Human Development and Economic Growth in Unequal Contexts: A comparative Analysis of Greece and Georgia

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ABSTRACT:

This study examines the relationship between human development and economic growth in two small economies at different stages of development—Greece, an EU member, and Georgia, a transitioning post-Soviet state. Using an Autoregressive Distributed Lag (ARDL) model over the period 1990–2022, the analysis evaluates the role of the Human Development Index (HDI) alongside key macroeconomic variables such as capital formation, government expenditure, trade openness, and population growth. While numerous studies explore the HDI-growth nexus, few focus on small or transitioning economies, and even fewer offer comparative insights between countries embedded in the EU institutional framework and those navigating post-transition reforms. Our findings reveal that HDI significantly influences economic growth in both contexts, but the nature of the relationship diverges: Georgia shows a delayed, linear impact of HDI on growth, whereas in Greece, a non-linear relationship emerges, where higher levels of human development yield compounding economic benefits. Capital investment and fiscal policy also display different dynamics-inefficient and contractionary in Georgia, but more growth-enhancing in Greece. These insights are particularly relevant amid ongoing discussions about EU cohesion, sustainable convergence, and the development trajectories of post-Soviet economies. The study underscores the importance of tailored policy strategies: Georgia must focus on institutional reform, investment efficiency, and public sector effectiveness, while Greece needs to leverage human capital to sustain long-term growth. By comparing two structurally distinct economies, this research contributes to the literature on development heterogeneity and offers actionable guidance for policymakers in similar national contexts.

Keywords: human development index, economic growth, ARDL Model, Greece, Georgia, transition economies, EU Policy

1. Background and Objectives

Understanding the relationship between human development and economic growth remains a central concern in development economics. While economic growth is often viewed as a driver of improved living standards, there is growing recognition that investments in human capital—such as health, education, and quality of life—are themselves key engines of economic expansion. The Human Development Index (HDI), developed by the United Nations Development Programme (UNDP), offers a multidimensional framework to capture these critical aspects of development. Despite

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extensive research on the HDI-growth nexus, significant gaps persist, especially regarding small and transitioning economies.

Much of the existing literature focuses on large, advanced economies or broad cross-country analyses that may obscure country-specific dynamics. There is a relative scarcity of comparative empirical studies that explore how HDI impacts economic growth in countries at different stages of development—particularly within distinct institutional contexts such as European Union (EU) member states versus post-Soviet transition economies. Moreover, while many studies assume a uniform or linear relationship between HDI and growth, fewer examine whether this relationship may be delayed, non-linear, or structurally dependent on national conditions.

This study addresses these gaps by investigating the relationship between HDI and economic growth in two small but structurally different economies: Greece, an EU member state with access to a mature institutional and fiscal framework, and Georgia, a transitioning post-Soviet state still consolidating its economic and governance systems. Greece has faced significant economic turbulence in recent decades, including financial crises and austerity measures that have tested its resilience, while Georgia continues to navigate a complex transition toward a market economy amid challenging geopolitical and socio-economic realities. These contrasting contexts provide a rich comparative framework to understand how investments in human development translate into economic outcomes under varying institutional and structural conditions.

Using an Autoregressive Distributed Lag (ARDL) model over the period 1990–2022, this research examines not only the direct impact of HDI on GDP growth but also considers the roles of capital formation, government expenditure, trade openness, and population growth. In doing so, it aims to answer key questions: Does HDI significantly impact economic growth in Greece and Georgia? Are the effects of HDI consistent between an EU member state and a transitioning economy? Is the HDI-growth relationship linear or non-linear? How do institutional, demographic, and policy differences moderate this relationship?

By focusing on small countries like Greece and Georgia, this study fills an important gap in the literature, which often prioritizes larger economies and overlooks the unique challenges faced by smaller nations—such as limited resources, demographic constraints, and external dependencies. Unlike traditional economic indicators, HDI provides a comprehensive measure of development by integrating health, education, and living standards—critical components of human capital and essential drivers of sustainable economic growth. Understanding the role of HDI in shaping GDP growth thus offers valuable policy implications for countries with similar characteristics, highlighting pathways to resilience and long-term development.

