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Article

# GARCH modeling: Economic growth, idiosyncratic risk and SDGs in ASEAN countries

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**Abstract:** This study examines the relationships among economic growth, idiosyncratic risk, Foreign Direct Investment (FDI), inflation, and Sustainable Development Goals (SDGs) within the Association of Southeast Asian Nations (ASEAN). The research integrates Structural Equation Modeling (SEM) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) modeling to analyze both structural relationships and volatility dynamics in macroeconomic variables. Economic data from ASEAN member countries were analyzed using SEM with AMOS (Analysis of Moment Structures) to identify direct and indirect relationships among variables, while GARCH modeling using EViews was applied to evaluate time-varying volatility in economic growth. The empirical results indicate a significant positive relationship between idiosyncratic risk and economic growth, suggesting that higher levels of firm- or asset-specific risk may reflect entrepreneurial activity, innovation, and investment in higher-return opportunities that contribute to economic expansion. The analysis also shows that progress toward the Sustainable Development Goals exhibits a relationship with economic performance, although the statistical significance varies across models. Furthermore, the GARCH results confirm the presence of volatility clustering, indicating that past fluctuations in economic growth significantly influence current volatility. These findings highlight the importance of effective risk management and balanced policy strategies that encourage innovation while maintaining economic stability. For ASEAN policymakers, strengthening risk management frameworks, supporting entrepreneurship, and aligning development strategies with sustainability objectives can enhance economic resilience and promote long-term sustainable growth.

**Keywords:** economic growth; idiosyncratic risk; Sustainable Development Goals (SDGs); GARCH modeling

## 1. Introduction

The Association of Southeast Asian Nations (ASEAN) has positioned itself as a dynamic economic bloc characterized by strong growth, a diverse economy, and many special challenges. As ASEAN countries strive to address the complexities of globalization and sustainable development, policymakers and stakeholders need to understand the complex dynamics of economic variables. shape the future of the region. In this article, we review the results of recent regression analyses that shed light on the interactions between key economic factors in ASEAN [1–3]. By leveraging empirical insights gained from statistical modeling, we aim to uncover relationships and implications that are meaningful to policymakers seeking to promote

sustainable development and optimize economic outcomes in ASEAN member states. Exploring economic drivers in ASEAN is essential to inform evidence-based decision-making and guide strategic interventions to promote inclusive growth, innovation, and resilience. Embark on a journey to explore the lessons from rigorous analysis, providing concrete recommendations to advance ASEAN towards a prosperous and sustainable future [4–7].

## 2. Literature review

The ASEAN economic landscape has been the subject of extensive research and analysis. Previous studies have emphasized the importance of Foreign Direct Investment (FDI) in promoting economic growth and regional integration in ASEAN. Additionally, researchers have explored the impact of sustainable development initiatives, aligned with the United Nations Sustainable Development Goals (SDGs), on economic performance and social well-being in regional association [8, 9]. Additionally, research on risk management strategies has emphasized the importance of balancing risk and innovation to promote economic dynamism. a global economic power. This literature review synthesizes key findings and lessons from previous studies examining the dynamics of economic variables in ASEAN, thereby providing a basis for understanding the context and implications of the Recent regression analysis results [10].

### 2.1. Foreign Direct Investment (FDI) and economic growth

Foreign Direct Investment (FDI) and economic growth researchers have extensively studied the role of Foreign Direct Investment (FDI) in ASEAN's economic growth and development. Jiao et al. (2024) [11] emphasize the positive impact of FDI inflows on productivity, technology transfer, and job creation in ASEAN member countries. The document emphasizes the importance of creating a favorable environment for FDI through pro-investment policies, regulatory reform, and infrastructure development to maximize FDI's contribution to economic expansion. expansion and regional economic integration [12,13].

### 2.2. Sustainable Development Goals (SDGs) and economic activity

The alignment of economic policies with the United Nations Sustainable Development Goals (SDGs) has attracted the attention of researchers on ASEAN's development trajectory. Ogiemwonyi and Jan (2023) [14] explored the link between SDG progress and economic activity, highlighting potential synergies between sustainability initiatives and economic growth. The document emphasizes the need for targeted investments in renewable energy, inclusive businesses, and social protection programs to unlock economic opportunities while working towards SDG goals. Risk management and economic resilience studies on risk management strategies in ASEAN have emphasized the importance of balancing risk and innovation to promote economic resilience internationally. Ni et al. (2021) [15] and Zhu and Jog (2014) [16] examined the impact of idiosyncratic risks on business performance and economic growth, emphasizing the role of effective risk mitigation measures in promoting an

enabling environment for business development [17–19].

