication of diminishing returns or aid effectiveness being confined to "favorable" policy environments.

Makki & Somwaru (2004) analyzed data from sixty-six developing countries and identified a robust positive correlation between trade and advancing economic growth.

Wagner (2003) employed the gravity model to scrutinize the relationship between aid and the export expansion of donor countries to recipient nations. The analysis disclosed a 133% increase in exports for related resources, with exports associated with aid projects yielding 35 cents per dollar of aid back to the donor country.

Karras (2006) investigated the connection between foreign aid and per capita GDP growth, utilizing annual data from 1960 to 1997 for 71 resource-receiving developing economies. The study concluded that Official Development Assistance (ODA) exerts a strongly positive, permanent, statistically significant, and substantial impact on economic growth.

Clements, Bhattacharya, and Nguyen (2003) discovered that a substantial reduction in foreign debt in highly indebted emerging economies could result in an annual increase in per capita income of approximately one percentage point.

Foreign Direct Investment (FDI) can yield advantages for the recipient industry and other domestic sectors, benefiting from spillover effects such as increased human capital and technological advancements (Rappaport, 2000). FDI contributes to the host country by generating additional employment, introducing modern technology, and facilitating knowledge transfer, thereby fostering an increase in domestic investment (Borensztein, De Gregorio, or Lee, 1998).

Barro's (1996) empirical findings, based on a panel of approximately 100 countries spanning the period from 1960 to 1990, strongly support the concept of conditional convergence. A higher initial level of schooling and life expectancy, along with factors such as lower fertility, reduced government consumption, effective rule of law, lower inflation, and improvements in trade, enhance the growth rate given a particular starting level of real per capita GDP. However, growth exhibits a negative correlation with the initial level of real per capita GDP once adjustments are made for the values of these and

other variables. Political freedom demonstrates a weak impact on growth, with some indication of a nonlinear relationship. At lower levels of political rights, expanding these rights stimulates economic growth, but once a moderate degree of democracy is achieved, further development tends to reduce growth.

Barro (1999) discovered that investments in human capital augment the workforce's capabilities and boost overall productivity. Each additional year of schooling led to a 0.7 percent yearly increase in a country's growth rate.

Sachs & Warner (1995) observed that economically thriving nations consistently outperformed less prosperous ones in terms of annual real growth of GDP. Trade openness has the potential to enhance human capital and productivity even in economically challenged countries. However, the least developed countries, heavily reliant on primitive agriculture, remain more susceptible to economic shocks. Despite their rich natural resources, African countries endowed with assets like oil or diamonds have not witnessed significant GDP growth (Sachs & Warner, 1995), possibly due to falling into the trap of natural resources.

In specific cases, the export of resources (natural) can give rise to the "Dutch Disease," a phenomenon where the prominence of natural resource exports influences the exchange rate, making other exports more expensive. This process may divert human capital away from other industries, causing contraction in those sectors (Collier, 2007). Furthermore, sales of natural resources can exacerbate undesirable rent-seeking behavior & corruption, particularly in certain growing nations in Africa (Sub-Saharan) that possess abundant resources of nature and exhibit a lower GDP per capita.

International trade plays a pivotal role in enhancing the economies of both importing and exporting nations. The positive correlation between international trade and economic growth has been established, as evidenced by Kavoussi (1984), who identified a robust connection between higher economic growth rates and elevated export growth rates, a trend observed across middle and low-income countries.

Denison (1980) pinpointed increased capital stock as a fundamental source of economic growth. His research, spanning the years 1948 to 1973, revealed an annual growth rate of 3.8 percent, with approximately 15 percent attributed to the expanded utilization of capital. Additional contributing factors encompassed growth in resources, the capacities of the labor force, and technological advancements.

Papanek (1973), analyzing data from 51 countries between 1950 and 1965, identified a positive correlation between assistance (foreign aid) and economic growth. While aid had a positive impact on saving generation in developing countries, Papanek underscored that the mere presence of aid does not guarantee a meaningful contribution to economic growth.

Caves (1971) uncovered a positive contextual link between the productivity of multinational enterprises and the labor productivity of domestic firms in the same industries. This connection was attributed to the competition and continuous improvement fostered by foreign investment in the domestic market.

Economic growth is more significant concerning GDP in real terms than per capita GDP, underscoring sustained increases in national production at constant prices. The factors influencing economic growth make the equilibrium level between invested capital and technological progress, and they also influence human resources and natural resources. Furthermore, some indirect elements like financial organizations, government agencies, monetary and fiscal policies, investment & saving rates, aggregate demand level, labor and capital migration, the efficiency of the economy, and the effectiveness of the government affected economic growth.

Within the framework of economic growth, four primary determinants emerge: Natural resources, human resources, technology, and capital formation. Nevertheless, researchers have ascribed varying degrees of importance to each determinant.

Author(S)	Countries And Time	Method Used	Summary Findings
Artur Ribaj & Fitim Mexhuani (2021)	Kosovo for the period of 2010–2017	Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF), and Ganger causality tests	Unit root tests were conducted to confirm stationarity, and regression analyses revealed that deposits exerted a significant and positive impact on Kosovo's economic growth. The influx of savings played a crucial role in stimulating investment, production, and employment, thereby contributing to sustainable economic growth. Loans and remittances emerged as notable factors directly contributing to the economic upturn in Kosovo, given their positive influence on investment activities. The combination of a high national savings rate and a diminished reliance on foreign direct investment played a pivotal role in reducing the risks associated with volatile foreign investments. This strategy aimed to enhance economic stability and resilience in the face of external economic fluctuations.
Batrancea, Rathnaswamy, & Batrancea (2021)	34 countries across Africa during 2001–2019	Panel data analysis	The GDP growth rate in African countries was found to be substantially influenced by key economic indicators, including imports, exports, gross capital formation, and gross domestic savings. These factors collectively played a crucial role in

Author(S)	Countries And Time	Method Used	Summary Findings
			shaping the economic trajectory of the studied nations. The study highlighted the importance of foreign direct investment (FDI) inflows and outflows in influencing capital and savings within African countries. The dynamics of FDI played a significant role in shaping the economic landscape, emphasizing the interplay between international investment and domestic economic indicators. The findings suggested that national authorities in African countries could implement strategic measures to boost economic growth and development. The study implied that targeted policies focusing on improving indicators such as imports, exports, capital formation, domestic savings, and the management of foreign direct investment could contribute to sustained economic development across the African continent.
Samsuddin & Amar (2020)	10 growing nations in G20 members	Linear regression, Random Effect Model (REM)	Economic Growth, Foreign Direct Investment, Inflation, Total Population, and Exchange Rates were taken into account. Direct funding exhibited a substantial yet insignificant impact.

Author(S)	Countries And Time	Method Used	Summary Findings
			Inflation displayed a weak and extensive influence. Population demonstrated an insignificant effect. Exchange rates had a substantial and broad impact.
Leshoro (2014)	South Africa	Vector autoregression version approach	Revealed a negative correlation between Foreign Direct Investment (FDI) and GDP in South Africa. Indicated a lack of significant or negative association between economic growth & FDI in some host countries.
Peng & Heshmati (2010)	6-12 months of balanced panel data of 31 provinces of China from 2002 to 2007	Panel data	Emphasized the significance of international trade in fostering China's economic growth. Revealed that increased engagement in global trade enabled China to accrue static and dynamic benefits, driving rapid national economic growth. Noted that both quantitative shifts and shifts toward high exports on a global scale had noteworthy effects on China's local productivity.
Batrancea Larissa et al.(2020)	The study analyzes panel data for the period 2005–2016 and focuses on 10 Central and Eastern		The study revealed that adjusted net savings had an impact on GDP in the ten countries under examination. Highlighted the imperative for national authorities to implement policy

Author(S)	Countries And Time	Method Used	Summary Findings
	European and Baltic countries that are considered transition countries of the former Soviet bloc.	A Panel Data Analysis	changes that facilitate sustainable economic growth and a seamless transition from a brown economy to a green economy in these nations.
Plaxedes Gochero & Seetanah Boopen	Zimbabwe's economy, 1988–2018	Autoregressive Distributed Lag (ARDL) approach	Over the long term, foreign direct investment in the mining sector shows a substantial positive relationship with the country's GDP. Mining FDI exerts relatively more pronounced effects compared to FDI in the non-mining sector and domestic investment. Short-run analysis indicates positive and significant impacts on growth for mining FDI, non-mining FDI, and domestic investment, albeit to a relatively lesser extent.
M. Afdal. Samsuddin, Syamsul Amar	Developing countries of G20 members; 2013-2018	Linear regression and the Random Effect Model (REM)	FDI has a positive yet insignificant impact on economic growth in developing countries among G20 members. This lack of significance is attributed to the limited foreign direct investment inflow, stemming from government inaccuracies in regulations and policies for foreign investment. Inflation exhibits a negative and significant effect on economic growth

Author(S)	Countries And Time	Method Used	Summary Findings
			in developing countries among G20 members. This is attributed to low inflation levels, facilitating capital purchases for the production of goods and services. This, in turn, boosts the production of goods and services, ultimately contributing to economic growth. The exchange rate demonstrates a positive and significant influence on economic growth in developing countries among G20 members. This is explained by an appreciation in the exchange rate leading to an increase in the country's foreign exchange reserves. With higher reserves, there is a subsequent rise in export demand, resulting in increased production of goods and services and ultimately contributing to economic growth.
Barrie, Mohamed Samba	Sierra Leone, 1980-2018	Autoregressive Distributed Lag model	Foreign direct investment exhibited a positive influence in both the short and long run, though statistical significance was only observed at the 10% level in the short-run dynamic model. Gross capital formation and population growth displayed positive and statistically significant effects in determining real gross domestic

Author(S)	Countries And Time	Method Used	Summary Findings
			product (RGDP) growth in both the static long-run and dynamic short-run models. Openness to trade exerts a negative and significant impact on real gross domestic product (RGDP) growth in the short run but is deemed insignificant in the long run. • Conversely, fluctuations in real exchange rates, domestic credit rates, and private remittances exhibit negative and statistically significant effects on RGDP growth.
Chirwa & Odhiambo (2016)	Developed and developing nations	Qualitative narrative appraisal	Determinants influencing economic growth encompass foreign aid, foreign direct investment, fiscal policy, investment, trade, human capital development, demographics, monetary policy, natural resources, reforms, and geographic, regional, political, and financial factors. Important macroeconomic determinants related to economic growth include physical capital, fiscal policy, human capital, trade, demographics, monetary policy, and financial and technological factors.

Author(S)	Countries And Time	Method Used	Summary Findings
Wang & Choi (2016)	21 Asian countries	Panel data analysis	Official development assistance (ODA), foreign direct investment (FDI), exports, population, and commodity prices are identified as factors influencing economic growth in Asian countries. ODA has a more pronounced effect on the economic growth of middle-earning countries but a minimal effect on low-earning Asian countries. FDI demonstrates a positive impact on the economic growth of middle-earning countries and has no significant effect on low-earning countries. The population does not exhibit a significant impact on economic growth. Commodity costs unequivocally influence economic growth in both low- and middle-earning Asian countries.
Upreti (2015)	76 countries from 2010, 2005, 2000, and 1995	Cross-country statistics	Factors such as excessive exports, abundant natural resources, longer life expectancy, and higher investment rates exert effective influences on the growth of per capita gross domestic product in developing countries.
Şen Şentürk et al (2014)	Brazil, India, China, South	Unit root tests of LLC	Foreign direct investments and energy are identified as exogenous

Author(S)	Countries And Time	Method Used	Summary Findings
	Africa, and Turkey, 1970-2011	and IPS panels, Panel cointegration test of Pedroni, Kao, and Johansen Fisher	determinants of GDP growth in Brazil, India, China, South Africa, and Turkey. The variables exhibit cointegration, indicating a long-term relationship between them.
Nsiah et al. (2016)	Sub-Saharan African economies		Foreign direct investment (FDI) in Sub-Saharan African economies exhibited a positive but statistically insignificant impact. FDI inflows in the region were primarily concentrated in mining and raw material exports, resulting in marginal benefits for the national economy.
Ekanayake & Chatrna (2010)	Asia, Africa, and Latin American, Caribbean nations	Panel regression	Official Development Assistance (ODA) is found to have a positive impact on economic growth in developing nations. ODA is recognized as a factor capable of fostering financial growth in developing nations.
Makki & Somwaru (2004)	66 developing countries during the last 3 decades	Panel regression	Identified a robust and high-quality relationship between trade and the advancement of economic growth in the studied nations.

Author(S)	Countries And Time	Method Used	Summary Findings
Karras (2006)	71 resource-receiving growing economies; annual statistics from 1960 to 1997	Panel regression	Official Development Assistance (ODA) exhibited a strongly positive, permanent, statistically significant, and sizable impact on economic growth in the analyzed resource-receiving growing economies.
Knight, Loayza & Villanueva (1993)	76 developing nations; 1960-1985	Panel regression	Capital (human & physical) exhibits a positive and significant effect on economic growth. Public investment & economic growth is positively and significantly related. Growth is negatively related to weighted tariff rates.
Dollar (1992)	Analyzed 95 developing economies from 1976-1985	Employed cross-sectional regression	The investment rate demonstrates a positive and significant association with economic growth. Real exchange rate variability and distortions are negatively and significantly associated with economic growth.
Most & Vann de Berg (1996)	Focused on 11 African countries (Sub-Saharan)	Utilized time series regression	Foreign aid shows a negative and significant association with economic growth in some countries, including Togo, Ivory Coast, Nigeria, Zambia, Rwanda, and Botswana. Conversely, it effected economic growth in Niger, Senegal, and Mauritius positively. Economic growth in Togo, Senegal, Ivory Coast, Nigeria, Cameroon, and

Author(S)	Countries And Time	Method Used	Summary Findings
			Kenya is positively affected by domestic savings; however, it is negatively and significantly associated with economic growth in Mauritius and Zambia. FDI and growth were positively related in Ivory Coast, Niger, Kenya, and Togo. Conversely, it is negatively and significantly associated with economic growth in Mauritius and Rwanda.
Barro (1996)	Investigated 100 countries (Asia, Latin America, OECD, Sub-Saharan Africa) during 1960-1990	Utilized 3stage least squares regression model	Democracy and the rule of law index, international openness, investment, and schooling are positively and significantly associated with economic growth. Total fertility rate, government consumption & inflation are negatively and significantly associated with economic growth.
Burnside & Dollar (2000)	56 countries, 16 middle-income and +40 low-income countries, were studied during the period 1970-1993.	Applied the 2SLS method, with regressions divided into six four-year periods covering the years	Foreign aid exhibits a positive and significant association with economic growth In East Asia, economic growth displays positive and significant associations with Budget surplus, institutional quality, and trade openness.

Author(S)	Countries And Time	Method Used	Summary Findings
Barro (2003)	87 countries (developed & developing) encompassing year1965-1995.	Employed cross-country regressions	Economic growth is positively and significantly associated with democracy, trade, openness, the rule of law, years of schooling, and investment terms of trade. With the initial level of per capita GDP, life expectancy, fertility rate, government consumption, inflation rate, and land lockedness, economic growth is negatively related.
Bhaskara-Rao & Hassan (2011)	Focused on Bangladesh during the period 1970-2007	Utilized the neoclassical growth framework with the ARDL method	Reforms implemented since the 1980s, foreign direct investment (FDI), money supply, and trade openness are positively and significantly associated with economic growth in Bangladesh. Government expenditure and inflation display negative and significant associations with economic growth.
Chang & Mendy (2012)	Investigated 36 African nations from 1980 to 2009.	Applied a panel fixed effects regression model	Economic growth in African nations shows positive and significant associations with foreign aid, exports, imports, labor employed, and openness. Conversely, negative and significant associations exist between economic growth and foreign direct investment, domestic investment, and gross domestic savings. The impact of foreign aid varies across regions, being positive in Middle and

Author(S)	Countries And Time	Method Used	Summary Findings
			North Africa but negative in West and East Africa.
Bleaney, Gemmell, & Kneller (2001)	Studied 22 OECD countries spanning 1970-1995	Employed panel estimation with a two-way fixed effects model	Economic growth in OECD countries is positively and significantly associated with investment and productive expenditure. Conversely, there is a negative and significant association between economic growth and distortionary taxation.
Botric & Slijepcevic (2008)	Examined 6 South-Eastern European countries during 1995-2005	Utilized panel fixed effects regression	Economic growth exhibits negative and significant associations with inflation and interest rate spread in South-Eastern European countries from 1995 to 2005. Conversely, a positive and significant association is found between economic growth and the general government balance as a share of GDP.
Prochniak (2011)	Examined 10 Central and Eastern European countries from 1993 to 2009	Utilized Ordinary Least Squares	Economic growth in Central and Eastern European countries is positively and significantly associated with the investment rate, human capital development, financial sector development, high services share in

Author(S)	Countries And Time	Method Used	Summary Findings
			GDP, a high share of working-age population, development of information, communication, and technology (ICT), high private sector share in GDP, economic freedom, and progress in market and structural reforms. In contrast, economic growth displays a negative and significant association with interest rates, inflation, budget deficits, and public debt.
Fetahi-Vehapi, Sadiku & Petkovski (2015)	Investigated 10 South East European countries during 1996-2012.	Employed Panel Fixed Effects regression	Economic growth is positively and significantly associated with trade openness, the initial level of GDP per capita, human capital development, gross fixed capital formation, and foreign direct investment in South East European countries from 1996 to 2012. The population shows a negative and significant association with economic growth.
Manmohan S. Kumar & Jaejoon Woo (2010)	Analyzed 38 advanced and emerging economies, mostly OECD member nations, from 1970 to 2007	Used Growth Regressions and growth Accounting	Identified an inverse relationship between initial debt and subsequent growth in advanced and emerging economies from 1970 to 2007. A ten-percentage point increase in the initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of approximately

Author(S)	Countries And Time	Method Used	Summary Findings
			0.2 percentage points per year on average, with a smaller impact in advanced economies. The adverse effect is primarily attributed to a slowdown in labor productivity growth due to reduced investment and slower growth of the capital stock.
Carmen M. Reinhart & Kenneth S. Rogoff (2010)	Analyzed 44 advanced economies from 1790 to 2009, comprising 3700 annual observations.	Employed a comprehensive approach covering a diverse array of political systems, historical circumstances, institutions, exchange rate arrangements	Established that the relationship between real GDP & government debt (growth is weak for debt or GDP ratios under 90 %_) Above this threshold, median growth rates decrease by 1%, and average growth falls considerably more. Emerging markets exhibit lower thresholds for external debt, with annual growth declining by approximately two percent when external debt reaches 60 %of GDP. Growth rates are roughly halved due to higher levels of external debt. Emerging markets witness a notable increase in inflation as debt levels rise, while a contemporaneous link between inflation and public debt levels is observed for advanced countries.
R. Gaston Gelos, Ratna	Analyzed 2053 individual bond issuances and 5065	Utilized cross-sectional	Conventional indicators like trade openness and macroeconomic factors

Author(S)	Countries And Time	Method Used	Summary Findings
Sahay & Guido Sandleris	commercial banks syndicated loans to 144 developing countries from 1982 to 2000.	differences and a panel approach.	do not significantly clarify market access, with the exception of inflation. A nation's susceptibility to shocks and the perceived quality of its policies and institutions emerge as pivotal factors influencing its government's market access. Countries more vulnerable to shocks exhibit lower likelihoods of accessing international credit markets. The probability of market access is not notably impacted by defaults in the preceding year; countries that defaulted did not encounter disruptions in market access during the 1990s.
Hajilee & Al Nasser	Investigated 19 Latin American and Asian countries during 1979-1999.		Variations in U.S. FDI are predominantly explained by variations in fundamental economic and social factors, including market size, GDP growth, macroeconomic stability, trade openness, school enrollment, and infrastructure availability. Latin American countries attract Foreign Direct Investment (FDI) from the United States for different reasons than Asian countries.
Paolo Mauro	Analyzed 56 country risk factors for 68 countries during 190-1983	Business International indices on the judiciary	Corruption exerts adverse effects on private investment, resulting in diminished economic growth, even in

Author(S)	Countries And Time	Method Used	Summary Findings
	and 30 country risk factors for 57 countries during 1971-1979	system, red tape, and corruption	nations burdened by intricate bureaucratic regulations. Enhancing the integrity of Bangladesh's bureaucracy to the level of Uruguay could elevate its investment rate by nearly five percentage points and its annual GDP growth rate by more than half a percentage point. Corruption demonstrates a strongly negative association with investment rates.
Samsuddin & Amar (2020)	Investigated ten growing nations of G20 members from 2013-2018	Using panel data analysis.	Economic growth is directly related to foreign investment. Inflation demonstrates a substantial and adverse effect on economic growth. The population has a significant yet negligible effect on economic growth. Exchange rates have a significant and expansive impact on financial growth in the developing nations of G20 members.
Barrie & Samba (2020)	Analyzed Sierra Leone from 1980 to 2018	Employing a quantitative method with the ARDL model	In both short and long-run models, FDI shows a positive and statistically significant impact. Real Gross Domestic Product (RGDP) growth is statistically significant with Gross capital formation and population growth.

Author(S)	Countries And Time	Method Used	Summary Findings
			Openness to trade negatively influences real gross domestic product (RGDP) growth in the short run but is deemed insignificant.
Coşkun et al. (2017)	Analyzed Turkey from 2006:M1 to 2016:M6	Using co-integration analysis with various models	Improvement in the capital market has a notable and positive influence on the nation's economic growth.
Chirwa & Odhiambo (2016)	Investigated both developing and developed nations	Qualitative narrative approach	Fundamental macroeconomic factors impacting economic growth in developing nations include foreign aid, foreign direct investment, fiscal policy, investment, trade, human capital development, demographics, monetary policy, natural resources, reforms, and various other elements.
Wang & Choi (2016)	Analyzed 21 Asian countries	Panel analysis	Official Development Assistance (ODA) has a more pronounced impact on economic growth in middle-income countries. Foreign direct investment (FDI) positively influences the economic growth of middle-income countries but lacks influence on low-income Asian countries. The population's role in affecting economic growth is negligible.

Author(S)	Countries And Time	Method Used	Summary Findings
			Commodity prices play a role in influencing economic growth in low- and middle-income Asian countries.
Nsiah et al. (2016)	Examined economies in Sub-Saharan Africa	Quantitative analysis	A positive correlation between Foreign Direct Investment (FDI) and economic growth was discovered, though statistical significance was not established. FDI primarily targeted mining and raw material exports, resulting in limited benefits for the national economy.
Bal, Dash & Subhasish (2016)	Explored India from 1970 to 2012	Autoregressive Distributed Lag (ARDL) model	The findings indicate that TFP, exchange rates, trade openness, and capital formation all contribute positively to economic growth. Conversely, short-term growth is adversely affected by inflation.
Upreti (2015)	Across 76 nations for the years 2010, 2005, 2000, and 1995.	Cross-country analysis	Emphasized factors like exports, an abundance of natural resources, higher investment rates, and longer life expectancies have a positive impact on the increase of per capita GDP in emerging nations.
Şen Şentürk et al. (2014)	Investigated Brazil, India, China, South Africa, and Turkey spanning 1970-2011	Panel analysis	Confirmed that external factors influencing GDP growth comprised FDI and energy imports and exports.

Author(S)	Countries And Time	Method Used	Summary Findings
Leshoro (2014)	Analyzed South Africa	Vector autoregressive analysis	Demonstrated the inverse link between GDP and FDI
Chang & Mendy (2012)	To study 36 African nations over the period 1980-2009.	Panel fixed effects regression model	Growth and foreign aid, exports, imports, labor, and trade openness were found to be positively correlated. On the other hand, negative correlations were found with FDI, domestic investment, and gross national savings.
Peng & Heshmati (2010)	Examined 31 provinces in China from 2002 to 2007	Panel analysis	Emphasized how greater participation in international trade has a favorable effect on productivity and economic progress.
Huchet-Bourdon, Le Mouél, and Vijil (2011)	Study on trade openness and economic growth	Empirical analysis	Noted that faster economic growth is a result of exporting goods of a higher caliber.
Ekanayake & Chatrna (2010)	85 nations across Asia, Africa, Latin America, and the Caribbean.	Utilized panel data analysis	Suggested that promoting economic growth in developing nations can be aided by official development assistance (ODA).
Kumar or Woo (2010)	Examined a sample of emerging advanced economies	Empirical analysis	Demonstrated that encouraging economic growth in underdeveloped nations is a role that official development assistance, or ODA, may play.

Author(S)	Countries And Time	Method Used	Summary Findings
Reinhart & Rogoff (2010)	20 developed economies	Investigated the long-term relationship between growth and debt	Suggested, with some nuance, a negative correlation between economic growth and high debt levels.
Gelos, Sahay, & Sandleris (2010)	Research on credit and borrowing in large and wealthy countries	Conducted empirical analysis	Discovered that rich and big nations typically have easier access to larger loans.
Al Nasser (2007)	Examined the association between human capital and productivity.	Research study	Established a clear correlation between productivity and an employee's level of education, stressing that bad government and corruption inhibit economic growth.
Özbey (2023)	South Africa	Granger causality analysis	Bidirectional relationship between capital formation and economic growth The causality from fixed capital formation to economic growth is more pronounced at lower frequencies compared to the reverse causality The impact of economic growth on capital formation is stronger than the impact of capital formation on economic growth

Author(S)	Countries And Time	Method Used	Summary Findings
			However, it suggests that unemployment does not have an immediate impact on GDP. The second model reveals a significant and positive correlation between UNEMP and GCF. The third model shows an inverse relationship between GDP and UNEMP.
Pasara & Garidzirai, (2020)	South Africa using data from 1980-2018	Vector Autoregressive (VAR)	South Africa is grappling with persistent macroeconomic challenges, including stagnant economic growth, declining investment, and high unemployment rates. Gross Capital Formation (GCF) as a tool to boost employment and stimulate economic growth (GDP).
Meyer&Kazee m.(2019)	South Africa Using quarterly data from 1995 to 2016	Johansen cointegration and Vector Error Correction Models (VECM)	There is a long-term relationship between domestic investment, employment, and economic growth, with causality primarily running from economic growth to investment. Investment has a positive long-run impact on employment. Bi-directional causality is observed between employment and economic growth, while uni-directional causality, from investment to employment, was also identified.

Author(S)	Countries And Time	Method Used	Summary Findings
Iftikhar & Ali (2016)	Pakistan	Johnson's co-integration methodology	investigated the relationship between gross domestic capital formation, exports, and economic growth in Pakistan The presence of a single co-integrated vector connecting exports, gross domestic capital formation, and economic growth. Granger causality tests, conducted using Error Correction Models, indicate that both gross domestic capital formation and exports impact the steady-state level of GDP.
Uneze (2013)	Sub-Saharan African countries	Panel cointegration and causality testing techniques	The results reveal a two-way causal relationship, Suggesting that higher economic growth leads to increased capital formation, and conversely, higher capital formation contributes to greater economic growth. These findings are consistent regardless of whether capital formation is measured by private fixed capital formation or gross capital formation.

Author(S)	Countries And Time	Method Used	Summary Findings
Gibescu Octavia (2010)	Romania, Bulgaria, Czech Republic, Poland, and Hungary from 2003 to 2009.	Correlation analysis	Correlation analysis was employed to confirm the connection between these two macroeconomic indicators. The results demonstrated a strong, direct relationship between economic growth and gross fixed capital formation. With correlation coefficients approaching 1 for Romania, Bulgaria, Czech Republic, and Poland, it suggests that higher levels of gross fixed capital formation positively affect economic growth in these countries.

Table 3: Main Macroeconomic Elements Affecting Developed and Developing Economies' Growth

Source: Created by the author.

1.4. Conclusion

In conclusion, the literature review reveals the diverse perspectives and methodologies employed by researchers to understand the determinants of economic growth. While some studies emphasize the positive impact of factors like FDI and education, others delve into the challenges posed by issues such as corruption, debt, and natural resource dependence. The role of international trade emerges as a common thread, with openness to trade consistently associated with enhanced productivity. The subtle variations revealed in regional analyses underscore the significance of taking into account context-specific factors when engaging in discussions about economic growth. As this study builds upon this rich body of literature, it aims to contribute valuable insights that deepen our understanding of the intricate mechanisms driving economic development across the globe.

2. CHAPTER: METHODOLOGY

2.1. Introduction

As the global landscape experiences transformative technological shifts, traditional narratives rooted in historical cases may no longer suffice. The intricate interplay of evolving global dynamics, technological disruptions, and emergent policy paradigms underscores the exigency for fresh empirical inquiries that capture the essence of growth dynamics in real-time. This study's ramifications stretch beyond the confines of academic exploration. By elucidating the factors underpinning growth in developing countries, this study sets a precedent that could catalyze further research and case studies. Through an intricate understanding of growth dynamics, nations worldwide, particularly those in the developmental spectrum, stand to glean insights that pave the way for sustainable growth strategies. This study, poised at the nexus of theory, empirical analysis, and practical implications, transcends theoretical discourse to impinge on the realm of policy formulation and socioeconomic transformation.

2.2. Overall Method

A comprehensive cross-country growth analysis was conducted by collecting panel data from diverse categories of countries, aligning with the research question. This analysis, spanning the period from 1990 to 2020, employed various econometric methods and scrutinized specific indicators. Econometric analysis of panel data, coupled with investigations into cross-section dependence, was undertaken to examine economic growth patterns in the data. The study also elucidated the specification of relationships between different factors and development.

To examine the stationarity of variables in our model, we applied Pesaran's (2007) panel unit root test, which considers cross-section dependence among both developing and developed countries. The Cross-sectionally augmented Im-Pesaran-Shin (CIPS), derived from Pesaran's (2007) panel unit root test, was calculated by averaging individual Cross-sectionally extended Augmented Dickey-Fuller (CADF) statistics. To investigate the relationship between dependent and independent variables, we employed a causality test developed by Dumitrescu and Hurlin in 2012

.

Tests	Objective
Shapiro-Wilk Test and JB Test	Assessing normality
Variance Inflating Factor	Checking the existence of multicollinearity
Cross-sectional Dependence (CSD) Test	Identifying the presence of cross-sectional dependence among countries in panel data.
Panel unit-root test	Checking stationarity of variables.
Panel cointegration test	Assessing the long-term relationship between variables across different countries and over the years.
Wald test	Confirming the overall significance of the estimated models.
Dumitrescu and Hurlin's (2012) panel causality test	Clarifying the relationship between dependent and independent variables.

Table 4: Initial and Follow-up Tests for The Panel Estimation

Source: Created by the author.