Beyond its academic contribution, this research holds practical policy relevance. At a time when the European Union grapples with internal cohesion and convergence, and transitioning economies face challenges in translating human development into economic performance, these insights can inform more effective public investment strategies, institutional reforms, and human capital policies tailored to the structural realities of both EU and non-EU contexts.

2. Literature Review

A number of studies have examined the relationship between economic growth and the Human Development Index (HDI), aiming to understand how human development influences economic performance and vice versa.

Barro (1991) emphasizes that higher education levels and life expectancy significantly contribute to economic growth, noting that countries with a high HDI—marked by strong education and healthcare systems—experience greater productivity, reinforcing the importance of human capital in long-term development. Solow (1956) similarly highlights that effective capital formation requires a qualified labor force, which in turn depends on the level of human development. Bloom and Canning (2000) argue that life expectancy, a key HDI component, reflects the quality of a nation's health policies and directly correlates with economic productivity. Pritchett (1996) adds that government investment in education and health leads to better living standards and stronger HDI performance. Aghion et al. (2004) emphasize that economic growth alone does not automatically lead to improvements in HDI; instead, such outcomes depend on state policies, particularly in the health and education sectors.

Regional differences also play a role, as Herrero, Martínez, and Villar (2019) show that while Southeast Asian countries have improved HDI through economic growth and investment in human capital, African countries often face challenges due to economic instability.

Ghislandi et al. (2019) challenge the assumption that economic growth alone improves quality of life, arguing that HDI reflects broader socio-cultural factors such as life expectancy and education, not just income. Frankel and Romer (1999) argue that countries exhibiting higher levels of human development tend to demonstrate greater openness to international trade and enhanced capacity to attract foreign direct investment, both of which serve as important catalysts for economic growth.

Reports by the United Nations Development Programm (UNDP, 2019; 2023) and the World Bank (2022) confirm that countries with a high HDI generally have better governance, lower levels of corruption, and higher innovation rates, all of which support sustained economic growth. Tsiklashvili et al. (2020) note that increased investment in human capital raises the economic value of education, supports effective policy implementation, and contributes to national competitiveness. Overall, the literature consistently supports the idea that while economic growth can influence human development, the reverse is equally true—strong human development is both a precondition and a driver of long-term economic prosperity.

3. Descriptive Statistics

To provide context for the econometric analysis, we first present a series of charts comparing the evolution of key variables for both Greece and Georgia. Figure 1 shows the trajectory of the Human Development Index (HDI) for both countries, highlighting their respective progress in human development. Figure 2 illustrates the GDP growth rates for each country, providing a clear view of economic performance. Figure 3 depicts the

government expenditure as a share of GDP, shedding light on fiscal policy strategies, while Figure 4 compares trade openness, an important factor influencing economic growth.

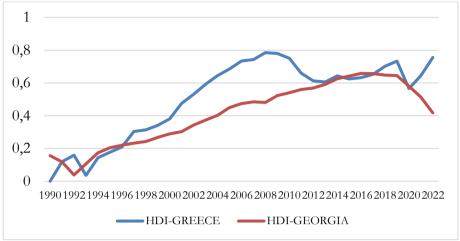


Figure 1: HDI Georgia and Greece: Evolution of Government Consumption Source: World Bank data and authors' calculations

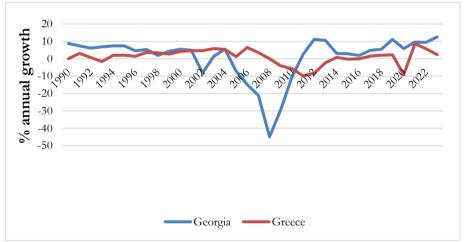


Figure 2: Georgia and Greece: Annual GDP Growth (%) Source: World Bank data and authors' calculations

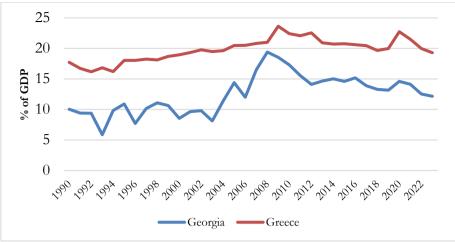


Figure 3: Georgia—Greece: Government Consumption % GDP Source: World Bank data and authors' calculations