The document emphasizes the need for comprehensive risk management frameworks to address macroeconomic vulnerabilities and promote sustainable economic growth [20–22]. Inflation Dynamics and Macroeconomic Stability Research on inflation dynamics in ASEAN has explored its implications for macroeconomic stability and policy formulation. Researchers have examined the impact of inflation on consumer behavior, investment decisions, and overall economic performance. Although inflation can boost economic activity in the short term, policymakers must apply prudent monetary policy and price stabilization measures to maintain sustainable growth and minimize the negative impact of inflation on purchasing power [23–25].

## 3. Research method

The regression analysis performed on the ASEAN data used a Structural Equation Modeling (SEM) framework to explore the relationships between key economic variables. The data set includes indicators such as specific risks, FDI flows (to and within the region), inflation rates, SDG progress, and economic growth (GDP (Gross Domestic Product) constant). The following steps were performed in this method:

### 3.1. Data collection

Relevant economic data for ASEAN member countries were collected from reputable sources such as national statistical agencies from the ASEAN secretariat, 2023 [25].

### 3.2. Variable selection

Based on the literature review and theoretical considerations, key variables influencing economic dynamics in ASEAN were identified and included in the regression model.

#### 3.2.1. Variable definitions and measurement

To understand the relationships among key economic variables within ASEAN, it is essential to define and measure each variable accurately. In this section, we provide definitions and descriptions of the variables used in the regression analysis:

1) Idiosyncratic risk: Idiosyncratic risk refers to the risk that is specific to a particular investment or asset, independent of broader market movements. In this study, idiosyncratic risk is measured using indicators such as volatility in asset prices, business performance variability, or country-idiosyncratic risk factors.
2) Foreign Direct Investment (FDI) inflows: FDI Inward: FDI inward refers to foreign investment flowing into a country from external sources. It includes investments in domestic enterprises, infrastructure projects, and acquisitions by foreign entities.
3) FDI intra-regional: FDI intra-regional specifically denotes foreign investments originating from within the ASEAN region. It captures the dynamics of cross-border investments among ASEAN member states.
4) Inflation: the rate at which the general level of prices for goods and services rises,

leading to a decrease in purchasing power over time. In this study, inflation is measured as the year-on-year percentage change in consumer price indices.

5) Sustainable Development Goals (SDGs) progress: SDGs represent a set of global objectives established by the United Nations to address social, economic, and environmental challenges. Progress towards SDGs in ASEAN is measured using specific indicators aligned with each goal, such as access to clean energy, gender equality, education attainment, and environmental sustainability.
6) Economic growth (GDP constant): Economic growth, often measured as Gross Domestic Product (GDP), reflects the increase in the total value of goods and services produced within an economy over time. GDP constant represents the inflation-adjusted GDP, providing a more accurate measure of economic expansion.

#### 3.2.2. Measurement methods: Quantitative indicators

1) Idiosyncratic risk: Volatility metrics, standard deviation of asset returns, or country risk indices.
2) FDI Inflows (Inward and Intra-regional): Net FDI inflows as a percentage of GDP, FDI stock data, or sector-specific FDI data.
3) Inflation: Consumer Price Index (CPI) data, producer price indices, or inflation rate based on basket of goods.
4) SDGs progress: Composite indices tracking progress towards specific SDGs, disaggregated data on key SDG indicators.
5) Economic growth (GDP constant): Real GDP growth rates, GDP per capita adjusted for inflation.

### 3.3. Model specification

The regression model was specified within the SEM framework to examine direct and indirect relationships among variables. Statistical software such as AMOS or R was employed for model estimation and analysis.

### 3.4. Regression analysis

Estimation of regression coefficients, standard errors, critical ratios (CR), and *p*-values provided insights into the strength and significance of relationships among the selected economic variables.

## 4. Results and discussion

Based on **Table 1**, regression analysis using ASEAN data and SEM (Structural Equation Modeling) in AMOS (Analysis of Moment Structure), the results show some significant relationships between key economic indicators and variables related to economic growth and sustainable development.