2.3. Variables and Model Overview

In our analysis, we embrace a simplistic production function that encapsulates the impact of various economic factors on the overall economic output, portraying an intertemporal optimization problem reflective of the essence of economic growth, denoted by real GDP. The model integrates K, symbolizing the quantity of capital (quantified through Gross Fixed Capital Formation), and L, representing the volume of labor (assessed by the total population). Taking cues from the research conducted by Ajide (2014), N'Zue (2011), and Rivera-Batiz (2004), we employ the Cobb-Douglas production function to estimate output data.

$$Y = AL^{\alpha}K^{\beta} \dots \dots \dots (1)$$

Variables and transformations in the model:

Y represents output.

L represents the labor force.

K represents the total capital stock

α is the coefficient of labor, and β is the coefficient of capital.

To convert the equation into a linear form, the logarithm of both sides of the original model is taken. The log transformation is expressed as follows:

$$\log Y = \log A + \alpha \log L + \beta \log K + U_i \dots \dots (2)$$

Due to the insufficient data for a few countries, capital stock has been proxied by gross capital formation. To mention some, the percentage of missing information for the capital stock of Türkiye is 64.5%. Libya and Zimbabwe are missing 35.5% of information each. A few other countries have similar issues.

The efficiency parameter (A) and input coefficients were estimated using the provided equation (2). The coefficients α and β signify the proportional changes in production corresponding to proportional changes in labor and capital. The error term, denoted as U_i , represents unobserved factors.

The combined coefficients ($\alpha+\beta$) assess the overall proportionate impact on output resulting from proportional adjustments in both labor and capital. This combined value indicates the measure of returns to scale. If ($\alpha+\beta$) is greater than 1, it implies that the increase in output surpasses the increase in inputs. Conversely, if ($\alpha+\beta$) is less than 1, it suggests that the increase in output is less than the increase in inputs. When ($\alpha+\beta$) equals 1, the output exhibits a proportional increase in response to the rate of increase in inputs. Consequently, the determination of economies of scale, constant returns to scale, or diseconomies of scale hinges on the assessment of whether ($\alpha+\beta$) is greater than 1, equal to 1, or less than 1 respectively. This highlights the adaptability of the Cobb-Douglas production function in illustrating diverse magnitudes of returns to scale.

The expectation is that input coefficients (α and β) should be positive ($\alpha>0$ and $\beta>0$) in theoretical terms. Traditionally, changes in A capture technological advancement (Solow, 1956), although these changes may extend beyond technology, encompassing factors like war, natural disasters, and economic reforms. Considering this, we specify a comprehensive model with additional control variables:

$$GDP\ PC = f(GCF, LF, EXP, LIFE, RR, NFDI) \dots \dots (3.1)$$

$$GDP\ PC_{it} = \alpha_i + \beta_{i1}(GCF) + \beta_{i2}(LF) + \beta_{i3}(EXP) + \beta_{i4}(LIFE) + \beta_{i5}(RR) + \beta_{i6}(NFDI) + \epsilon_{it} \dots \dots (3.2)$$

$$t = 1990, 1991, \dots \dots , 2019, 2020$$

$$i = 1, 2, \dots, N; N = \text{Number of countries} = 49$$

Note: All the variables have been log-transformed.

This model accounts for potential influences on economic growth beyond the core production function.

2.3.1. Variable and Developed-Developing Countries Justification and Hypothesis

The growth rate of GDP per capita denoted by real GDP, or GDP PC in the model, is the variable that represents economic growth (Y). It represents the percentage change in GDP per capita from the year before to the year after. This metric may indicate expansion or contraction and be either positive or negative. It is better to have a larger growth rate.

Variables and reasons for using them in this analysis:

1. GDP PC: The inclusion of the GDP PC variable is grounded in the recognition that the economic growth of any nation is subject to the influence of numerous macroeconomic factors. GDP (Real GDP), being the primary indicator of economic growth, serves as a comprehensive measure to assess the overall economic performance and expansion of a country (Barro, R. J., 2003)
2. Gross capital stock formation (GCF), which is the major component of domestic investment, is seen as an important process that could accelerate economic growth.
3. Labor Force (LF): To model the Cobb-Douglas production function, we required the labor force to understand how it influences economic growth.
4. Exports (EXP): Increased export volume signifies a greater engagement in international trade, indicating a heightened potential for economic gains.
5. Life expectancy (LIFE): Enhanced life expectancy reflects an improved healthcare system, accessibility to medical professionals and facilities, and the promotion of a healthy lifestyle. These achievements are typically associated with economic prosperity.
6. Resource Rent (RR): The export of resources could either positively contribute to a country's growth or have a negative impact, attributed to factors like the Dutch Disease and rent-seeking.
7. Net foreign direct investment (NFDI): Net FDI is viewed as a crucial catalyst for attaining economic growth. Foreign investment by outsiders generates employment opportunities and additional economic activities that positively impact the local economy. Moreover, during periods of economic growth, net FDI tends to increase.

Sign Of the Variable	Variable	Description	The Expected Sign of Co-Efficient or Parameter	Source	The Aim of Using the Variable	Reference
GDP_PC (Real GDP Per Capita)	Growth (Dependent Variable)	Thousand US \$		WB	The inclusion of (GDP_PC) variable is grounded in the recognition that the economic growth of any nation is subject to the influence of numerous macroeconomic factors. GDP, being the primary indicator of economic growth, serves as a comprehensive measure to assess the overall economic performance and expansion of a country (Barro, R. J., 2003)	Barro, R. J., 2003
GCF	Gross Capital Formation (Independent Variable)	%	$\beta_{it} > 0$	WB	To model the cobb-dogless production function, we required capital to understand how it influences economic growth	Pasara,M. T.;Garidzir ai,R,2020

Sign Of the Variable	Variable	Description	The Expected Sign of Co-Efficient or Parameter	Source	The Aim of Using the Variable	Reference
LF	Labor Force (Independent Variable)	Numbers in million	$\beta_{i2} > 0$	WB	To model the Cobb-Douglas production function, we required capital to understand how it influences economic growth.	Van Ark, B., & McGuckin, R. H., 1999
EXP	EXPORT (Independent Variable)	Billion US \$	$\beta_{i3} > 0$	WB	Increased export volume signifies a greater engagement in international trade, indicating a heightened potential for economic gains.	Elena Pelinescu, 2009
LIFE	LIFE (Independent Variable)	Years	$\beta_{i4} > 0$	WB	Enhanced life expectancy reflects an improved healthcare system, accessibility to medical professionals and facilities, and the promotion of a healthy lifestyle. These achievements are	Miladinov, 2020

Sign Of the Variable	Variable	Description	The Expected Sign of Co-Efficient or Parameter	Source	The Aim of Using the Variable	Reference
					typically associated with economic prosperity.	
RR	RESOURCE RENT (Independent Variable)	%	$\beta_{i5} > \text{or} < 0$	WB	The export of resources could either positively contribute to a country's growth or have a negative impact, attributed to factors like the Dutch Disease and rent-seeking.	Mohamed, E. S. E., 2020
NFDI	Net Foreign Direct Investment (Independent Variable)	% GDP	$\beta_{i6} > 0$	WB	Net FDI is viewed as a crucial catalyst for attaining economic growth. Foreign investment by outsiders generates employment opportunities and additional economic activities that positively impact the local economy. Moreover, during periods of economic growth, net FDI tends to increase.	Batten, J. A., & Vo, X. V., 2009

Table 5: Predicted Indicators, a Description, a Unit of Variables and Variables.

Source: Created by the author.

Hypotheses:

- H_{GCF} : There is a positive relationship between economic growth and gross capital formation.
- H_{LF} : There is a positive relationship between economic growth and the labor force.
- H_{EXP} : There is a positive relationship between economic growth and exports.
- H_{LIFE} : There is a positive relationship between economic growth and life expectancy.
- H_{RR} : There is a relationship between economic growth and resource exports, but the direction of the relationship is uncertain.
- H_{NFDI} : There is a positive relationship between economic growth and net foreign direct investment.

2.3.2. Panel Data Model Specifications

To grasp the dynamic behavior of parameters and bolster the precision of estimation, our study employs the panel data estimation method. This approach, as supported by Hsiao (1985, 1986) and advocated by Baltagi and Kao (2000), presents numerous advantages. Utilizing panel data sets enhances the dataset's robustness by providing a substantial number of observations, thereby improving variability & degree of freedom. Additionally, it facilitates the exploration of dynamic adjustments over time. Considering individual heterogeneity in the analysis helps mitigate the risk of obtaining skewed results. The panel data model encompasses a range of methods, offering a comprehensive approach to our investigation.

2.3.2.1. Cross-Sectional Dependence Test

In panel-data models, the errors may manifest significant cross-sectional dependence attributed to common shocks, unobserved components, spatial dependence, and idiosyncratic pairwise dependence. Cross-sectional dependence in the error term frequently arises from the inclusion of unobserved components, as discussed by Pesaran (2004).

Once the nations are classified, an examination of cross-sectional dependence is crucial, particularly within clusters of countries. Before estimating panel data models, it is essential to conduct diagnostics, and one key diagnostic is testing for cross-sectional dependency. The significance of cross-sectional dependence becomes evident as countries cease to represent independently drawn observations, exerting considerable influence on each other's outcomes. Additionally, it facilitates more appropriate unit root

and cointegration tests for the data, as highlighted by Henningsen & Henningsen (2019) & Tugcu (2018).

If the dependence among countries is not considered while fitting a model, the error term may demonstrate cross-sectional dependence. Such a phenomenon violates the assumption of ordinary least squares that states errors should be IID (Independently and Identically Distributed). Hence, this issue should be taken into account when modeling a panel regression model.

Two tests of cross-sectional dependence have been performed -the Cross-sectional dependence (CD) test (Pesaran, 2015) and the bias-corrected CD* test (Pesaran et al., 2021).

The test statistics are as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \times \sum_{i=1}^{N-1} \sum_{j=i+1}^N \rho_{ij}$$

$$CD^* = \frac{CD + \sqrt{\frac{T}{2\theta}}}{1 - \theta}$$

Where θ is the bias correction and a function of the estimated factor loadings.

2.3.2.2. Panel Unit-Root Test

Two generations of tests exist in panel unit root testing. First-generation tests may produce misleading results in the presence of cross-sectional dependence. To address this concern, we employ the CIPS (Cross-Sectional Dependence Improved) unit root test, a second-generation test proposed by Pesaran (2007). The CIPS test combines the Augmented Dickey-Fuller (ADF) and Im-Pesaran-Shin tests, offering robustness against cross-sectional dependence and providing more consistent and reliable results compared to traditional unit root tests (Pesaran, 2007). The hypothesis is given below-

H_0 : The variable under consideration possesses a unit root, indicating non-stationarity.

H_1 : The variable under consideration does not possess a unit root, indicating stationarity.

The test statistic is as follows:

$$CIPS = \frac{1}{N} \sum_{i=1}^N CADF_i$$

2.3.2.3. Panel Cointegration Test

To ascertain the existence of a long-run relationship between variables in panel data, it is suggested that panel cointegration tests be performed. The existence of cointegration would imply that there exists a stable, linear combination of variables that exhibits a stationary or integrated process, indicating a long-term relationship among them.

One widely used test for assessing cointegration between nonstationary variables is the Pedroni test (Pedroni, 1999) that provides seven test statistics grouped in two categories: four panel statistics (within-dimension) and three group-mean statistics (between-dimension). All the test statistics (panel v , panel and group ρ , panel and group t , panel and group ADF) are adjusted to follow a standard normal distribution –

$$\frac{e_{N,T} - \mu\sqrt{N}}{\sqrt{S^2}} \sim N(0,1)$$

They test the null hypothesis of no cointegration in nonstationary heterogeneous panels against the alternative that there is cointegration. The test is performed using ‘xtpedroni’ in STATA designed by Neal (2014). All these test statistics are one-tailed, of which the panel v statistic diverges in the right tail and the remaining six diverge in the left tail. The panel statistics pool the autoregressive (AR) coefficients along the panels and the group statistics take averages of the individual AR coefficients. The rejection of null hypothesis for this test is well discussed by Baltagi (2013, 296) that states the rejection of null hypothesis means sufficient number of individual cross-sections have test statistics far from the theoretically predicted means if they followed the null hypothesis. In short, the alternative seeks to confirm that the panels have cointegration.

In addition, since the data possess cross-sectional dependency, the bootstrap approach of the Westerlund panel cointegration test is employed, enabling inference even under general forms of cross-sectional dependence (Westerlund, 2007). The test is performed using ‘xtwest’ in STATA. The cross-sectional statistics are represented by G_t and G_a and the panel statistics are represented by P_t and P_a .

The G_a and G_t test statistics test $H_0: a_i = 0$ for all i versus $H_1: a_i < 0$ for at least one i . Therefore, the rejection of H_0 should, therefore, be taken as evidence of the cointegration of at least one of the cross-sectional units. On the contrary, P_a and P_t test statistics pool information over all the cross-sectional units to test $H_0: a_i = 0$ for all i vs $H_1: a_i < 0$ for

all i . Rejection of H_0 should, therefore, be taken as evidence of cointegration for the panel as a whole.

Robust P-values are used for decision-making, as the test results are sensitive to lag and lead lengths, especially when the time dimension is short (Persyn & Westerlund, 2008).

2.3.2.4. Slope Homogeneity Test

In the context of panel data analysis, assessing the homogeneity of slopes across panels is imperative to ensure the validity of the model's assumptions. One widely employed approach to investigate slope homogeneity in large panels is the method proposed by Pesaran and Yamagata (2008). Their proposed test offers a standardized version of Swamy's test, specifically tailored for panel data models where the cross-sectional dimension (N) may be considerably large relative to the time series dimension (T) (Pesaran, H., & Yamagata, T 2008).

As dynamic macro datasets are prone to serial correlation in errors, we utilize the robust HAC (Heteroskedasticity and Autocorrelation Consistent) standard errors option. This approach, following Blomquist and Westerlund (2013), ensures reliable inference even in the presence of autocorrelation in the residuals (Blomquist & Westerlund, 2013).

2.3.2.5. Model

In our study, we employed the Common Correlated Effects Mean Group (CCEMG) and Augmented Mean Group (AMG) estimators to fit the model, owing to their robustness and versatility in handling various complexities inherent in panel data analysis. These models are particularly used for panel time series models with heterogeneous slopes (Eberhardt, 2012).

The CCEMG approach, as explained by Pesaran (2006) and further discussed by Eberhardt (2012), is particularly suitable for scenarios where a mix of strong and weak factors exists within the dataset. These factors encompass both global shocks, such as major financial crises, and local spillover effects, making the CCEMG estimator adept at capturing the nuanced dynamics present in heterogeneous panel data settings.

Additionally, the AMG estimator by Eberhardt & Bond (2009) offers a robust solution for handling cross-sectional dependence, a common feature in panel datasets. By allowing for cross-sectional dependence, both the CCEMG and AMG estimators provide a comprehensive framework for modeling the interdependencies among observations across different panels.

2.3.2.6. Panel Causality

We apply Dumitrescu & Hurlin's (2012) panel causality test, serving as an alternative to Granger's (1969) test for models with heterogeneous panel data. This test examines the pairwise causal connections between variables, assuming the null hypothesis of homogeneous noncausality (HNC). It relies on the semi-asymptotic distribution of the average statistic, characterized by a fixed T sample and individual Wald statistics. These individual Wald statistics gradually converge to a standard normal distribution. The test statistic for the null hypothesis of homogeneous non-causality (HNC) is expressed as follows:

$$W_{N,T}^{HNC} = \frac{1}{N} \sum_{i=1}^N W_{i,T}$$

Where, $W_{i,T}$ represents the unique Wald statistics for each cross-section unit, and the test statistic is the same for each unique test that uses the null hypothesis, $H_0: \beta_i = 0$. This does not contain any p-value; hence, the Z bar statistic is reported along with p-values.

2.4. Data Management and Analysis

In this study, we drew upon secondary data sources, primarily from the World Bank database, for their credibility and breadth. Following a meticulous data collection process, we conducted a thorough consistency check to ensure the reliability of subsequent analyses. To ensure the utmost transparency and reproducibility, we adopted a structured approach using Stata version 17.0. For the detailed analysis of the data, we used R Studio. This involved organizing and managing our data using do files and r scripts, which meticulously recorded each step of data wrangling and transformation. This meticulous documentation enabled others to precisely replicate our analytical process. Our initial analysis involved descriptive methods to gain a preliminary understanding of variable distributions and overall data characteristics. Subsequently, we applied suitable statistical techniques.

For a more comprehensive understanding of economic growth patterns, we employed advanced methods. This encompassed econometric analysis of panel data. Our choice of employing the Stata 17.0 statistical software package was grounded in its robust analytical capabilities for the necessary statistical tests and estimating the models, and summary statistics were computed in R Studio, which aligned well with the diverse analyses we planned to undertake. By weaving together these various strategies, incorporating

secondary World Bank data, and leveraging Stata 17.0 & R Studio, our study rigorously explored economic growth dynamics. Our study significantly added to the body of knowledge in this field through the application of panel-time series analysis.

2.5. Sample Size and Sampling

The primary challenge is to develop a sampling frame from which we would select our desired number of samples. We worked out several options and finally decided to collect the necessary data and information at the open-source websites. Moreover, this study is based on the details of multiple countries, and it is almost impossible to collect data physically from the research team.

We chose the list of the developing and developed countries and their economic status from the World Bank based on their geo-locations and trading dependencies.

The selection of the 49 countries for this study was guided by a deliberate and comprehensive approach to ensure a diverse representation of economic scenarios and regional dynamics. Including 14 European Union (EU) countries showcases the economic integration within this influential bloc. Additionally, the incorporation of 6 countries from the Association of Southeast Asian Nations (ASEAN), 4 from the Organization of Islamic Cooperation (OIC), 3 from the North American Free Trade Agreement (NAFTA), 3 from the BRICS Association, and 3 from the South Asian Association for Regional Cooperation (SAARC) allows for an examination of various regional trade dynamics and economic cooperation. Randomly selecting countries from other, potentially less prominent, trade blocs add to the depth of understanding of global economic interactions. This diverse set of nations enables a nuanced perspective, facilitating a robust comparative analysis of economic growth patterns, policy implications, and developmental considerations across different trade blocs and regions.

1. Geo-locations: In our considerations, we have both developing countries (N=29) and developed countries (N=20) based on all 6 continents. Most of the developed countries are in the European region.

Continents	Sample
Asia	16
Europe	16
Africa	7
North America	4
South America	4
Australia	2

Table 6: Geo Locations

Source: WDI, World Bank

1. Trade bloc: We also included the countries that have bilateral trade between countries or members of any trade bloc. Here, we have 14 EU countries, 6 ASEAN countries, 4 OIC countries, 3 NAFTA countries, 3 BRICS countries, and 3 SAARC countries. Also, we randomly picked some countries from other trade blocs that are less renowned.

Types of Countries	Sample countries
Developing Economies	29
Developed Economies	20
Total	49

Table 7: Typewise Total Countries and Sample Size

Source: Created by the author.

2. Income Group: We categorized the developed countries based on their income level. Suppose it has a high-income status based on the World Bank definition.

Group	Corresponding Per Capita Income Ranges (in USD)
Low income	Less than 1,045
Lower-middle income	1,046 to 4,095
Upper-middle income	4,096 to 12,695
High income	More than 12,695

Table 8: Income Category Define

Source: World Bank, 2021

Countries classified as developed were those with high-income status, while developing countries encompassed both upper-middle and lower-middle-income groups in this study. Utilizing a stratified sampling approach, we conducted a global study, considering the economic status and land area (up to 50,000 KM²). Out of 283 countries, 90 were randomly selected based on income type, and considering financial status, we excluded lower-income countries (Table 8). Our final plan involved selecting 49 countries, encompassing both developing and developed nations and streamlining the analysis and data presentation. Stata, version 17.0, was employed for efficient sampling strategies.

Countries	Trade Bloc	Developed Status	Continents
Argentina	Mercosur	Developing Countries	South America
Bangladesh	SAARC	Developing Countries	Asia
Bulgaria	EU	Developing Countries	Europe
Bolivia	Andean Community	Developing Countries	South America
China	BRICS	Developing Countries	Asia
Algeria	Arab Maghreb Union	Developing Countries	Africa
Egypt, Arab Rep.	OIC	Developing Countries	Africa
Guatemala	SICA	Developing Countries	North America
Indonesia	ASIAN	Developing Countries	Asia
India	BRICS	Developing Countries	Asia
Iran, Islamic Rep.	OIC	Developing Countries	Asia
Jordan	OIC	Developing Countries	Asia
Kenya	COMESA	Developing Countries	Africa
Libya	OIC	Developing Countries	Asia
Sri Lanka	SAARC	Developing Countries	Asia
Morocco	Arab Maghreb Union	Developing Countries	Africa

Countries	Trade Bloc	Developed Status	Continents
Mexico	NAFTA	Developing Countries	North America
Malaysia	ASIAN	Developing Countries	Asia
Pakistan	SAARC	Developing Countries	Asia
Peru	Mercosur	Developing Countries	South America
Philippines	ASIAN	Developing Countries	Asia
Paraguay	Mercosur	Developing Countries	South America
Russian Federation	BRICS	Developing Countries	Europe
Senegal	ECOWAS	Developing Countries	Africa
Thailand	ASIAN	Developing Countries	Asia
Tunisia	Arab Maghreb Union	Developing Countries	Africa
Ukraine	no economic region	Developing Countries	Europe
Vietnam	ASIAN	Developing Countries	Asia
Zimbabwe	SADC	Developing Countries	Africa
Australia	Asia-Pacific	Developed Countries	Australia
Austria	EU	Developed Countries	Europe
Canada	NAFTA	Developed Countries	North America
Germany	EU	Developed Countries	Europe
Spain	EU	Developed Countries	Europe
France	EU	Developed Countries	Europe
United Kingdom	former EU	Developed Countries	Europe
Greece	EU	Developed Countries	Europe
Croatia	EU	Developed Countries	Europe

Countries	Trade Bloc	Developed Status	Continents
Ireland	EU	Developed Countries	Europe
Italy	EU	Developed Countries	Europe
Japan	ASIAN	Developed Countries	Asia
Norway	EU	Developed Countries	Europe
New Zealand	Asia-pacific	Developed Countries	Australia
Oman	GCC	Developed Countries	Asia
Poland	EU	Developed Countries	Asia
Portugal	EU	Developed Countries	Europe
Sweden	EU	Developed Countries	Europe
Turkiye	EU	Developed Countries	Europe
United States	NAFTA	Developed Countries	North America

Table 9: Final List of Sample Countries

Source: WDI, World Bank

2.6. Conclusion

In summary, this study employed a methodologically robust approach to examine cross-country economic growth. Utilizing panel data analysis and diverse econometric methods, the research aimed to reveal intricate patterns and relationships among economic indicators. Strict statistical tests were used to improve analytical precision and provide a comprehensive understanding of the elements driving economic growth, such as Pesaran's unit root test, CCEMG, AMG models, and Dumitrescu and Hurlin's causality test. The inclusion of preliminary and post-estimation tests for model validation added further credibility to the findings. Overall, the methodology laid a solid foundation for a comprehensive exploration of the research question, contributing valuable insights to the broader understanding of determinants of economic growth.

3. CHAPTER: ANALYSIS AND DISCUSSION OF RESULTS

3.1. Empirical Results

Within the realm of empirical investigation, this section delves into the substantive findings derived from a meticulous analysis of both developing and developed countries. The exploration encompasses a multifaceted approach, including descriptive analyses, unit root tests, assessments of multicollinearity, cross-sectional dependence evaluations, slope homogeneity tests, cointegration tests, fit models, and pairwise causality examinations. The empirical results offer a nuanced understanding of the complex relationships among key macroeconomic variables, providing insights into the dynamics of economic growth in diverse national contexts. The insights gleaned from these analyses serve as the foundation for informed discussions and policy implications in subsequent sections.

3.1.1. For Developing Countries

3.1.1.1. Descriptive Statistics

The initial stage of our analytical process involved a comprehensive descriptive analysis, as depicted in Table 10, which encapsulates key statistical measures for 29 developing countries. The variables under consideration were GDP PC, GCF, LF, EXP, LIFE, RR, and NFDI. After calculating descriptive statistics, additional preliminary tests were conducted. Shapiro–Wilk test and JB test were used to assess the normality of the attributes. The results, with p-values indicating high significance levels, substantiate the normality assumption, affirming the foundational integrity of subsequent statistical analyses.

	GDP Per Capita	Gross Capital Formation	Labor Force	Exports	Life Expectancy	Resource Rent	Net Foreign Direct Investment
Mean	3.2	23.85	61.4	98.42	69.03	6.62	1.89
Median	2.05	22.62	15.7	21.12	70.56	3.08	1.21
Min	0.1	0	0.73	1	41.96	0.04	-4.7
Max	15.97	50.78	780.7	2730	79.27	66.06	29.04
SD	2.99	8.58	149.5	284.59	5.99	9.07	2.8
Skewness	1.57	0.33	3.73	6.64	-1.45	3.01	3.72
Kurtosis	2.15	0.62	13.27	49.7	2.69	11.64	22.28
Shapiro Statistic	0.82	0.97	0.4	0.32	0.89	0.65	0.69
Shapiro P- value	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
JB Statistic	544.93	31.49	8725.1	99614.25	588.77	6464.58	20761.81
JB P-value	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Observations	899	899	899	899	899	899	899

Table 10: Descriptive Statistics of the N-29 Developing Countries

Source: Created by the author.

The average GDP per capita across the sample is \$3.2 thousand, reflecting the relatively low-income levels typical of developing countries. The median value of \$2.05 thousand suggests that half of the countries have a GDP per capita below this threshold, indicating a distribution skewed towards lower income levels. This is further evidenced by the positive skewness (1.57), which indicates a long right tail, meaning there are a few countries with significantly higher GDP per capita. The distribution also exhibits slight leptokurtosis (kurtosis = 2.15), indicating heavier tails than a normal distribution. The results of the Shapiro-Wilk test (statistic = 0.82, p-value < 0.01) and the Jarque-Bera test (statistic = 544.93, p-value < 0.01) confirm that the GDP per capita distribution deviates significantly from normality.

The mean Gross Capital Formation is 23.85%, with a median of 22.62%. The data shows minimal skewness (0.33) and low kurtosis (0.62), indicating a distribution close to normal. However, the normality tests (Shapiro-Wilk statistic = 0.97, p-value < 0.01; Jarque-Bera statistic = 31.49, p-value < 0.01) still reject the hypothesis of normality.

The labor force in developing countries shows considerable variability, with an average size of 61.4 million workers and a median of 15.7 million. This significant difference between the mean and median suggests a distribution that is highly skewed to the right, as confirmed by the skewness value of 3.73. The labor force ranges from a minimum of 0.73 million to a maximum of 780.7 million, highlighting the wide disparities in population and economic activity across these countries. The distribution of the labor force data also exhibits extreme kurtosis (13.27), indicating the presence of outliers or countries with exceptionally large labor forces relative to the rest of the sample. The results from the Shapiro-Wilk test (statistic = 0.4, p-value < 0.01) and the Jarque-Bera test (statistic = 8725.1, p-value < 0.01) strongly reject the null hypothesis of normality, suggesting that the labor force distribution is far from normal and is heavily influenced by a few countries with very large labor forces.

The average value of exports is 98.42 billion USD, with a median of 21.12 billion USD. The disparity between the mean and median, coupled with the minimum and maximum values (1 billion USD and 2730 billion USD, respectively), suggests significant variability in export levels. The distribution is highly right-skewed (skewness = 6.64) with substantial kurtosis (kurtosis = 49.7), indicating the presence of extreme values. Both the Shapiro-Wilk and Jarque-Bera tests strongly reject the normality of the export data (Shapiro-Wilk statistic = 0.32, p-value < 0.01; Jarque-Bera statistic = 99614.25, p-value < 0.01).

Life expectancy among the countries has a mean of 69.03 years and a median of 70.56 years, indicating that most countries have life expectancies around this range. The negative skewness (-1.45) suggests a tail towards higher life expectancy values, with a moderate kurtosis (2.69). Although the distribution is relatively close to normal, the Shapiro-Wilk and Jarque-Bera tests still indicate a deviation from normality (Shapiro-Wilk statistic = 0.89, p-value < 0.01; Jarque-Bera statistic = 588.77, p-value < 0.01).

Resource rent, which measures the revenue from natural resources as a percentage of GDP, has an average of 6.62% and a median of 3.08%. The positive skewness (3.01) and

high kurtosis (11.64) suggest a distribution with a long right tail, driven by a few countries with exceptionally high resource rents. The tests for normality also confirm significant deviations (Shapiro-Wilk statistic = 0.65, p-value < 0.01; Jarque-Bera statistic = 6464.58, p-value < 0.01).

Net FDI as a percentage of GDP have a mean value of 1.89% and a median of 1.21%. The distribution is positively skewed (skewness = 3.72) with substantial kurtosis (22.28), reflecting the presence of outliers with very high FDI relative to GDP. The distribution is confirmed to be non-normal by both the Shapiro-Wilk and Jarque-Bera tests (Shapiro-Wilk statistic = 0.69, p-value < 0.01; Jarque-Bera statistic = 20761.81, p-value < 0.01).

3.1.1.2. Multicollinearity and Cross-Sectional Dependence Test

To ensure the resilience of the analytical framework, a thorough examination of both multicollinearity and cross-sectional dependence was conducted. Table 11 illustrates the pairwise correlation table, and Table 12 illustrates the utilization of the Variance Inflation Factor (VIF) for evaluating multicollinearity and variable-wise CD test results. In addition, Pesaran's cross-sectional dependence test result is shown in Table 13, which assesses cross-sectional dependence.

Variables	Log GDP PC	Log GCF	Log LF	Log EXP	Log LIFE	Log RR
Log GCF	0.123***					
Log LF	-0.119***	0.156***				
Log EXP	0.554***	0.237***	0.711***			
Log LIFE	0.665***	0.104***	0.084**	0.553***		
Log RR	-0.177***	0.093***	0.074**	0.232***	-0.052	
Log NFDI	-0.073***	-0.113***	-0.098***	-0.092***	0.148***	-0.082**

Table 11: Pairwise Correlations in Developing Countries

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

The examination of multicollinearity and cross-sectional dependence is crucial for ensuring the integrity of our econometric model for developing countries. Here, the VIF values, assessing multicollinearity, depict a favorable scenario.

Variables	VIF	Pesaran CD (2015)	Pesaran, Xie CD* (2021)
Log GDP PC	-	95.73***	-2.30**
Log GCF	1.07	5.32***	1.66*
Log LF	3.11	76.08***	1.91*
Log EXP	5.11	100.78***	3.14***
Log LIFE	2.41	91.25***	-1.04
Log RR	1.22	46.02***	-1.92*
Log NFDI	1.09	7.33***	0.94

Table 12: Variance Inflating Factor and CD tests

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

However, the cross-sectional dependence test, using the Pesaran CD statistic and CD* statistic, reveals a significant level of interdependence among observations across different cross-sections, as indicated by highly significant p-values (p-value < 0.001). While our model remains robust in terms of multicollinearity, the acknowledgment of cross-sectional dependence underscores the importance of employing advanced econometric techniques that appropriately address these dependencies in subsequent analyses. These meticulous considerations contribute to the credibility of our model, affirming the reliability of our empirical findings for developing countries.

Test	Statistic
Pesaran CD (2015)	21.25***
Pesaran, Xie CD* (2021)	1.58

Table 13: Cross-sectional Dependence Test Result for N-20 Countries

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

3.1.1.3. Panel Unit-Root Test

In the thorough evaluation of the time-series attributes of the analyzed variables, a pivotal step involved conducting the panel unit root test (CIPS). This statistical procedure is

specifically designed to detect the existence of unit roots in panel-time series data. The null hypothesis in the CIPS test assumes that all series possess a unit root. The outcomes of this crucial test are detailed in Table 14, providing valuable insights into the stationarity characteristics of the variables under examination. These results contribute to establishing a foundational comprehension of the time-series dynamics and play a crucial role in shaping subsequent analyses and interpretation.

	Intercept		Intercept & Trend	
	Level	First-difference	Level	First-difference
Log GDP PC	-2.652***	-	-2.722**	-
Log GCF	-2.053	-4.694***	-2.338	-4.731***
Log LF	-1.494	-4.080***	-1.991	-4.154***
Log EXP	-2.452***	-	-2.405	-4.989***
Log LIFE	-2.627***	-	-1.928	-3.900***
Log RR	-2.321***	-	-2.754**	-
Log NFDI	-3.171***	-	-3.542***	-

Table 14: CIPS Panel Unit Root Test Result

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

The Unit Root Test for Developing Countries, conducted through the Panel Unit Root Test (CIPS), provides insights into the stationarity properties of the examined variables. This statistical analysis is crucial for understanding the time-series dynamics and establishing the foundation for subsequent analyses and interpretations. The results, considering both scenarios without trend and with trend, reveal distinctive patterns for each variable.

In particular, the GDP per capita (GDP PC), Export (EXP), Life Expectancy (LIFE), Natural Resource Rent (RR), and Net Foreign Direct Investment (NFDI) exhibit stationarity levels, whereas Gross Capital Formation (GCF) and labor force (LF) are integrated of order 1. GDP PC, RR, and NFDI have shown consistent results when considering intercept-only specification as well as intercept and trend-added

specification, while EXP and LIFE become integrated into order 1 when considering intercept and trend specification.

These findings are crucial for determining the integration order of each variable, where $I(0)$ signifies a stationary series without a trend, and $I(1)$ indicates a series with a unit root or a random walk. The nuanced dynamics revealed by the CIPS test contribute valuable insights into the time-series properties of these key economic indicators in developing countries.

3.1.1.4. Panel Cointegration Test

Table 15 represents the Pedroni panel cointegration test and Westerlund bootstrap panel cointegration test result for developing countries. The panel cointegration analysis for developing countries, using both the Pedroni and Westerlund tests, provides strong evidence of long-run relationships among the economic variables studied.

Pedroni Panel Cointegration Test			
Panel Cointegration	Z-value		P-value
Panel v -statistic	8.672		<0.001
Panel ρ -statistic	-6.362		<0.001
Panel t -statistic	-5.652		<0.001
Panel ADF-statistic	-3.678		<0.001
Group ρ -statistic	-5.184		<0.001
Group t -statistic	-6.273		<0.001
Group ADF-statistic	-3.699		<0.001
Westerlund Panel Cointegration Test			
Panel Cointegration	Z-value	P-value	Robust P-value
G_t	-5.308	<0.001	<0.001
G_α	-1.125	0.105	0.030
P_t	-1.174	0.120	0.410
P_α	-4.348	<0.001	0.200

Table 15: Panel Cointegration Test Results for Developing Countries

Source: Created by the author.

The Pedroni panel cointegration Test consistently rejects the null hypothesis of no cointegration, with all panel and group-specific statistics (Panel v , ρ , t , and ADF; Group ρ , t , and ADF) showing significant Z-values (p-values < 0.001). These results indicate a stable long-run equilibrium relationship among the variables across the panel.

The Westerlund panel cointegration test shows a similar result. The G_t statistic strongly suggests cointegration, with a Z-value of -5.308 and robust p-values < 0.001. The G_α statistic shows weaker evidence, with a standard p-value of 0.105 and a robust p-value of 0.030 that is significant at 5% level. The P_t statistic does not support cointegration, with a robust p-value of 0.410, while the P_α statistic shows significant cointegration (Z-value of -4.348, standard p-value < 0.001), although this significance weakens when considered

robust p-value. Overall, the Pedroni test results confirm the existence of cointegration and the Westerlund test provides somewhat supportive evidence.

3.1.1.5. Slope Homogeneity Test

The slope homogeneity test result by Pesaran and Yamagata (2008) is presented in Table 16. From the test results, it is evident that we reject the null hypothesis of the existence of homogeneous slopes.

Homogeneity Tests	Statistic
Delta	10.801***
Delta-adjusted	15.275***

Table 16: Slope Homogeneity Test Result

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

Thus, when considering modeling techniques, models that allow slope heterogeneity should be used.

3.1.1.6. CCEMG and AMG Model

The CCEMG and AMG estimation results are presented in Table 17. The results indicate that the CCMEG and AMG estimators both match in terms of the direction of the relationship, although some of them are statistically insignificant.

There is a significant positive effect of export and life expectancy on economic growth (referred by GDP per capita); meanwhile, a significant negative effect of natural resource rent is observed. Gross capital formation seems significant at the 10% level only in the AMG model and has a positive effect on the economic growth of developing countries. Both of the models have been assessed by the Wald test for significance and have obtained a significant fit. The CCEMG model has a lower RMSE, meaning it is a better fit.

	CCEMG	AMG
Log GCF	0.014 (0.046)	0.121* (0.064)
Log LF	-0.308 (0.242)	-0.329 (0.304)
Log EXP	0.452*** (0.060)	0.467*** (0.057)
Log LIFE	2.761*** (1.208)	1.238 (0.752)
Log RR	-0.200*** (0.053)	-0.175*** (0.037)
Log NFDI	-0.169 (0.125)	-0.146 (0.134)
Constant	1.208 (13.456)	0.285 (7.009)
Wald	79.45***	98.68***
RMSE	0.0471	0.0706
Number of Obs.	899	899

Table 17: CCEMG and AMG Results for Developing Countries

Source: Created by the author.

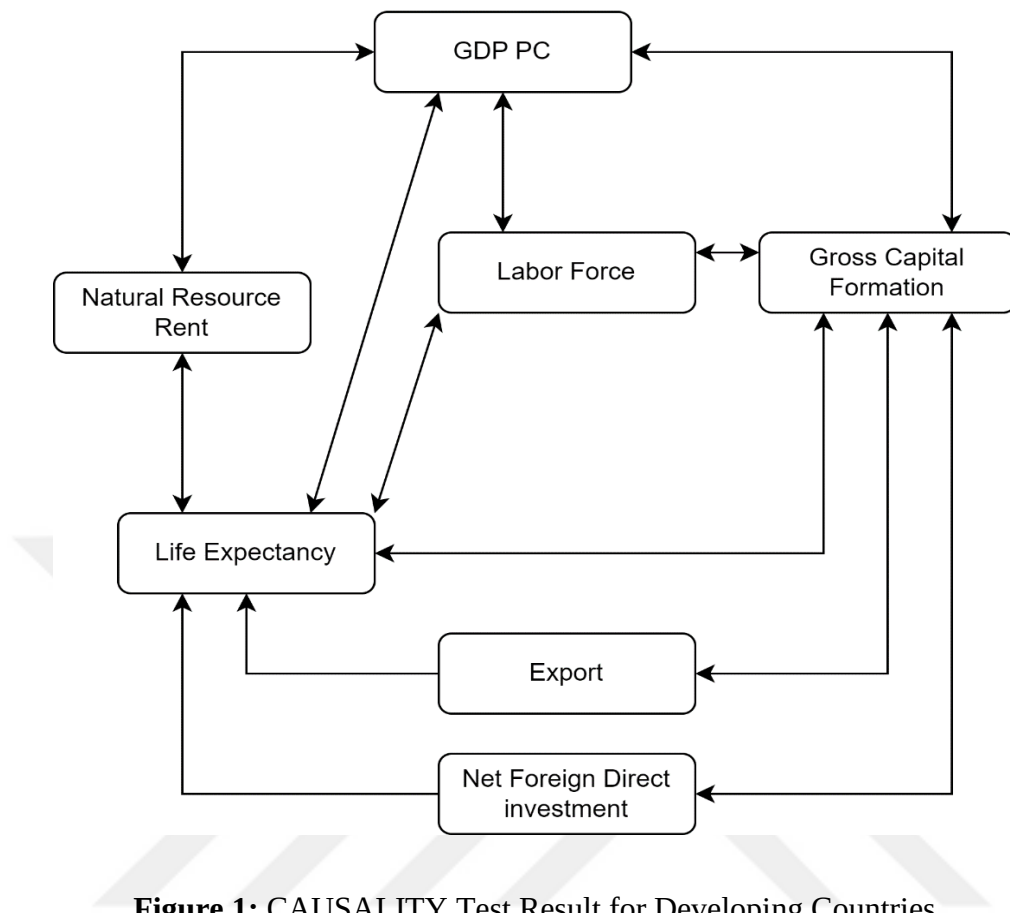


Figure 1: CAUSALITY Test Result for Developing Countries

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

3.1.1.7. Pairwise Dumitrescu-Hurlin Panel Causality Test (For Future Researcher)

Within the framework of exploring causal connections between economic growth and diverse macro variables in developing nations, the outcomes of the Pairwise Dumitrescu–Hurlin panel causality test are presented in Table 18. This empirical scrutiny delves into the directional causality between each of the variables.

The results furnish substantive evidence of unidirectional causality, offering insights into the intricate dynamics between economic growth and the identified macro variables. This crucial empirical investigation significantly contributes to a nuanced understanding of the factors influencing economic growth in developing countries. This also helps to future researcher to making new outcome by using new model like VAR or anyother which support this causality relationship Akal (2016).

Direction of Causality	$\bar{Z}$ Statistic
GCF → GDP PC	30.62***
GDP PC → GCF	9.12**
LF → GDP PC	26.82***
GDP PC → LF	15.73*
EXP → GDP PC	12.65
GDP PC → EXP	10.19
LIFE → GDP PC	26.06***
GDP PC → LIFE	6.29***
RR → GDP PC	13.98*
GDP PC → RR	12.16***
NFDI → GDP PC	7.97
GDP PC → NFDI	10.74
GCF → LF	5.71
LF → GCF	20.54***
GCF → EXP	20.10***
EXP → GCF	7.10***
GCF → LIFE	2.61***
LIFE → GCF	17.77***
GCF → RR	20.82***
RR → GCF	5.19***
GCF → NFDI	32.30***
NFDI → GCF	2.41***
LF → EXP	10.23

Direction of Causality	$\bar{Z}$ Statistic
EXP → LF	10.85
LF → LIFE	41.82***
LIFE → LF	18.02***
LF → RR	11.89
RR → LF	7.31
LF → NFDI	12.45
NFDI → LF	20.37***
EXP → LIFE	9.99***
LIFE → EXP	9.18
EXP → RR	5.25
RR → EXP	10.38
EXP → NFDI	10.03
NFDI → EXP	16.28***
LIFE → RR	3.97
RR → LIFE	11.10***
LIFE → NFDI	10.83
NFDI → LIFE	10.93***
RR → NFDI	3.32
NFDI → RR	6.02

Table 18: Pairwise Causality Test for Developing Countries

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

Pairwise Causality analysis for developing countries sheds light on the directional relationships between different variables and GDP per capita, and vice-versa. The findings reveal several notable patterns, as discussed below.

Unidirectional Causality: The test indicates instances of unidirectional causality from certain variables to GDP per capita. Notably, there is evidence of significant unidirectional causality from Gross Capital Formation (GCF), Labor Force (LF), Life Expectancy (LIFE), and Natural Resource Rent (RR) towards GDP per capita.

Bidirectional Causality: Additionally, bidirectional causality is observed between some variables and GDP per capita. Some of these include the relationship between GDP PC and GCF, GDP PC and LF, GDP PC and LIFE, and GDP PC and RR.

No Causality: Some relationships show no significant causality between the variables in either direction. For instance, no significant causality was observed for GDP PC by export and net foreign direct investment.

These results emphasize the complex interactions among these economic markers and illuminate the various factors influencing economic growth in developing nations. The statistical significance, denoted by the z bar at the different significance levels, enhances the credibility of these causal connections, offering valuable insights for policymakers and researchers alike.

3.1.2. For Developed Countries

3.1.2.1. Descriptive Statistics

The preliminary exploration of the dataset involved a comprehensive descriptive analysis, providing key insights into the central tendencies and distributions of the variables under consideration. Table 19 encapsulates the essential statistical measures for the examined variables.

	GDP Per Capita	Gross Capital Formation	Labor Force	Exports	Life Expectancy	Resource Rent	Net Foreign Direct Investment
Mean	29.7	22.61	23.12	336.29	78.53	2.82	0.41
Median	26.76	22.74	14.17	191.8	78.69	0.36	0.2
Min	1.73	0	0.56	0.71	67.71	0.01	-21.16
Max	103.55	54.77	167.1	2538	84.56	50.48	29.76
SD	17.99	5.18	33.5	436.21	3.14	7.73	3.52
Skewness	0.94	-0.62	2.8	2.47	-0.7	4.08	1.83
Kurtosis	1.35	7.11	7.98	7.09	0.28	16.47	17.16
Shapiro Statistic	0.95	0.89	0.62	0.71	0.96	0.38	0.79
Shapiro P-value	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
JB Statistic	140.12	1357.62	2471.7 1	1945.33	52.9	8785.57	8012.1
JB P-value	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Observations	620	620	620	620	620	620	620

Table 19: Descriptive Statistics of the N-20 Developed Countries

Source: Created by the author.

The GDP per capita for developed countries averages \$29.7 thousand, with a median value of \$26.76 thousand. This indicates that the income levels are relatively high across these countries, with the distribution slightly right-skewed (skewness = 0.94). The GDP per capita ranges from a minimum of \$1.73 thousand to a maximum of \$103.55 thousand, reflecting substantial variation even among developed nations. The distribution's kurtosis (1.35) suggests tails that are slightly lighter than those of a normal distribution. However, the Shapiro-Wilk test (statistic = 0.95, p-value < 0.01) and the Jarque-Bera test (statistic = 140.12, p-value < 0.01) indicate a departure from normality, though this deviation is less pronounced compared to other variables.

The mean Gross Capital Formation is 22.61%, with a median value of 22.74%, showing an even distribution around the central values. The distribution is slightly negatively

skewed (-0.62), suggesting that more countries have Gross Capital Formation slightly above the mean. The range of values extends from 0% to 54.77%, indicating some variance in investment levels. The high kurtosis value (7.11) points to a distribution with heavy tails, meaning there are more extreme values than would be expected in a normal distribution. The Shapiro-Wilk (statistic = 0.89, p-value < 0.01) and Jarque-Bera (statistic = 1357.62, p-value < 0.01) tests confirm that the distribution is not normal.