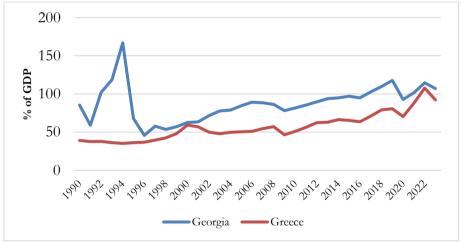


Figure 4: Trade (% of GDP) – Georgia and Greece Source: World Bank data and authors' calculations

What the above charts describe is that Georgia's economy is more dynamic, with higher growth rates and greater trade openness, but also greater volatility, as seen in the fluctuations in its growth rate on the chart. Greece's economy, while more stable, has faced stagnation, high public spending, and a slow recovery post-2008 due to austerity measures and high public debt (this comment is based on the general economic context, not directly from the charts). The charts also show that Greece has relatively higher government expenditure, which has supported economic stability but may have contributed to slower growth. In contrast, Georgia has outpaced Greece in both economic growth and Human Development Index (HDI), reflecting stronger long-term development trends driven by reforms in governance, education, and infrastructure.

4. Estimation procedure

4.1 The variables

Our model represents a multiple linear regression equation where GDP growth (GDPGRO) is the dependent variable, and the independent variables are:

HDI: Human Development Index-in our model HDI is made up of three key components — years of schooling, GNI per capita, and life expectancy and was estimated as geomean of normalized indices of the three dimensions . The HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone

CAPFORM: Gross Fixed Capital Formation % of GDP (logs)

GOVEXP: General government final consumption expenditure % of GDP (logs)

TRADEOPEN: exports+imports / GDP (logs)

INFL: Inflation, GDP deflator (annual %) (logs)

POPGRO: Population growth (annual %)

HDI*POPGRO=Interaction Variable, it is used to capture the joint effect of these two variables on a dependent variable that may be different from the individual effects of HDI and POPgrowth alone. In other words, the interaction term captures whether higher human development (better health, education, and income) amplifies or dampens the effect of population growth on the economy.

D (Dummy variable only in the Greek model,). Where D=1 (Before Crisis, year 2009) and D=0 (After Crisis). With this coding of the dummy variable, the results will focus on how the pre-crisis period (before the crisis hit) affects the economy in comparison to the post-crisis period.

4.2 Stationarity Tests (Augmented Dickey-Fuller Test)

Applying the ADF test to the series for Georgia, the results reveal that the series are not integrated of the same order. Specifically, GDP growth, government expenditure, capital formation, and population growth are I(1), while HDI (Human Development Index) and inflation are I(0). This suggests that some variables follow a long-term trend, while others do not. Similarly, applying the ADF test to the series for Greece, the results indicate that the series are not integrated of the same order. GDP growth and inflation are I(0), while the remaining variables—government expenditure, capital formation, population growth, HDI, and trade openness—are I(1). In this case as well, there is a risk that some variables follow a long-term trend while others do not.

Given these results, we chose the ARDL (Autoregressive Distributed Lag) model, as OLS does not account for the possibility of a long-run equilibrium existing between the variables.

4.3 The Model

Since we have a small cross-section (two countries), the appropriate estimation method is time series analysis. This method will be applied separately to each country, and the results will then be compared.

Suggested Model: A time series model will be used to analyze the impact of the Human Development Index (HDI) on economic growth for each country (Greece and Georgia). The model can be specified as follows

The general linear time series regression equation is:

Growtht= $\beta 0+\beta 1\cdot HDIt+\sum(\beta k\cdot Control Variables) k,t+\epsilon t$

More specifically

Where:

C(1) is the intercept

C(2) to C(7) are the coefficients of the independent variables

 ϵ is the error term

Note: In the Greece model, we add a dummy variable to examine the results before and after the crisis.