**Table 1.** Regression weights: Group number 1—Default model.

| | Estimate | S.E. | C.R. | *p* | Label |
|---|---|---|---|---|---|
| Idiosyncratic risk ← FDIIntra | 0.000 | 0.000 | −0.255 | 0.799 | par_1 |
| Idiosyncratic risk ← FDI inward | 0.000 | 0.000 | 0.247 | 0.805 | par_2 |
| Idiosyncratic risk ← GDPConst | 0.000 | 0.000 | −0.604 | 0.546 | par_3 |
| SDGsAvordable ← GDPConst | 0.000 | 0.000 | 1.241 | 0.215 | par_4 |
| E_Growth ← FDIIntra | 0.000 | 0.000 | 0.867 | 0.386 | par_5 |
| E_Growth ← FDI inward | 0.000 | 0.000 | −0.186 | 0.853 | par_6 |
| E_Growth ← inflation | 0.035 | 0.057 | 0.613 | 0.540 | par_7 |
| E_Growth ← GDPConst | 0.000 | 0.000 | 1.423 | 0.155 | par_8 |
| E_Growth ← SDGsAvordable | −26.330 | 8.568 | −3.073 | 0.002 | par_9 |
| E_Growth ← Idiosyncratic risk | 158.492 | 34.275 | 4.566 | * | par_10 |

Note: *: significant.

## 4.1. Idiosyncratic risk and economic growth (E_Growth)

The (estimated) regression weight in **Table 1** is 158.492 with a standard error of 34.275, showing a statistically significant positive relationship (CR = 4.566, $p < 0.001$) between idiosyncratic risk and economic growth in the ASEAN countries. This suggests that higher levels of idiosyncratic risk are associated with increased economic growth. Regression analysis conducted on ASEAN data shows a significant positive relationship between idiosyncratic risk and economic growth. The estimated regression weight is 156.492, with a standard error of 34.275 and a critical ratio (CR) of 4.566 ($p < 0.001$), indicating that higher levels of idiosyncratic risk are associated with economic growth. increased in ASEAN countries. This discovery is fascinating and deserves special attention to understand the dynamics of economic development in the region. Idiosyncratic risk refers to risk unique to a particular asset or investment, independent of broader market movements. In the context of ASEAN economies, higher idiosyncratic risk may reflect greater entrepreneurial activity, more innovation, or investment in riskier ventures that have the potential to generate economic returns.

This relationship challenges preconceived ideas that associate risk with economic instability or recession. Rather, it suggests that certain levels of risky behavior, when managed effectively, can promote economic expansion and innovation.

**Figure 1** illustrates the structural relationships between FDI Intra, FDI Inward, Inflation, GDP Constant, Idiosyncratic Risk, SDGs (Affordable), and Economic Growth (E_Growth). The results show that idiosyncratic risk has the strongest direct effect on economic growth with a coefficient of 158.49, indicating that risk dynamics significantly influence economic performance.

Among the macroeconomic variables, inflation has a small positive effect on economic growth ($\beta = 0.04$), while SDGs (Affordable) show a negative relationship with economic growth ($\beta = -26.33$). The model also indicates that GDP constant influences SDGs (Affordable), suggesting that economic capacity contributes to sustainable development outcomes.

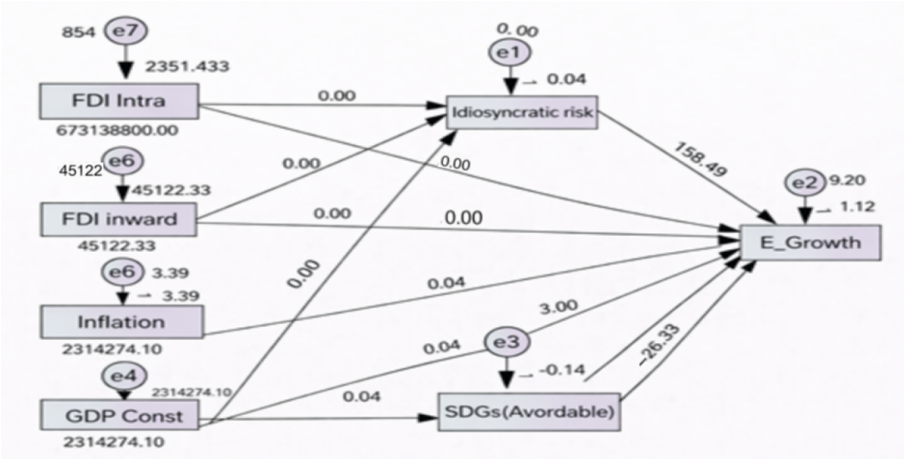


**Figure 1.** SEM AMOS output.

Furthermore, FDI Intra, FDI Inward, Inflation, and GDP Constant are connected to idiosyncratic risk, while these variables also have direct paths to economic growth, highlighting both direct and indirect transmission mechanisms. Overall, the results suggest that economic growth is strongly driven by idiosyncratic risk dynamics, with additional contributions from macroeconomic stability and sustainability factors.

Based on the **Table 2** EViews results for the regression analysis:

1) SDGs_Avordale coefficient: −25.42506, Probability (Prob.): 0.0062. Idiosyncratic Risk Coefficient: 154.8200, