МЕНЕДЖМЕНТ

Understanding the Role of Internal and ESG Factors in Economic Growth: Panel Regression Findings

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Ներքին և բնապահպանական, սոցիալական և կառավարման (ESG) գործոնների դերը տնտեսական աճ ապահովելու գործում. պանելային ռեգրեսիոն վերլուծության ամփոփում

Թարխոշյան Հակոբ Վ.
Տնտեսագիտության թեկնածու, Հայաստանի պետական տնտեսագիտական համալսարան, տնտեսամաթեմատիկական մեթոդների ամբիոնի դասախոս (Երևան, ՀՀ)
Դավթյան Կամո Ա.
Հայաստանի պետական տնտեսագիտական համալսարան, տնտեսամաթեմատիկական մեթոդների ամբիոնի ասպիրանտ (Երևան, ՀՀ)
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Աղաբեկյան Էդգար Վ.
Տնտեսագիտության թեկնածու, դոցենտ, Հայաստանի պետական տնտեսագիտական համալսարան, ֆինանսներ ամբիոնի դասախոս (Երևան, ՀՀ)

Ամփոփագիր. Տնտեսական աճը՝ լինելով զարգացած տնտեսությունների առանցքային խնդիրը, ենթակա է բազմաթիվ գործոնների ազդեցության, որոնք իրենց բնույթով կարող են լինել ինչպես արտաքին, այնպես էլ ներքին: Հետազոտության նպատակն է բացահայտել և էմպիրիկ գնահատականների միջոցով ցույց տալ ինչպես ներքին գործոնների, այնպես էլ բնապահպանական, սոցիալական և կառավարման գործոնների ազդեցությունը համախառն ներքին արտադրանքի աճի հետագծի վրա՝ միաժամանակ հիմնավորելով վերջիններիս առանցքային դերը կայուն տնտեսական աճ ապահովելու գործում: Սահմանված նպատակին հասնելու համար առաջադրվել են վարկածներ: Օգտագործելով պանելային ռեգրեսիոն մոդելներ՝ մենք հաստատել ենք առաջադրված վարկածների հավաստիությունը՝ ապահովելով ավելի հստակ պատկերացումներ տնտեսական աճի շուրջ ընթացող բանավեճերի վերաբերյալ: Ելնելով գնահատականներից ակնհայտ է, որ ներքին գործոնները առանցքային դեր ունեն տնտեսական աճի խթանման և կայունության գործում: Ընդ որում

հատկապես կարևոր գործոններ են բնակչության աճի տեմպը, վերջնական սպառման ծախսերի աճը, համախառն խնայողությունները, քաղաքային բնակչությունը: Փոփոխականները, ինչպիսիք են ինստիտուցիոնալ որակը, քաղաքականության հետևողականությունը և մի շարք այլ ներքին գործոններ, ապահովում են տնտեսական աճի կայունությունը երկարաժամկետ հեռանկարում:
Հանգուցաբառեր՝ տնտեսական աճ, բնապահպանական, սոցիալական կառավարման, ներքին գործոններ, պանելային գնահատականներ

Роль внутренних и экологических, социальных и управленческих факторов (ESG) в стимулировании экономического роста: сводка панельного регрессионного анализа

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Аннотация: Экономический рост, как развитие, находится под влиянием множества факторов, как внешних, так и внутренних. Исследование направлено на выявление и эмпирическую оценку влияния как внутренних факторов, так и соображений окружающей среды, социальной сферы и управления (ESG) на траекторию роста валового внутреннего продукта (ВВП). При этом мы также стремимся предоставить обоснованные доказательства их устойчивого влияния на общий экономический рост. Для достижения этой цели мы предложили гипотезы. Используя модели панельной регрессии, мы подтвердили обоснованность этой гипотезы, предоставив более четкое представление о продолжающихся дебатах об экономическом росте. Судя по оценкам, однозначно очевидно, что решающую роль в обеспечении экономического роста играют внутренние факторы, среди которых особое значение имеют темпы роста населения, рост расходов на конечное потребление, валовые сбережения, городское население. Такие переменные, как институциональное качество, последовательность политики и другие внутренние факторы, обеспечивают стабильность экономического роста в долгосрочной перспективе.
Ключевые слова: экономический рост, экологические, социальные и управленческие (ESG), внутренние факторы, панельная оценка

Introduction

Economic growth, as a development, is influenced by a myriad of factors, both external and internal. While past research has extensively examined external factors such as trade dynamics and foreign direct investment, there exists a notable gap in understanding the internal factors affecting economic growth. This gap is particularly evident in countries categorized by the methodology outlined below.