Time span: 1990-2022

4.4 Estimation Results

In this section, we present the estimation results for both Georgia and Greece using the Autoregressive Distributed Lag (ARDL) modeling framework. The models were specified following the general-to-specific approach, and optimal lag lengths were determined based on the Akaike Information Criterion (AIC). The dependent variable is the GDP growth rate, while the key explanatory variable is the Human Development Index (HDI) alongside control variables such as capital formation, government expenditure, trade openness, population growth, and inflation (only in the case of Greece).

The ARDL models were estimated separately for each country over the period. The significance of the short-run and long-run coefficients was tested, and the models were checked for adequacy using diagnostic tests (serial correlation, heteroskedasticity, and model stability). The results are summarized in Table 1 below.

Table 1: Comparative ARDL Estimation Results for Georgia and Greece (time span 1990-2022) Dependent Variable: GDP Growth Rate (%)

Variable	Georgia	Greece
GDPGRO(-1)	0.964	-0.6777
	(0.0001***)	(0.0492**)
HDI	-160.685	9.9820
	(0.0441**)	(0.5662)
HDI(-1)	-127.490	0.1292
	(0.6308)	(0.9912)
HDI(-2)	791.7675	-18.6736
	(0.0111**)	(0.0625*)
CAPFORM	-10.5692	25.5394
	(0.3641)	(0.0018***)
CAPFORM(-1)	-33.642	2.8624
	(0.0005***)	(0.6763)
CAPFORM(-2)	_	-7.0794
		(0.2655)

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Prob(F-statistic) 0.000019 0.0000			
Durbin-Watson 3.149 2.254			
	Durbin-Watson	3.149	2.254

Note:

p-values are reported in parentheses under the coefficients. Significance: *** p < 0.01, ** p < 0.05, * p < 0.10

(—) means not included.

Table 2: Comparison of Diagnostic Test Results for Georgia and Greece

Test	Georgia	Greece
Serial Correlation (Breusch-Godfrey LM Test)	p-value = 0.1817 (Fail to reject H_0 : No serial correlation)	p-values = 0.4113 (F-stat) and 0.1028 (Obs* R^2) (Fail to reject H_0 : No serial correlation)
(Breusch-Pagan-Godfrey Test)	(Obs*R ²), 0.9235 (Scaled Explained SS) (Fail to reject H ₀ : Homoskedasticity)	
Normality of Residuals (Jarque-Bera Test)	Jarque-Bera Statistic = 18.3, p-value = 0.0000 (Reject H ₀ : Residuals not normally distributed)	Jarque-Bera Statistic = 2.93, p-value = 0.23 (Fail to reject H ₀ : Residuals are normally distributed)
Model Specification (Ramsey RESET Test)	1 ,	$\begin{array}{ll} p\text{-values} = 0.6118 \; (t\text{-statistic}, F\text{-statistic}) \\ (Fail \; to \; reject \; H_0\text{:} \; Model \; correctly \\ specified) \end{array}$

Note: Both models do not exhibit serial correlation or heteroskedasticity. The Greece model satisfies normality assumptions, while the Georgia model does not. However, non-normality is not a major issue for coefficient estimation. Both models are correctly specified according to the Ramsey RESET test. Overall, the models are statistically valid and reliable for policy recommendations or decision-making.

5. Discussion

The analysis of the ARDL models for Georgia and Greece offers valuable insights into the determinants of economic growth in these two countries, revealing both common trends and divergent dynamics. Below is a concise discussion of the key findings.

Human Development Index (HDI): Georgia exhibits a short-term negative effect of HDI on GDP growth, which turns positive in the long term. This suggests that while initial investments in education, healthcare, and social services may incur costs and slow growth, they ultimately yield economic benefits over time. In Greece, HDI's immediate effect on GDP growth is insignificant, but its squared term (HDI2) shows a positive relationship with GDP at higher levels of HDI. This indicates that improvements in human development accelerate economic growth as the country reaches a certain threshold in human capital development. These findings imply that Georgia is still in the early stages of benefiting from human capital investments, while Greece is reaping the rewards of past investments. The non-linear relationship observed in Greece likely results from multiple compounding mechanisms that arise once foundational human development thresholds—such as widespread tertiary education, effective labor market integration, and institutional stability—are surpassed. For example, when a significant share of the workforce attains higher education, the economic returns become multiplicative rather than merely additive, fostering greater innovation, productivity, and labor market flexibility.