The labor force in developed countries varies significantly, with a mean of 23.12 million and a median of 14.17 million. The distribution is highly right-skewed (skewness = 2.8), indicating that a few countries have very large labor forces compared to the rest. The kurtosis (7.98) also suggests a distribution with more extreme values than a normal distribution. The range extends from 0.56 million to 167.1 million, demonstrating considerable variation. Both the Shapiro-Wilk test (statistic = 0.62, p-value < 0.01) and the Jarque-Bera test (statistic = 2471.71, p-value < 0.01) reject the normality of the distribution.

Exports in developed countries show substantial variation, with a mean of 336.29 billion USD and a median of 191.8 billion USD. The distribution is right-skewed (skewness = 2.47), indicating that a few countries have very high export levels. The minimum and maximum values range from 0.71 billion USD to 2538 billion USD, highlighting the diversity in export volumes. The distribution also exhibits high kurtosis (7.09), indicating the presence of outliers. The Shapiro-Wilk test (statistic = 0.71, p-value < 0.01) and the Jarque-Bera test (statistic = 1945.33, p-value < 0.01) further confirm the non-normality of the distribution.

Life expectancy in developed countries averages 78.53 years, with a median of 78.69 years, indicating a relatively consistent and high life expectancy across these nations. The slight negative skewness (-0.7) suggests that more countries have life expectancy slightly above the mean. The kurtosis value (0.28) is close to that of a normal distribution, indicating a bell-shaped curve. However, the Shapiro-Wilk (statistic = 0.96, p-value < 0.01) and Jarque-Bera (statistic = 52.9, p-value < 0.01) tests suggest deviation from normality.

Resource rent, representing revenue from natural resources, has a mean of 2.82% and a median of 0.36%, with a distribution that is highly skewed to the right (skewness = 4.08). This indicates that while most developed countries rely minimally on resource rent, a few

rely heavily on it. The high kurtosis (16.47) further indicates that there are extreme outliers in this distribution. The Shapiro-Wilk (statistic = 0.38, p-value < 0.01) and Jarque-Bera (statistic = 8785.57, p-value < 0.01) tests confirm a significant departure from normality.

Net FDI as a percentage of GDP are relatively low in developed countries, with a mean of 0.41% and a median of 0.2%. The distribution is positively skewed (skewness = 1.83), indicating that a few countries receive significantly higher FDI relative to GDP. The data shows a wide range, from -21.16% to 29.76%, reflecting the diversity in FDI and outflows. The kurtosis (17.16) suggests the presence of significant outliers. The Shapiro-Wilk (statistic = 0.79, p-value < 0.01) and Jarque-Bera (statistic = 8012.1, p-value < 0.01) tests strongly reject normality for this indicator.

3.1.2.2. Multicollinearity and Cross-Sectional Dependence Test

The analysis conducted here aimed to assess potential multicollinearity and cross-sectional dependence among the variables in the dataset. This evaluation is crucial for ensuring the reliability of the empirical findings. Table 20 presents the correlation matrix, table 21 presents variance inflating factors and variable-wise CD test results, and lastly, Table 22 presents the cross-section dependence test result.

Multicollinearity, resulting from a high correlation among independent variables in a regression model, can compromise the accuracy of estimated coefficients. Concurrently, cross-sectional dependence, indicating interconnections among cross-sections, may violate the independence assumption necessary for specific statistical analyses. The results of these tests are pivotal for appraising the robustness of the statistical model and instilling confidence in subsequent empirical analyses.

Variables	Log GDP PC	Log GCF	Log LF	Log EXP	Log LIFE	Log RR
Log GCF	0.371***					
Log LF	0.186***	0.041				
Log EXP	0.681***	0.261***	0.795***			
Log LIFE	0.840***	0.292***	0.188***	0.598***		
Log RR	-0.114***	-0.066	-0.404***	-0.370***	-0.285***	
Log NFDI	-0.155***	0.053	-0.114***	-0.148***	-0.110***	0.101**

Table 20: Pairwise Correlations in Developed Countries

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

The analysis of multicollinearity and cross-sectional dependence for developed countries offers crucial insights into the model's robustness. The variance inflation factor (VIF) was employed to evaluate potential multicollinearity among variables, where a $VIF < 10$ suggests no significant multicollinearity issues. All the variables obtained VIF below the critical threshold, confirming the absence of multicollinearity concerns. This result reinforces the model's reliability, ensuring each variable contributes unique information without redundant overlap.

Variables	VIF	Pesaran CD (2015)	Pesaran, Xie CD* (2021)
Log GDP PC	-	69.08***	-1.02
Log GCF	1.18	5.55***	9.61***
Log LF	4.81	46.95***	3.06***
Log EXP	6.81	74.43***	2.51**
Log LIFE	2.55	75.14***	-0.63
Log RR	1.29	28.85***	-0.58
Log NFDI	1.04	-1.47	-0.17

Table 21: Variance Inflating Factor and CD Tests

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

Additionally, the CD tests for cross-sectional dependence produced mixed results. All variables except NFDI obtained statistics that resulted in the rejection of the null hypothesis of cross-sectional independence, with p-values consistently below 0.001, highlighting the presence of cross-sectional dependence among different cross-sections, emphasizing variable interrelatedness.

This nuanced understanding of multicollinearity and cross-sectional dependence strengthens the model's credibility, establishing a robust foundation for analyzing economic dynamics within developed countries.

Test	Statistic
Pesaran CD (2015)	13.56***
Pesaran, Xie CD* (2021)	2.21**

Table 22: Cross-sectional Dependence Test Result for N-20 Countries

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

3.1.2.3. Panel Unit-Root Test

The subsequent examination involved the implementation of the panel unit root test, specifically the Cross-Sectionally Augmented Im, Pesaran, and Shin (CIPS) test. This diagnostic procedure is tailored to identify the presence of unit roots within the dataset. The null hypothesis for the CIPS test suggests that all series under consideration exhibit a unit root. The outcomes of the CIPS test, outlined in Table 23, illuminate the presence or absence of unit roots across the variables in the study. The results of this test play a pivotal role in ascertaining the stationarity characteristics of the variables, thereby offering crucial insights into the time series properties of the scrutinized data.

	Intercept		Intercept & Trend	
	Level	First-difference	Level	First-difference
Log GDP PC	-2.104	-4.633***	-2.290	-4.686***
Log GCF	-2.044	-4.740***	-2.438	-4.819***
Log LF	-1.504	-3.480***	-1.853	-3.932***
Log EXP	-2.633***	-	-2.719**	-
Log LIFE	-2.362***		-2.521	-5.874***
Log RR	-2.015	-5.699***	-2.467	-5.838***
Log NFDI	-3.779***	-	-4.166***	-

Table 23: CIPS Panel Unit Root Test Result

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

The utilization of the CIPS method, both with and without trends, in the panel unit root test offers valuable insights into the stationarity of variables in developed countries. This analysis provides crucial information for assessing the stability of these variables over time. The results reveal that EXP, LIFE, and NFDI are stationary when considering intercept-only specifications. Among these, LIFE becomes an I(1) process if specification with intercept and trend is considered. GDP PC, GCF, LF, and RR are I(1) processes irrespective of which specification is used. This nuanced understanding of the integration orders provides a foundation for interpreting the temporal dynamics of the variables in the context of developed countries.

3.1.2.4. Panel Cointegration Test

Table 24 presents the results of the Pedroni and Westerlund panel cointegration tests for developed countries.

Pedroni Panel Cointegration Test			
Panel Cointegration	Z-value	P-value	
Panel v -statistic	-0.601	0.726	
Panel ρ -statistic	0.324	0.627	
Panel t -statistic	-1.656	0.049	
Panel ADF-statistic	-1.762	0.040	
Group ρ -statistic	1.766	0.961	
Group t -statistic	-0.813	0.208	
Group ADF-statistic	-0.892	0.186	
Westerlund Panel Cointegration Test			
Panel Cointegration	Z-value	P-value	Robust P-value
G_t	-2.291	0.107	<0.001
G_a	-3.984	1.000	0.470
P_t	-6.721	0.819	0.370
P_a	-6.105	0.424	0.030

Table 24: Panel Cointegration Test Result for Developed Countries

Source: Created by the author.

Pedroni panel cointegration test results show evidence for cointegration. The panel t -statistic and panel ADF-statistic provide some evidence of cointegration with Z-values of -1.656 ($p = 0.049$) and -1.762 ($p = 0.040$), which are significant at the 5% level. All the group-specific statistics indicate insignificant results. In addition, the Westerlund panel cointegration test shows that G_t and P_a are statistically significant at 5% level when considering robust p-values. Overall, the Pedroni test and Westerlund test provides evidence for cointegration.

3.1.2.5. Slope Homogeneity Test

The slope homogeneity test result by Pesaran and Yamagata (2008) for developed countries is presented in Table 25. From the test results, it is evident that we reject the null hypothesis of slope homogeneity.

Homogeneity Tests	Statistic
Delta	11.794***
Delta-adjusted	16.680***

Table 25: Slope Homogeneity Test Result

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

Hence, models that allow slope heterogeneity are used, ideally CCEMG and AMG.

3.1.2.6. CCEMG and AMG Model

The CCEMG and AMG estimation results are presented in Table 26. Both models for developed countries are statistically significant, as denoted by the Wald test. The direction of the relationship between the macroeconomic indicators and the growth indicator GDP per capita is consistent in both models.

Unlike developing countries, developed countries show a significant positive effect of gross capital formation on economic growth. In addition, exports have a positive effect on GDP per capita. On the contrary, and with quite surprise, we observed that life expectancy has a significant negative effect on developed countries' growth, which is supported by natural resource rent. In the AMG model, net foreign direct investment seems to have a statistically positive effect on economic growth. Among these models, the CCEMG model has a slightly better fit according to the RMSE of the models.

	CCEMG	AMG
Log GCF	0.158** (0.070)	0.146** (0.069)
Log LF	0.246 (0.552)	0.230 (0.356)
Log EXP	0.579*** (0.101)	0.547*** (0.078)
Log LIFE	-3.783** (1.794)	-0.207 (1.164)
Log RR	-0.028** (0.011)	-0.036*** (0.012)
Log NFDI	0.037 (0.030)	0.085** (0.039)
Constant	8.618 (11.705)	-6.584 (9.929)
Wald	50.66***	67.99***
RMSE	0.0287	0.0394
Number of Obs.	620	620

Table 26: CCEMG and AMG Results for Developed Countries

*, **, *** indicates 10%, 5%, and 1% level of significance, respectively

Source: Created by the author.

3.1.2.7. Pairwise Dumitrescu-Hurlin Panel Causality Test (For Future Researcher)

The examination of pairwise Dumitrescu–Hurlin panel causality, as implemented in this study following the approach suggested by Dumitrescu and Hurlin (2012), provides significant revelations about the causal connections among different variables. The findings, outlined in Table 27, act as empirical proof of one-way causation, demonstrating

a causal relationship between economic growth and all other macro variables within the framework of developing countries. This robust analysis contributes to a nuanced understanding of the interconnected dynamics and directional influences among key economic indicators. By employing Dumitrescu and Hurlin's approach, the study enhances its ability to discern the causal linkages that shape the economic landscape of developing nations, providing a foundation for informed policy decisions and future research directions. It also aims to uncover significant causal relationships that may shed light on the economic dynamics within these nations. The $\bar{Z}$ Statistic serves as a measure of the strength and significance of the causal links between the variables under consideration. Future researcher can use VAR or other model to support this causality Akal (2016).

Direction of Causality	$\bar{Z}$ Statistic
GCF $\rightarrow$ GDP PC	7.41
GDP PC $\rightarrow$ GCF	10.31
LF $\rightarrow$ GDP PC	11.32
GDP PC $\rightarrow$ LF	18.75*
EXP $\rightarrow$ GDP PC	23.62*
GDP PC $\rightarrow$ EXP	9.81
LIFE $\rightarrow$ GDP PC	16.65*
GDP PC $\rightarrow$ LIFE	5.53
RR $\rightarrow$ GDP PC	9.85
GDP PC $\rightarrow$ RR	6.19
NFDI $\rightarrow$ GDP PC	9.37
GDP PC $\rightarrow$ NFDI	5.40
GCF $\rightarrow$ LF	6.78
LF $\rightarrow$ GCF	7.03
GCF $\rightarrow$ EXP	8.43

Direction of Causality	$\bar{Z}$ Statistic
EXP → GCF	9.69*
GCF → LIFE	6.54
LIFE → GCF	34.36***
GCF → RR	4.53
RR → GCF	3.43
GCF → NFDI	8.55
NFDI → GCF	6.52
LF → EXP	9.01
EXP → LF	8.25
LF → LIFE	2.43
LIFE → LF	11.09
LF → RR	22.54*
RR → LF	7.09
LF → NFDI	2.52
NFDI → LF	16.10***
EXP → LIFE	11.91
LIFE → EXP	5.56
EXP → RR	3.43
RR → EXP	-1.08
EXP → NFDI	12.62***
NFDI → EXP	5.85
LIFE → RR	3.28
RR → LIFE	7.88

Direction of Causality	$\bar{Z}$ Statistic
LIFE → NFDI	5.78
NFDI → LIFE	8.63
RR → NFDI	4.65***
NFDI → RR	16.33***

Table 27: Pairwise Causality Test for Developed Countries

, **, * indicates 10%, 5%, and 1% level of significance, respectively*

Source: Created by the author.

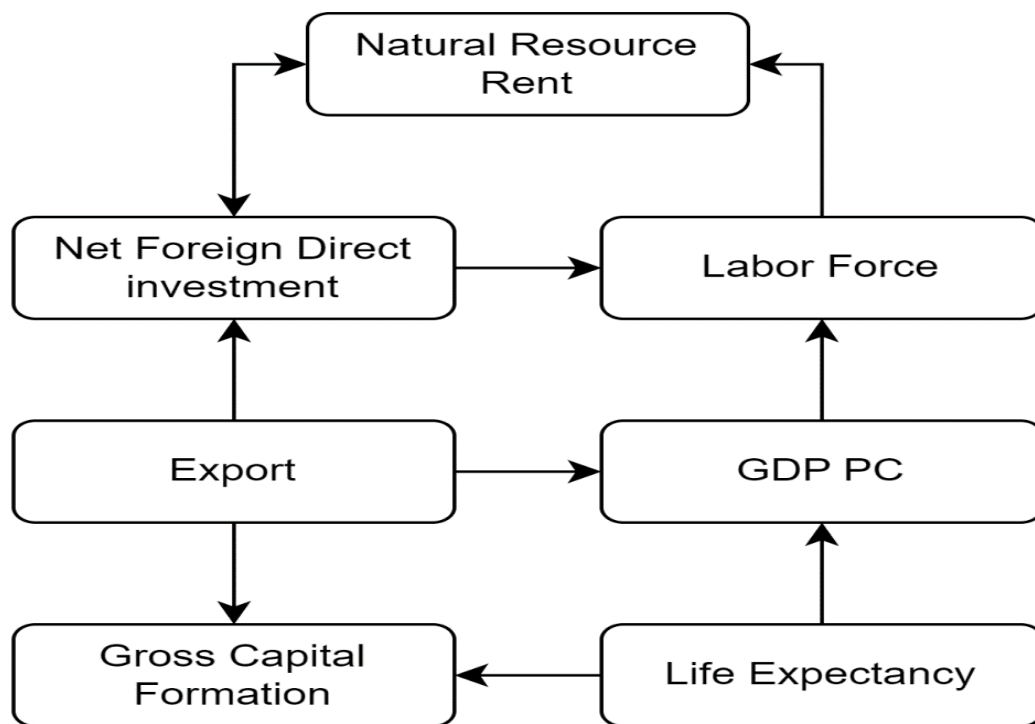


Figure 2: Causality Test Result for Developed Countries

Source: Created by the author.

The pairwise causality test conducted for developed countries reveals insightful findings. It indicates a direct causal relationship between exports and life expectancy with GDP per capita. However, the analysis suggests that in developed countries, other variables such as gross capital formation, labor force participation, exports, resource rent, and net foreign direct investment do not exhibit significant unidirectional causality with GDP per capita.

This nuanced understanding contributes to a more comprehensive grasp of specific drivers of economic growth in developed contexts.



4. CHAPTER: POLICY IMPLICATIONS

The comparative economic growth analysis between developing and developed countries has yielded nuanced insights that bear significant policy implications for both categories of nations. The findings underscore the importance of tailored policy frameworks that account for the unique characteristics and challenges faced by each group.

4.1. Targeted Investment Strategies for Developing Countries

The analysis reveals that developing countries exhibit diverse economic growth patterns influenced by factors such as exports, life expectancy, natural resource rent, and gross capital formation. Policymakers in these nations should consider implementing targeted investment strategies to address specific growth determinants. For instance, enhancing education and healthcare infrastructure can positively impact life expectancy, while incentivizing foreign direct investment can contribute to economic expansion through increased gross capital formation and life expectancy.

4.2. Strengthening Institutional Capacities

Developing countries often face challenges related to institutional capacities, which can hinder economic growth. Policy initiatives should prioritize the establishment and reinforcement of robust institutions capable of fostering economic stability, efficient resource allocation, and transparent governance. Strengthening legal frameworks, reducing bureaucratic barriers, and enhancing regulatory environments can create an investor-friendly climate, stimulating economic activities.

4.3. Inclusive Policies for Sustainable Growth

The study underscores the importance of inclusive policies that address disparities within developing countries. Policymakers should focus on formulating strategies that ensure equitable distribution of resources, promote social inclusion, and address labor market challenges. Inclusive growth not only contributes to social welfare but also fosters sustainable economic development.

4.4. Innovation and Technological Advancement

Innovation in technology plays an important role in driving economic growth, especially in developed countries. Policymakers should prioritize policies that encourage innovation, research and development, and the adoption of cutting-edge technologies. Creating a conducive environment for startups, investing in education and skills

development, and facilitating collaboration between the public and private sectors can propel economies towards sustainable growth.

4.5. Fiscal and Monetary Policy Coordination

Developed countries, characterized by mature economies, need to focus on prudent fiscal and monetary policy coordination. Policymakers should adopt measures to balance economic stability, inflation control, and sustainable public finances. Flexibility in adapting to changing global economic conditions and leveraging fiscal and monetary tools effectively can mitigate risks and ensure long-term economic resilience.

4.6. Global Collaboration for Sustainable Development

The study emphasizes the interconnectedness of the global economic landscape. Policymakers, both in developed & developing nations, should actively engage in collaborative efforts to address shared challenges such as climate change, trade imbalances, and global health crises. Multilateral cooperation and partnerships can amplify the impact of individual policies and contribute to the collective pursuit of sustainable development goals.

In summary, the policy implications drawn from this comparative economic growth analysis offer a strategic guide for policymakers in both developing and developed countries to navigate the intricate dynamics of their economies. The context-specific recommendations, tailored to each unique challenge and opportunity, strive to promote inclusive, sustainable, and resilient economic growth within the constantly evolving global landscape.

CONCLUSION

This comprehensive study delves into the intricate dynamics of economic growth, scrutinizing the impact of key indicators across 29 developing countries and 20 developed countries from 1990 to 2020, utilizing data from the World Development Indicator (WDI).

Developing Countries: A Multifaceted Growth Story

For developing countries, our investigation has yielded substantial insights into the determinants of economic growth. Gross capital formation, export, life expectancy, and resource rent have emerged as significant drivers. The validation of hypotheses H_{GCF} , H_{LIFE} , H_{EX} and H_{RR} underscores the diverse macroeconomic factors influencing the Gross Domestic Product (Real GDP) of developing nations. Notably, export, life expectancy, and natural resource rent exhibit a discernible role in fostering economic growth. This suggests that policymakers in developing countries should tailor their strategies to harness the potential of these influential factors.

Developed Countries: Capital and Longevity as Pillars of Growth

In contrast, the economic landscape of developed countries reveals a distinct narrative. In this context, the validation of hypotheses H_{GCF} , H_{LIFE} , H_{EX} , H_{NFDI} , H_{RR} underscores the pivotal role of gross capital formation, life expectancy, export, net foreign direct investment, and natural resource rent in influencing economic growth.

Developed nations should prioritize policies that promote capital investment and enhance life expectancy to fortify their economic foundations. The need for a nuanced approach acknowledges the unique challenges faced by mature economies and underscores the significance of long-term capital strategies.

Implications for Policymakers

The validated hypotheses in both developing and developed contexts offer targeted policy recommendations. Developing nations are urged to focus on fostering holistic growth by investing in education and healthcare to increase life expectancy, focusing on export and foreign direct investment to increase gross capital formation. In contrast, developed nations should emphasize gross capital formation, export, and foreign direct investment and consider resource rent, global Implications and Collaborative Endeavors.

The findings also highlight the interconnectedness of the global economic ecosystem. As nations navigate the complexities of economic growth, fostering collaboration on a global

scale becomes imperative. Shared challenges, such as climate change, demand concerted efforts and multilateral solutions. Policymakers globally are urged to engage in cooperative endeavors that transcend borders, recognizing the interdependence of economies.

Future Research Directions

While this study provides valuable insights, avenues for further research remain open. Future investigations could explore the nuanced relationships between variables, considering regional disparities, geopolitical influences, and evolving global trends. Additionally, longitudinal studies can offer a more nuanced understanding of the evolving dynamics of economic growth over time.

The study adds a great deal to the body of knowledge already available on economic growth by offering complex insights into the factors that influence development in both rich and developing countries. The implications drawn provide a foundation for evidence-based policymaking, fostering inclusive, sustainable, and resilient economic growth in a dynamic global landscape.

BIBLIOGRAPHY

- Acemoglu, D. & Johnson, S. (2006). Disease and development: The effect of life expectancy and economic growth. *Bureau of Research and Economic Analysis of Development*, working paper: 120.
- Aghion, P. & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, 60(2), 323–351. <https://doi.org/10.2307/2951599>
- Aghion, P. & Howitt, P. (2009). *The economics of growth*. MIT Press.
- Ajide, K. B. (2014). Determinants of economic growth in Nigeria. *CBN Journal of Applied Statistics (JAS)*, 5(2), Article 8.
- Akal, M. (2016). Modeling world energy use efficiency, price, and GDP. *Energy Sources, Part B: Economics, Planning, and Policy*, 11(10), 911–919. <https://doi.org/10.1080/15567249.2012.741185>
- Akal, M. (2016). Modeling of energy intensity in Turkey. *Energy Sources, Part B: Economics, Planning, and Policy*, 11(9), 807–814. <https://doi.org/10.1080/15567249.2013.802829>
- Al Nasser, O. M. (2007). The determinants of U.S. foreign direct investment: Does the region matter? *Global Economic Review*, 36(1), 37-51.
- Azariadis, C., & Drazen, A. (1990). Threshold externalities in economic development. *The Quarterly Journal of Economics*, 105(2), 501–526. <https://doi.org/10.2307/2937797>
- Bal, D. P., Dash, D. P., & Subhasish, B. (2016). The effects of capital formation on economic growth in India: Evidence from ARDL-bound testing approach. *Global Business Review*, 17(6), 1388–1400. <https://doi.org/10.1177/0972150916660403>
- Balassa, B. (1964). The purchasing-power parity doctrine: A reappraisal. *Journal of Political Economy*, 72(6), 584–596. Retrieved from <http://www.jstor.org/stable/1829464>
- Baltagi, B. H., & Kao, C. (2000). Nonstationary panels, cointegration in panels and dynamic panels: A survey. *Advances in Econometrics*, 15, 10.1016/S0731-9053(00)15002-9.
- Baltagi, B.H. (2008). *Econometric Analysis of Panel Data*. John Wiley & Sons Ltd., Chichester.
- Baltagi, B. H. (2013). *Econometric Analysis of Panel Data*. John Wiley & Sons Ltd., Chichester. (5th ed., pp. 135-161, 175-180).
- Barro, R.J (1990). Government spending in a simple model of endogenous growth. *Journal of Political Economy*, 98(5), 103-125. <https://doi.org/10.1086/261726>

- Barro, R. J. (1996). Determinants of economic growth: A cross-country empirical study. Prepared for the Lionel Robbins Lectures, delivered at the London School of Economics, February 20-22, 1996. This paper is part of *NBER's Research Program in Economic Fluctuations and Growth*.
- Barro, R.J (1999). Human capital and growth in cross-country regressions. *Swedish Economic Policy Review*, 6, 237-277.
- Barro, R. J. (2003). Determinants of economic growth in a panel of countries. *Annals of Economics and Finance*, 4, 231-274
- Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100(2), 223–251. <http://www.jstor.org/stable/2138606>
- Barrie, M. S. (2020). An empirical analysis of the determinants of real GDP growth in Sierra Leone from 1980-2018. *ZBW – Leibniz Information Centre for Economics*.
- Bassanini, A., & Scarpetta, S. (2001). The driving forces of economic growth: Panel data evidence for the OECD countries. *OECD Economic Studies*, 33, 1-57.
- Batrancea, L., & Anca, N. (2015). Which is the best government? Colligating tax compliance and citizens' insights regarding authorities' actions. *Transylvanian Review of Administrative Sciences*, 11(44), 5-22. Retrieved from <https://rtsa.ro/tras/index.php/tras/article/view/422>
- Batrancea, L., Anca, N., A., Batrancea, I., & Moldovan, B. A. (2012). Tax compliance models: From economic to behavioral approaches. *Transylvanian Review of Administrative Sciences*, 8, 13-26.
- Batrancea, L., Anca, N., Lucian, G., Ema, M., Ioan, D. M., Gheorghe, F., & Andrei, M. (2019). An econometric approach on production, costs, and profit in Romanian coal mining enterprises. *Economic Research-Ekonomska Istraživanja*, 32, 1019–1036.
- Batrancea, L., Rathnaswamy, M. M., & Batrancea, L. (2021). A panel data analysis of economic growth determinants in 34 African countries. *Journal of Risk and Financial Management*, 14, 260. <https://doi.org/10.3390/jrfm1406026>
- Batrancea, L., Rathnaswamy, M. M., Batrancea, L., Nichita, A., Iosif, R. M., Tulai, H., Gheorghe, F., Speranta, M. A., & Ioan, D. M. (2020). Adjusted net savings of CEE and Baltic nations in the context of sustainable economic growth: A panel data analysis. *Journal of Risk and Financial Management*, 13, 234.
- Batten, J. A., & Vo, X. V. (2009). An analysis of the relationship between foreign direct investment and economic growth. *Applied Economics*, 41(13), 1621-1641.
- Bayraktar, B. (2006). Investigation on sources of growth for Turkey. *Canadian Journal of Development Studies / Revue Canadienne D'études du Développement*, 27(1), 25-38. <https://doi.org/10.1080/02255189.2006.9669118>

- Blomquist, J., & Westerlund, J. (2013). Testing slope homogeneity in large panels with serial correlation. *Economics Letters*, 121(3), 374–378. <https://doi.org/10.1016/j.econlet.2013.09.012>
- Botric, V., & Slijepcevic, S. (2008). Economic growth in South-eastern Europe: The role of the banking sector. *Post-Communist Economies*, 20(2), 253-262.
- Bruno, M., & Easterly, W. (1998). Inflation crises and long-run growth. *Journal of Monetary Economics*, 41, 3-26. [http://dx.doi.org/10.1016/S0304-3932\(97\)00063-9](http://dx.doi.org/10.1016/S0304-3932(97)00063-9)
- Burnside, C., & Dollar, D. (2000). Aid, policies, and growth. *American Economic Review*, 90(4), 847–868. <https://doi.org/10.1257/aer.90.4.847>
- Cervellati, M., & Sunde, U. (2009). Life expectancy and economic growth: The role of demographic transition. *The Institute for the Study of Labor (IZA)*, Discussion Paper No. 4160.
- Chang, C.-C., & Mendy, M. (2012). Economic growth and openness in Africa: What is the empirical relationship? *Applied Economics Letters*, 19(18), 1903-1907.
- Chenery, H. B., & Strout, A. M. (1966). Foreign assistance and economic development. *American Economic Review*, 56, 679-733.
- Chirwa, T. G., & Odhiambo, N. M. (2016). Macroeconomic determinants of economic growth: A review of international literature. *South East European Journal of Economics and Business*, 11(2), 33-47. <https://doi.org/10.1515/jeb-2016-0009>
- Ciccone, A., & Jarociński, M. (2010). Determinants of economic growth: Will data tell? *American Economic Journal: Macroeconomics*, 2(4), 222-246.
- Clements, B., Bhattacharya, R., & Nguyen, T. Q. (2003). External debt, public investment, and growth in low-income countries. *IMF Working Paper*, Fiscal Affairs Department.
- Collier, P. (2007). The bottom billion: Why the poorest countries are failing and what can be done about it. *Oxford University Press*.
- Coşkun, Y., Seven, Ü., Ertuğrul, H. M., & Ulussever, T. (2017). Capital market and economic growth nexus: Evidence from Turkey. *Central Bank Review*, 17(1), 19-29.
- Denison, E. F. (1980). The contribution of capital to economic growth. *The American Economic Review*, 70(2), 220-224. <http://www.jstor.org/stable/1815471>
- Dollar, D. (1992). Outward-oriented developing economies really do grow more rapidly: Evidence from 95 LDCs, 1976-1985. *Economic Development & Cultural Change*, 40(3), 523-544. <https://doi.org/10.1086/451959>

- Domar, E. D. (1946). Capital Expansion, Rate of Growth, and Employment. *Econometrica*, 14(2), 137–147. <https://doi.org/10.2307/1905364>
- Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modelling*, 29(4), 1450-1460. <https://doi.org/10.1016/j.econmod.2012.02.014>
- Durlauf, S. N., & Johnson, P. A. (1995). Multiple regimes and cross-country growth behaviour. *Journal of Applied Econometrics*, 10(4), 365-384. <http://www.jstor.org/stable/2285053>
- Easterly, W. R., & Wetzel, D. L. (1989). Policy determinants of growth: Survey of theory and evidence. *PPR Working Paper Series*, 343. The World Bank.
- Eberhardt, M. (2012). Estimating panel time-series models with heterogeneous slopes. *Stata Journal*, 12(1), 61-72. <https://go.gale.com/ps/i.do?p=AONE&sw=w&issn=1536867X&v=2.1&it=r&id=GALE%7CA404036608&sid=googleScholar&linkaccess=fulltext>
- Eberhardt, M., & Bond, S. (2009). Cross-section dependence in nonstationary panel models: A novel estimator. <https://mpra.ub.uni-muenchen.de/17692/1/MPRA>
- Eberhardt, M., & Teal, F. (2010). Productivity analysis in global manufacturing production. *DEGIT Conference Papers c015_019*, *DEGIT, Dynamics, Economic Growth, and International Trade* no. 515.
- Ekanayake, E. M., & Chatrna, D. (2010). The effect of foreign aid on economic growth in developing countries. *Journal of International Business and Cultural Studies*, 3(1), 1-13.
- Fetahu, M., Sadiku, L., & Petkovski, M. (2015). Empirical analysis of the effects of trade openness on economic growth: Evidence for South East European countries. *Procedia Economics and Finance*, 19, 17-26. [https://doi.org/10.1016/S2212-5671\(15\)00004-0](https://doi.org/10.1016/S2212-5671(15)00004-0)
- Fischer, K. W. (1983). Developmental levels as periods of discontinuity. *New Directions for Child Development*, 1983(21), 5-29. <https://doi.org/10.1002/cd.23219832103>
- Fischer, S. (1992). Macroeconomic stability and growth. *Cuadernos de Economía*, 29(87), 171-186. <http://www.jstor.org/stable/23830518>
- Frankel, M. (1962). The Production Function in Allocation and Growth: A Synthesis. *The American Economic Review*, 52(5), 996–1022. <http://www.jstor.org/stable/1812179>
- Gibescu, O. (2010). Does the gross fixed capital formation represent a factor for supporting the economic growth? *MPRA Paper 50135*. University Library of Munich, Germany