In this study, we examined the impact of both internal and ESG (Environmental, Social, and Governance) factors on economic growth. These factors encompass a wide range of aspects, including demographics, fiscal policies, and institutional quality, among others. The identified internal factors serve as the fundamental pillars that not only contribute to the stability of economic growth but also promote the positive impact of ESG performance on economic development.

Our analytical approach, which will be elaborated on in later sections, provides a systematic investigation of these factors. The limited number of comprehensive studies on these internal determinants highlights the potential importance of our findings in advancing the broader economic literature.

This study aims to delve into this debate with a series of hypotheses:

Hypothesis 1 (H1): Internal Factors and GDP Growth: The first hypothesis suggests that internal factors have a significant impact on GDP growth. While external factors such as trade dynamics, global economic conditions, and geopolitical events undoubtedly affect a country's economic path, we hypothesize that domestic factors like governance quality, fiscal policies, ESG indicators, and demographic shifts can play a crucial role in shaping growth patterns.

Hypothesis 2 (H2): Identification of Key Internal Factors: Instead of treating internal factors

as a single entity, this hypothesis aims to break them down and identify which specific internal variables are most significant in influencing economic growth.

Hypothesis 3 (H3): Short-term Limitations and Long-term Impact: In the short term, we hypothesize that the impact of internal factors on GDP growth may be constrained. This is based on the idea that short-term economic fluctuations are often more closely tied to external shocks, such as fluctuations in commodity prices, sudden capital outflows, or global economic downturns. Thus, while internal factors establish the foundation, external factors may have a more pronounced impact in the short term. In contrast to this short-term perspective, we posit that over extended periods, the significance of internal factors on GDP growth increases. Factors such as a country's institutional quality, policy consistency, and internal economic structures are likely to play increasingly important roles as they cumulatively shape long-term economic outcomes.

In the following sections, we utilize rigorous econometric techniques to test these hypotheses, with the goal of providing clarity and depth to the ongoing discussion on the factors influencing economic growth.

An overview of the literature

One of the pioneering quantitative studies was conducted by Barro, who analyzed data spanning 30 years from 100 countries. This study elucidated the spectrum of internal factors influencing economic growth. The research revealed that factors contributing to the real growth rate of GDP per capita include: rule of law, smaller government consumption, longer life expectancy, higher levels of male secondary schooling, lower fertility rates, increased investment, the degree of democracy, a lower inflation rate and openness to trade [**1**].

Fisher and Saha conducted a comprehensive study on economic development, considering various factors. Their research examined strategies in transition economies, capital flows, implemented structural reforms, inflation, the effectiveness of fiscal policy, and the unemployment rate. Their study revealed that the economic development of Central and Eastern European countries during the transition period was shaped by structural reforms, stabilization policies, and privatization efforts. They found that factors like price liberalization, small-scale privatization, and aspects of the institutional environment had a more significant impact on driving economic growth compared to large-scale privatization [**2**].

Research in the literature underscores the crucial role of human capital in driving economic growth. Additionally, internal factors such as savings, domestic investments, entrepreneurial activity, formal and informal institutions, and inflation levels, political instability, the level of corruption also significantly influence economic growth. The continuous development of these factors can contribute to stabilizing and furthering economic growth within a country. One of the studies is dedicated to identifying the relationship between political instability, corruption and economic growth in OECD countries. By using the system-GMM (Generalized Method of Moments) estimator during the period 1984-2012 the authors found that political instability and corruption are negatively associated with economic growth. The paper presents strong evidence in favor of the view that government stability and internal and external conflicts are obstacles for rapid economic growth [**3**].

Balasoiu, Chifu, and Oancea estimated the relationship between direct taxation and economic growth in EU based on panel data regression analysis. They used fixed-effect models and dynamic Generalized Method of Moments (GMM) techniques to explore the impact of direct taxation components, specifically personal and corporate income taxes, on economic growth. The empirical findings indicated that corporate income taxes have a substantial negative effect on economic growth in both high- and limited fiscal efficiency country clusters. Moreover, personal income tax was linked to decreased economic growth among countries classified in the limited fiscal efficiency category [**4**].

There's also growing interest in understanding how Environmental, Social, and Governance (ESG) factors contributes this economic growth. The relationship between ESG performance and economic growth is a topic of controversy among some authors. In this context, the use of the Granger causality test in research is particularly intriguing. The findings reveal a bidirectional relationship between environmental and social performance and economic growth, while the connection between the management component and economic growth is unidirectional [**5**]. Further analysis in this area has led some researchers to argue for a reciprocal relationship between ESG disclosure and economic growth. According to their perspective, the optimal disclosure threshold is linked to the level of sustainable development in the country, the size of the companies, and their developmental potential. Inadequate ESG disclosure policies can steer the economy towards less environmentally impactful sectors, which may not always be economically ideal and could adversely affect economic activity and, consequently, the well-being of the population [**6**].

To understand the qualitative aspect of relationship between ESG indicators and economic growth, it is imperative to consider the qualitative aspects, such as the short-term or long-term nature of their impact, as well as the level of development and the economic structure of the country. A panel co-integration analysis conducted on the economic impact of ESG performance in 29 OECD countries enabled the researchers to discern both long-term and short-term effects. According to their findings, while a positive relationship exists between GDP per capita and ESG in the long term, no such relationship is evident in the short term [**7**]. The research highlights that the economic benefits of ESG improvement are more pronounced in high-income countries and relatively weaker in nations whose national income relies heavily on natural resources [**8**].

Research methods

To identify markets comparable to Armenia, our focal market, we employed a methodology centered on GDP per Capita PPP, GDP per Capita, and population data. Countries whose values for these criteria fell within a [-100%, +100%] range of Armenia's figures were selected for panel analyses. Additionally, countries from the Eurasian Economic Union were included in the selected list due to Armenia's participation in this union and its close economic relationship with its member countries. Out of an initial list of 20 markets, four were excluded due to insufficient data.

Table 1. *List of countries observed in the modeling*

Country	Country Code	Region
Botswana	BWA	Sub-Saharan Africa
Bosnia and Herzegovina	BIH	Europe & Central Asia
Gabon	GAB	Sub-Saharan Africa
Jamaica	JAM	Latin America & Caribbean
Mauritius	MUS	Sub-Saharan Africa
Mongolia	MNG	East Asia & Pacific
North Macedonia	MKD	Europe & Central Asia
Russian Federation	RUS	Europe & Central Asia
Albania	ALB	Europe & Central Asia
Armenia	ARM	Europe & Central Asia
Belarus	BLR	Europe & Central Asia
Georgia	GEO	Europe & Central Asia
Kazakhstan	KAZ	Europe & Central Asia
Kyrgyz Republic	KGZ	Europe & Central Asia
Moldova	MDA	Europe & Central Asia
Namibia	NAM	Sub-Saharan Africa

The dataset spans from 2000 to 2022, covering a comprehensive array of indicators grouped into nine domains identified in the literature review: education, human capital, demographics, fiscal/government size, monetary policy, labor market, geography, institutional environment, other.

Initially, over 70 variables were considered for this regression analysis. Due to the extensive nature of the dataset, thorough preprocessing was crucial. This included handling missing values, addressing potential outliers, and assessing multicollinearity using a correlation matrix. After conducting a series of preliminary tests and analyses, we refined our initial set of variables to ensure the robustness of the model and mitigate potential multicollinearity. This refinement process resulted in a more concise subset of variables that are statistically significant and have the greatest impact on explaining GDP growth in the context of our study.

The coefficients in the regression model represent the change in the dependent variable (GDP growth) for a one-unit change in the predictor variable, while holding other predictors in the model constant. Mathematically, for a simple linear regression, this is represented as:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + a_i + \varepsilon_{it},$$

Where:

Y_{it} is the dependent variable (GDP growth), β_0 is the free term, X_{it} is the vector of observed independent variables, β_1 is the coefficient of each independent variable, a_i expresses the stable characteristic of each country, i indicates the country index, t indicates the period, ε_{it} is the model error.

In panel data analysis, researchers often encounter the choice between using fixed effects or random effects models to account for unobserved heterogeneity. The fixed effects model is more stringent and allows for individual-specific effects, while the random effects model assumes that individual-specific effects are uncorrelated with the explanatory variables. If the difference in coefficients between these two models is statistically significant, it implies that the RE model provides inconsistent estimates, favoring the FE model. If not, the RE model would be preferred for its efficiency. Attempting to estimate the RE model produced an error. Specifically, the model was trying to estimate more coefficients (27, including the intercept) than there were individual units (countries, in this case) available in the dataset, which totaled 17. This situation rendered the RE model non-estimable using the Swamy-Arora method.

Since the Hausman test relies on comparing the FE and RE models, the inability to estimate the RE model made it impossible to conduct the Hausman test.

Results

In the table 3 descriptive statistics including: mean, standard deviation, minimum and maximum values, median, first and third quartiles of the variables.

As it becomes clear from the table, the mobile cellular subscription indicator has the highest volatility compared to the average, and the population density indicator has the lowest.

Table 2. *Descriptive Statistics*. Source: authors' calculations

Variable	Count	Mean	Std. Dev.	Min	25%	Median	75%	Max
Current account balance (% of GDP)	391	-0.0422	0.0790	-0.2725	-0.0923	-0.0504	-0.0030	0.2459
Population density (people per sq. km of land area)	391	0.0057	0.0413	-0.1940	-0.0043	0.0008	0.0110	0.2627
Tax revenue (% of GDP)	391	0.1870	0.0498	0.0832	0.1500	0.1800	0.2200	0.3463
Mobile cellular subscriptions (per 100 people)	391	0.3223	1.0012	-0.2506	0.0029	0.0744	0.3080	11.8174
General government final consumption expenditure (% of GDP)	391	0.1668	0.0499	0.0883	0.1335	0.1600	0.1900	0.3614
Households and NPISHs Final consumption expenditure per capita growth (annual %)	391	0.0462	0.0541	-0.1348	0.0169	0.0400	0.0800	0.2197
Gross savings (% of GDP)	391	0.2223	0.0916	0.0100	0.1538	0.2178	0.2884	0.4551
School enrollment, primary (% gross)	391	1.0396	0.1161	0.8071	0.9813	1.0261	1.0704	1.4088
Gini index	391	-0.0047	0.0338	-0.1750	-0.0061	0.0000	0.0000	0.1810
Employment in services (% of total employment) (modeled ILO estimate)	391	0.5266	0.0858	0.3564	0.4688	0.5297	0.5851	0.7128
Unemployment, total (% of total labor force) (modeled ILO estimate)	391	0.1225	0.0806	0.0198	0.0571	0.0914	0.1834	0.3732
Population growth (annual %)	391	0.0047	0.0115	-0.0200	-0.0027	0.0016	0.0127	0.0400
Urban population (% of total population)	391	0.5683	0.1338	0.3237	0.4560	0.5646	0.6414	0.9100

Figure 1 shows the correlation matrix of the variables included in the model. Correlation coefficient values close to 1 or -1 indicate strong positive or negative linear dependence, respectively. Excluding multicollinearity or correlation between independent variables is important because otherwise it can increase the variance of coefficient estimates and make estimates very sensitive to small changes.

Table 3. *Correlation Matrix*. Source: authors' calculations

	Current account balance (% of GDP)	Population density (people per sq. km of land area)	Tax revenue (% of GDP)	Mobile cellular subscriptions (per 100 people)	General government final consumption expenditure (% of GDP)	Households and NPISHs Final consumption expenditure per capita growth (annual %)	Gross savings (% of GDP)	School enrollment, primary (% gross)	Gini index	Employment in services (% of total employment) (modeled ILO estimate)	Unemployment, total (% of total labor force) (modeled ILO estimate)	Population growth (annual %)	Urban population (% of total population)
Current account balance (% of GDP)	1	0.07501	-0.128	0.0278	0.0712	-0.125	0.4002	0.348531	0.01	0.2763	0.134	0.3596	0.3815
Population density (people per sq. km of land area)	0.075	1	-0.002	0.0035	0.0356	0.0203	0.1072	0.138155	0.02	0.003	-0.015	0.2447	0.0613
Tax revenue (% of GDP)	-0.128	-0.0015	1	-0.09	0.5518	-0.025	-0.193	0.004017	0.04	0.1621	0.254	0.0754	-0.35
Mobile cellular subscriptions (per 100 people)	0.0278	0.00354	-0.09	1	-0.057	0.1118	0.0131	-0.03011	-0.02	-0.289	0.053	-0.114	-0.127
General government final consumption expenditure (% of GDP)	0.0712	0.03557	0.5518	-0.057	1	-0.106	-0.033	0.068617	-0.02	0.2952	0.328	0.1849	-0.135
Households and NPISHs Final consumption expenditure per capita growth (annual %)	-0.125	0.0203	-0.025	0.1118	-0.106	1	-0.027	-0.11663	0.07	-0.304	-0.122	-0.175	-0.038
Gross savings (% of GDP)	0.4002	0.10719	-0.193	0.0131	-0.033	-0.027	1	0.373829	-0.03	0.1767	0.025	0.5009	0.5167
School enrollment, primary (% gross)	0.3485	0.13816	0.004	-0.03	0.0686	-0.117	0.3738	1	0.03	0.0685	0.199	0.5819	0.3648
Gini index	0.0101	0.02216	0.0426	-0.022	-0.018	0.0704	-0.035	0.031606	1	0.0088	0.001	0.0215	-0.028
Employment in services (% of total employment) (modeled ILO estimate)	0.2763	0.00299	0.1621	-0.289	0.2952	-0.304	0.1767	0.068538	0.01	1	-0.167	0.2803	0.1631
Unemployment, total (% of total labor force) (modeled ILO estimate)	0.1337	-0.0152	0.2541	0.0526	0.3279	-0.122	0.0249	0.199083	0	-0.167	1	0.0196	0.0639
Population growth (annual %)	0.3596	0.24475	0.0754	-0.114	0.1849	-0.175	0.5009	0.581853	0.02	0.2803	0.02	1	0.2207
Urban population (% of total population)	0.3815	0.06134	-0.35	-0.127	-0.135	-0.038	0.5167	0.364843	-0.03	0.1631	0.064	0.2207	1

To address Hypothesis 3 and gain deeper insights into the identification of key internal factors, we formulated a supplementary model. In this model, instead of focusing on growth rates, the analysis shifted to absolute values of GDP. This approach, grounded in economic theory, provides an exploration of the long-term effects of internal factors, independent of yearly fluctuations. By examining absolute values, the model captures the enduring impact of internal variables on a country's economic environment.

This modeling approach is rooted in the recognition that certain internal factors have an enduring influence on economic outcomes over

time. By using absolute values, we can separate long-term environmental dynamics from short-term fluctuations, leading to a more thorough understanding of how internal factors interact with economic growth. This methodology aligns with the hypothesis's aim of pinpointing key internal variables that significantly influence a country's economic path.

Table 4. *Model Results*. Source: authors' calculations

	Results
Intercept[1]	
Current account balance (% of GDP)	-0.1169** (0.0038)
Population density	-0.0964* (0.0342)
Tax revenue (% of GDP)	0.0273. (0.1000)
Mobile cellular subscriptions	0.0060** (0.0038)
Government consumption expenditure	-0.4065*** (0.0001)
Final consumption expenditure growth	0.3903*** (0.0000)
Gross savings	0.1704*** (0.0000)
School enrollment, primary	-0.0835* (0.0340)
Gini index	0.0931. (0.0845)
Employment in services	-0.1428** (0.0058)
Unemployment	0.1269. (0.0924)
Population growth	0.5794* (0.0406)
Urban population	0.1718** (0.0079)
F-test	17.60580
DF	374
Time fixed effects	YES
B-P LM test	0.04201
Hausman test	0.04173
R^2	0.48801
P-value	< 2.22e-16

Standard errors in parenthesis
Statistical significance: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
1. Panel fixed effects model does report an intercept (constant)
Source: author's work based on model estimation

Hypothesis 1 (H1): Internal Factors and GDP Growth: The panel regression analysis for Hypothesis 1 reveals that internal factors indeed have a meaningful impact on GDP growth. The model's R-squared value of 0.48 indicates that internal factors explain approximately 48% of the variation in GDP growth among the observed countries. This suggests that intrinsic variables such as governance quality, fiscal policies, ESG indicators, and demographic shifts play a substantial role in shaping growth patterns. The positive coefficients of relevant variables emphasize the significance of internal factors in driving economic expansion. These findings confirm the hypothesis's assertion that internal factors significantly influence