Additionally, Greece's integration into the European Union has supported institutional reforms, improved macroeconomic coordination, and access to structural funds, which further enhance the translation of human development into sustained

economic growth. These factors suggest that the observed non-linearity reflects an interplay of education thresholds, labor market dynamics, and institutional maturity, each worthy of deeper investigation to guide more precise policy design.

Our findings broadly align with prior research emphasizing human capital as a critical driver of economic growth. For instance, Ghislandi et al. (2019) demonstrate that improvements in health and education contribute significantly to productivity gains across European countries, although the scale varies depending on institutional quality and economic structure. The non-linear HDI-growth relationship in Greece complements these results by highlighting the compounding benefits that emerge once certain development thresholds are reached. Similarly, UNDP Human Development Reports stress sustained investments in human capital as key to fostering economic resilience, particularly in post-crisis contexts. By employing ARDL models, this study contributes a dynamic perspective, capturing how human development's effects unfold over time, thus enriching the existing literature beyond static or cross-sectional analyses.

The dynamic results also underscore the critical role of time lags in the HDI-growth nexus. In Georgia, the delayed positive effects may stem from long gestation periods required for education, healthcare, and institutional reforms to translate into productivity and innovation. Conversely, Greece's threshold effects likely reflect accumulated development advantages—such as higher baseline education levels and stronger institutions—that enable faster capitalization on human development improvements. While our study focuses on these two countries, future research should expand to include broader cross-national samples and explicitly incorporate institutional quality metrics (e.g., governance indices, corruption perception, rule of law). This would better capture how varying institutional environments mediate the HDI-growth relationship and clarify whether observed lags reflect policy implementation delays or structural inertia.

Capital Formation: In Georgia, capital formation has a delayed negative impact on GDP growth, suggesting inefficiencies or delayed returns on investment. This points to a need for better investment strategies to ensure that capital formation contributes to long-term growth. In contrast, Greece experiences positive short-term effects from capital formation, though older investments do not have a lasting impact. This suggests that Greece benefits from investment efficiency in the short term but may need to focus on sustaining these benefits over the long term.

Government Expenditure: Both countries show some form of negative relationship between government expenditure and GDP growth. In Georgia, government spending immediately reduces GDP, likely due to inefficiencies or misallocation of resources. For Greece, the impact of government expenditure is delayed, with negative effects becoming evident over time. This delayed negative impact suggests that while public spending may not harm the economy immediately, its long-term consequences, such as rising debt or inefficiencies, hinder economic growth.

Trade Openness: Georgia experiences a negative effect of trade openness on GDP growth, possibly due to factors such as trade imbalances or increased competition. The lagged effects of trade openness are not significant, indicating that the long-term benefits of trade may require more time to materialize. In Greece, trade openness shows no immediate effect on GDP growth, but the long-term effects are marginally positive.

This suggests that continued trade integration could be beneficial for Greece over time, though its full impact may take longer to realize.

Population Growth: In Georgia, population growth has a positive short-term impact on GDP, but this turns negative in the long term. This could be because rapid population growth may put pressure on resources and services, making it harder for the economy to keep up. In Greece, population growth does not have a significant effect on GDP, suggesting that other factors, like capital investment or technological progress, are more important for economic growth.

Interaction of HDI and Population Growth. In Georgia, the interaction variable of HDI and Population Growth (HDI*POPGRO) reveals no immediate significant effect but a positive long-term impact. This suggests that while initial pressures on resources and infrastructure may limit economic growth, the combined effects of improved human development and a growing labor force lead to positive economic outcomes over time. This highlights the importance of aligning policies to address both human capital development and demographic changes, as they can complement each other and foster sustainable growth. In Greece, this interaction is not included in the model, implying that demographic changes do not play as crucial a role in influencing economic growth as they do in Georgia.

Dummy Variable for Economic Crisis: For Greece, the economic crisis dummy variable shows no immediate effect on GDP growth during the pre-crisis period. However, the delayed negative impact suggests that structural issues and challenges accumulated prior to the crisis contributed to the economic downturn, becoming more severe after the crisis. This emphasizes the importance of addressing structural vulnerabilities to prevent prolonged economic stagnation

5.1 Limitations and Future Research

This study is subject to several limitations that should be acknowledged.