- Gochero, P., & Seetanah, B. (2020). The effect of mining foreign direct investment inflow on the economic growth of Zimbabwe. *Journal of Economic Structures*, 9. <https://doi.org/10.1186/s40008-020-00230-4>
- Grossman, G. M., & Helpman, E. (1992). Protection for sale (No. 4149). *NBER Working Papers*. National Bureau of Economic Research, Inc.
- Hajilee, M., & Al Nasser, O. M. (2015). The relationship between financial market development and foreign direct investment in Latin American countries. *Journal of Developing Areas*, 49(2), 227-245.
- Harrod, R. F. (1939). An essay in dynamic theory. *The Economic Journal*, 49(193), 14-33. <https://doi.org/10.2307/2225181>
- Henningsen, A., & Henningsen, G. (2019). Analysis of panel data using R. In *Panel Data Econometrics* (pp. 345-398). Academic Press. <https://doi.org/10.1016/B978-0-12-814367-4.00012-5>
- Helpman, E. (2004). The mystery of economic growth. Bibliovault OAI Repository. *The University of Chicago Press*. <https://doi.org/10.2307/20034157>
- Higgins, K. L. (2015). Economic growth and sustainability: Systems thinking for a complex world. *Academic Press*.
- Hsiao, C. (1985). Benefits and limitations of panel data. *Econometric Reviews*, 4, 121-174. <https://doi.org/10.1080/07474938508800078>
- Huchet-Bourdon, M., Le Mouel, C. L. M., & Vijil, M. (2011, August). The relationship between trade openness and economic growth: Some new insights on the openness measurement issue. European Association of Agricultural Economists (EAAE), Zurich, Switzerland. https://hal.archives-ouvertes.fr/file/index/docid/729399/filename/A2_-_78_VIJIL.pdf
- Iftikhar, S., Nisa, U. F., Ali, M., & Umar, S. (2016). Domestic capital formation, export and economic growth. *Journal of Economics and Sustainable Development*, 7(13).
- Islam, N. (1995). Growth empirics: Panel data approach. *The Quarterly Journal of Economics*, 110(4), 1127-1170.
- Karras, G. (2006). Foreign aid and long run economic growth: Empirical evidence for a panel of developing countries. *Journal of International Development*, 18(1), 15-28.
- Kavoussi, R. M. (1984). International trade and economic development: The experience of developing countries. *Journal of Developing Areas*, 19, 379-392.
- Keita, L. (2018). Models of economic growth and development in the context of human capital investment: The way forward for Africa. *Asian Development*, 18, 159-183.

- Kneller, R., Bleaney, M., & Gemmell, N. (1999). Fiscal policy and growth: Evidence from OECD countries. *Journal of Public Economics*, 74(2), 171-190.
- Knight, M., Loayza, N., & Villanueva, D. (1993). Testing the neoclassical theory of economic growth: A panel data approach. *IMF Staff Papers*, 40(3), 512-541.
- Kumar, M. S., & Woo, J. (2010). Public debt and growth. *International Monetary Fund. Working Paper No. 174*.
- Leshoro, T. L. A. (2014). The effects of foreign resource inflow and savings on the economic growth of South Africa: A VAR analysis. *Journal of Economics and Behavioral Studies*, 6(3), 232-241. <http://ifrnd.org/journal/index.php/JEBS>
- Lucas, R. E., Jr. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3-42. [https://doi.org/10.1016/0304-3932\(88\)90168-7](https://doi.org/10.1016/0304-3932(88)90168-7)
- Makki, S. S., & Somwaru, A. (2004). Impact of foreign direct investment and trade on economic growth: Evidence from developing countries. *American Journal of Agricultural Economics*, 86(3), 795-801.
- Mankiw, N. G., Romer, D., & Weil, D. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(May), 407-437.
- Mauro, P. (1995). Corruption and growth. *The Quarterly Journal of Economics*, 110(3), 681-712.
- McKinnon, R. (1973). Money and capital in economic development. *The Brookings Institute*, Washington DC.
- Meyer, D., & Sanusi, K. (2019). A causality analysis of the relationships between gross fixed capital formation, economic growth, and employment in South Africa. *Studia Universitatis Babes-Bolyai Oeconomica*, 64, 33-44. <https://doi.org/10.2478/subboec-2019-0003>
- Minoiu, C., & Reddy, S. (2009). Development aid and economic growth: A positive long-run relation. International Monetary Fund. *Working Paper: 118*.
- Mohamed, E. S. E. (2020). Resource rents, human development, and economic growth in Sudan. *Economies*, 8(4), 99.
- Most, S., & van den Berg, H. (1996). Growth in Africa: Does the source of investment financing matter? *Applied Economics*, 28(12), 1427-1433.
- Mundell, R. (1963). Capital mobility and stabilization policy under fixed and flexible exchange rates. *Canadian Journal of Economics and Political Science*, 29(4), 475-485. <https://doi.org/10.2307/139336>
- Neal, T. (2014). Panel cointegration analysis with xtpedroni. *The Stata Journal*, 14(3), 684-692.

- Nsiah, C., Fayissa, B., & Wu, C. (2016). The spatial effects on the rate of economic growth: Evidence from Sub-Saharan Africa. *The Journal of Developing Areas*, 50(1), 275-288. <https://muse.jhu.edu/journal/258>
- N'Zue, F. F. (2011). Economic freedom and performance in ECOWAS countries: A dynamic panel data approach. *Africa Journal of Economic Policy*, 18(2), 28-53.
- Özbey, F. (2023). Granger causal linkages between economic growth and fixed capital formation in South Africa: A frequency domain analysis. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi*, 11(Afrika), 225-234. <https://doi.org/10.18506/anemon.1333770>
- Papanek, G. F. (1973). Aid, foreign private investment, savings, and growth in less developed countries. *Journal of Political Economics*, 81(1), 120-130.
- Pasara, M. T., & Garidzirai, R. (2020). Causality effects among gross capital formation, unemployment and economic growth in South Africa. *Economies*, 8(26). <https://doi.org/10.3390/economies8020026>
- Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and statistics*, 61(S1), 653-670.
- Pelinescu, E., & Radulescu, M. (2009). The impact of foreign direct investment on the economic growth and countries' export potential. *Journal for Economic Forecasting*, 12, 153-169.
- Peng, S., & Heshmati, A. (2010). International trade and its effects on economic growth in China. *IZA Discussion Paper No. 5151*. Bonn, Germany: IZA. Available from <http://ftp.iza.org/dp5151.pdf>
- Persyn, D., & Westerlund, J. (2008). Error-correction-based cointegration tests for panel data. *The Stata Journal*, 8(2), 232-241.
- Pesaran, M. H. (2004). General diagnostic tests for cross-section dependence in panels. *Cambridge Working Papers in Economics*. <https://ideas.repec.org/p/cam/camdae/0435.html>
- Pesaran, M. H. (2006). Estimation and inference in large heterogeneous panels with a multifactor error structure. *Econometrica*, 74(4), 967-1012. <https://doi.org/10.1111/j.1468-0262.2006.00692.x>
- Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2), 265-312. <https://doi.org/10.1002/jae.951>
- Pesaran, M. H. (2015). Testing weak cross-sectional dependence in large panels. *Econometric Reviews*, 34(6-10), 1089-1117. <https://doi.org/10.1080/07474938.2014.956623>

- Pesaran, M. H., Ullah, A., & Yamagata, T. (2008). A bias-adjusted LM test of error cross-section independence. *Econometrics Journal*, 11, 105-127. <https://doi.org/10.1111/j.1368-423x.2007.00227.x>
- Pesaran, M. H., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of Econometrics*, 142, 50-93. <https://doi.org/10.1016/j.jeconom.2007.05.010>
- Pesaran, M. H., Xie, Y., Bailey, N., Chudik, A., Gao, Z., Juodis, A., Smith, R., Reese, S., & Zhou, Q. (2021). A bias-corrected CD test for error cross-sectional dependence in panel data models with latent factors. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4198155>
- Pindyck, R. S. (1988). Irreversible investment, capacity choice and the value of the firm. *American Economic Review*, 78, 969-985.
- Pindyck, R. S., & Somalino, A. (1993). Economic stability and aggregate investment. *NBER Macroeconomics Annual*, 8, 259-318.
- Próchniak, M. (2011). Determinants of economic growth in Central and Eastern Europe: The global crisis perspective. *Post-Communist Economies*, 23(4), 449-468. <https://doi.org/10.1080/14631377.2011.622566>
- Radelet, S., Sachs, J., & Whang-Lee, J. (2001). The determinants and prospects of economic growth in Asia. *International Economic Journal*, 15(3), 1-29.
- Rao, B., & Hassan, G. (2011). An analysis of the determinants of long run growth rate in Bangladesh. *Applied Economics*, 44(1), 1-16. <https://doi.org/10.1080/00036846.2010.510466>
- Reinhart, C., & Rogoff, K. (2010). Growth in a time of debt. *National Bureau of Economic Research Working Paper No. 15639*.
- Ribaj, A., & Mexhuani, F. (2021). The impact of savings on economic growth in a developing country (the case of Kosovo). *Journal of Innovation and Entrepreneurship*, 10(1), 1-13.
- Riddell, R. C. (1987). Justifying the official aid programme: Challenging its critics. *International Relations*, 9(2), 140-152. <https://doi.org/10.1177/004711788700900205>
- Rivera-Batiz, F. L. (2004). *Democracy, governance and economic growth: Theory and evidence*. Working Paper, Columbia University.
- Rodrik, D. (2008). The real exchange rate and economic growth. *Brookings Papers on Economic Activity*, 2, 365-412. <http://dx.doi.org/10.1353/eca.0.0020>
- Romer, P. M. (1986). Increasing returns and long run growth. *Journal of Political Economy*, 94(5), 1002-1037.

- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5), S71-S102. <http://www.jstor.org/stable/2937632>
- Sachs, J. D., & Warner, A. M. (1995). Natural resource abundance and economic growth. *National Bureau of Economic Research Working Paper Series No. 5398*.
- Sala-I-Martin, X., Doppelhofer, G., & Miller, R. I. (2004). Determinants of long-term growth: A Bayesian averaging of classical estimates (BACE) approach. *American Economic Review*, 94(4), 813-835. <https://doi.org/10.1257/0002828042002570>
- Samsuddin, M. A., & Amar, S. (2020). Determinants of economic growth in developing countries of G20 members. *Advances in Economics, Business and Management Research*, 152.
- Samuelson, P. A. (1964). Theoretical notes on trade problems. *Review of Economics and Statistics*, 46(2), 145-154.
- Sanjay, G. R., & Camelia, M. (2006). Development aid and economic growth: A positive long-run relation. *IMF Working Paper No. 29*. Washington, DC: IMF, Department of Economics and Social Affairs. <https://www.imf.org/external/pubs/ft/wp/2009/wp09118.pdf>
- Shaw, E. S. (1973). Financial deepening in economic development. *Oxford University Press*.
- Sidrauski, M. (1967). Rational choice and patterns of growth in a monetary economy. *The American Economic Review*, 57(2), 534-544.
- Snowdon, B., & Vane, H. R. (2005). Modern macroeconomics: Its origins, development and current state. *Edward Elgar Publishing*
- Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65-94. <https://doi.org/10.2307/1884513>
- Stokey, N., & Rebelo, S. (1995). Growth effects of flat-rate taxes. *Journal of Political Economy*, 103(3), 519-550.
- Şen, A., Şentürk, M., Özkan, G., & Ducan, E. (2014). External determinants of economic growth in developing countries: Panel data analysis. *Marmara Üniversitesi İ.İ.B. Dergisi*, 36(1), 15-28. <https://doi.org/10.14780/iibdergi.201417534>
- Tobin, J. (1965). Money and economic growth. *Econometrica*, 33(4), 671-684. <https://doi.org/10.2307/1910352>
- Tugcu, C. T., & Topcu, M. (2018). Total, renewable and non-renewable energy consumption and economic growth: Revisiting the issue with an asymmetric point of view. *Energy*, 152, 64-74.
- Uneze, E. (2013). The relation between capital formation and economic growth: Evidence from Sub-Saharan African countries. *Journal of Economic Policy Reform*, 16(3).

- Upreti, P. (2015). Factors affecting economic growth in developing countries. *Major Themes in Economics*, 17, 37-54. <https://scholarworks.uni.edu/mtie/vol17/iss1/5>
- Van Ark, B., & Mc Guckin, R. H. (1999). International comparisons of labor productivity and per capita income. *Monthly Labor Review*, 122, 33.
- Wang, M. L., & Choi, C. H. (2016). Determinants of economic growth: A comparative analysis of Asian countries. *Journal of International Trade & Commerce*, 12(5), 167-184. <http://dx.doi.org/10.16980/jitc.12.5.201610.167>
- Wagner, D. (2003). Aid and trade: An empirical study. *Journal of the Japanese and International Economies*, 17(2), 153-173.
- Westerlund, J. (2007). Testing for error correction in panel data. *Oxford Bulletin of Economics and Statistics*, 69(6), 709-748. <https://doi.org/10.1111/j.1468-0084.2007.00477.x>
- World Bank. (1990). Economic Indicators. Retrieved from <http://data.worldbank.org/data-catalog>
- World Bank. (2021). World Development Indicators. Retrieved from <http://data.worldbank.org/data-catalog/world-development-indicators>

CURRICULUM VITAE

Full Name: Sheikh Abdul KADER	
Education Information (Undergraduate)	
University	Jahangirnagar University, Bangladesh
Faculty	Faculty of Social Science
Department	Economics
Education Information (Master Degree)	
University	Jahangirnagar University, Bangladesh
Faculty	Faculty of Social Science
Department	Economics
Articles and Papers	
1. Bazaluk, O., Kader, S. A., Zayed, N. M., & others. (2024). Determinants of economic growth in developing countries: A special case regarding Turkey and Bangladesh. Journal of the Knowledge Economy. 2. Kader, S. A., Zayed, N. M., Faisal-E-Alam, M., Salah Uddin, M., Nitsenko, V., & Klius, Y. (2022). Factors affecting demand and supply of housing market: A study on three major cities of Turkey. Computation, 10(11), 196. 3. Kader, S. A., Kulsum, U., Islam, K. M. A., Siddiki, M. N. A., Zayed, M. N., & Raisa, S. T. (2021). Present situation of the field workers in the development sector: A social, financial and employment aspect in Bangladesh. Journal of Southwest Jiaotong University, 56(2)	