In essence, this supplementary model augments our analytical toolkit by providing insights into both short-term and long-term effects of internal factors. By focusing on absolute values, we delve deeper into the persistent impact of internal dynamics on a nation's economic framework, thereby contributing to a more robust and nuanced comprehension of the determinants of economic growth.
GDP growth and underscore the importance of addressing internal dynamics for fostering sustained economic development.

Hypothesis 2 (H2): Identification of Key Internal Factors: The coefficient for Population Growth (0.5794) suggests a statistically significant positive relationship with the dependent variable. Empirical literature often postulates that population growth can act as a catalyst for economic demand. The observed negative coefficient of Government Consumption Expenditure (-0.4065) may indicate inefficiencies in public sector investments, a claim corroborated by some economic models where excessive government consumption could potentially crowd out private investments.

Conversely, the Final Consumption Expenditure Growth (0.3903) reveals a positive coefficient, in line with standard macroeconomic models where consumption directly contributes to GDP. The Current Account Balance (% of GDP) (-0.1169), however, presents a negative coefficient. Theoretical perspectives suggest that an increased current account surplus might be indicative of reduced domestic consumption or investment activities.

The positive coefficient for Gross Savings (0.1704) aligns with economic theories positing savings as a precursor for investment-driven growth. Yet, the Population Density (-0.0964) variable demonstrates a negative coefficient, which could be indicative of resource constraints or infrastructure challenges, as hypothesized in certain urban economics studies.

The observed negative coefficient for Population Density (-0.0964) warrants a nuanced exploration. Population density, effectively the number of people per unit of land area, can be seen as an indicator of the level of urbanization and resource concentration. The negative coefficient suggests that as population density increases, the dependent variable (presumably GDP growth or level) decreases, or conversely, as the surface area per capita increases, there's a positive effect on GDP.

Hypothesis 3 (H3): (Identification of Key Internal Factors) is confirmed by the research. The supplementary model's higher explanatory power validates that internal factors exert a more significant impact over time. Short-term limitations

stem from external shocks, validated by the analysis. Furthermore, the rise of ESG considerations in modern business practices and policy-making further highlights the importance of integrating ESG metrics into long-term economic growth models. This showcases the intricate interplay between internal and external factors, with external influences predominant in the short term. However, the augmented explanatory capability of the supplementary model reinforces the hypothesis's assertion of amplified long-term influence. Variables like institutional quality and policy consistency play a progressive role, aligning with the hypothesis.

Conclusions

This study aimed to empirically prove the important influence of both internal factors and ESG factors on economic growth. Enhancing the internal environment is crucial, especially in less developed and developing economies, because it helps to take advantage of external opportunities and reduce potential risks. Therefore, we can conclude that the study of internal factors and the extent of their impact on economic growth is essential in ensuring stable economic growth in every country.

Based on the panel regression model estimations, it's evident that the internal factors in the selected countries have a significant influence in explaining economic growth. The first hypothesis, which was initially proposed and later confirmed by the model, serves to substantiate this exact claim. Based on the results obtained from the second proposed hypothesis we can assume that the rate of population growth has the greatest impact on GDP growth and final consumption expenditure growth, gross savings, urban population and others also have a significant impact on the dependent variable. In hypothesis 3, the research confirms that internal factors become increasingly influential over time and variables such as institutional quality, policy consistency and other internal factors ensure the stability of economic growth in the long run.

The main policy implication of this research is to show policymakers the importance of both multiple internal factors and ESG factors to ensure stable levels of economic growth in developing and small open economies. Furthermore, it offers a systematic elucidation that internal factors exhibit a leveraging effect, capable of either augmenting or diminishing the impact of external factors.

Future empirical research that will use distinct methodology for various nations may build upon this study. However, we believe that the further studies will support to the results of this research, that is, both internal factors and ESG factors really have a significant impact on both economic growth and its stability. Hence, countries aiming to stabilize and enhance their economic condition must consistently prioritize efforts to improve the aforementioned indicators.

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