One key limitation of this study lies in its narrow country scope. While Greece and Georgia provide contrasting examples of a developed EU member and a transitioning post-Soviet economy, they are not broadly representative of all European or transitional economies. As such, the generalizability of the findings may be constrained and suggests the need for future research incorporating a wider cross-country panel to capture diverse institutional, economic, and developmental contexts.

Second, although the role of institutional quality and governance was qualitatively discussed, the study did not include variables such as corruption perception, rule of law, or regulatory quality in the econometric models. These factors likely mediate the relationship between human development and economic growth, especially in emerging or transitional economies. Future work could benefit from integrating such indicators to deepen the understanding of how institutional frameworks influence the effectiveness of human development investments.

Upon the above mentioned limitations, future research could extend this analysis to include a wider set of countries with varying institutional frameworks, stages of development, and geographic contexts. This would enable more robust comparative insights and strengthen the policy relevance of the conclusions across regions.

6. Conclusion

By addressing the key questions posed at the beginning of this study, we find that HDI significantly impacts economic growth in both Greece and Georgia, but in different ways. In Georgia, a transitioning economy, the effects of HDI are delayed, and the relationship remains linear, meaning improvements contribute steadily to growth without accelerating returns. In contrast, in Greece, a developed economy, the non-linear relationship suggests that higher levels of human development yield increasing economic benefits. This divergence implies that while developed economies may experience compounding returns from human capital investments, transitioning economies require time for these benefits to materialize.

Beyond HDI, other explanatory variables reveal important structural differences between the two economies. Capital formation has an immediate positive impact on growth in Greece but shows inefficiencies in Georgia, where past investments negatively affect GDP. Government expenditure reduces economic growth in both countries, though its impact is immediate in Georgia and delayed in Greece, suggesting differing fiscal dynamics. Trade openness negatively affects Georgia's economy in the short term, while in Greece, its effects are neutral to slightly positive in the long run. Population growth initially supports economic expansion in Georgia but becomes a constraint over time, whereas in Greece, it has no significant effect, with other factors like investment and technology playing a more dominant role.

These findings highlight the role of institutional quality, investment efficiency, and policy effectiveness in shaping economic outcomes. For Georgia, strengthening governance, improving investment allocation, and ensuring productive government spending could accelerate the benefits of human development. For Greece, sustaining economic growth requires policies that reinforce long-term human capital gains while addressing fiscal and trade-related challenges. By examining two small economies at different stages of development, this study provides valuable insights for policymakers in other transitioning and developed nations.

7. Contribution and Tailored Policy Implications

This study contributes to the understanding of how human development, measured by the Human Development Index (HDI), influences economic growth in small economies at different development stages, using Greece and Georgia as illustrative cases. By highlighting the distinct HDI-growth dynamics in these countries, the research underscores the necessity of context-specific policy approaches that reflect structural and institutional differences. For transitioning economies like Georgia, where HDI improvements show delayed economic benefits, the focus should be on enhancing the efficiency of human capital investments and strengthening institutional capacity. This includes aligning educational curricula with labor market needs, expanding healthcare access particularly in underserved rural areas, strengthening vocational training, and improving governance by increasing institutional transparency and reducing bureaucratic hurdles. Such measures can accelerate the translation of human development into economic growth by optimizing investment returns and fostering innovation. Conversely,

developed economies like Greece should prioritize sustaining and leveraging their accumulated human capital gains amid fiscal constraints. This can be achieved by maintaining high educational and healthcare quality while reducing inefficiencies, strategically utilizing EU structural funds to support long-term development projects, and reinforcing institutional frameworks that support innovation and labor market flexibility. By tailoring policies to each country's unique development stage and institutional context, governments can maximize the growth impact of human development investments. Additionally, this study fills a gap in the literature by focusing on smaller economies, offering lessons that are relevant for other nations facing similar development challenges. The nuanced insights provided here emphasize that effective development strategies require more than generic prescriptions; they demand carefully designed interventions that address specific national realities to promote sustainable and inclusive economic growth

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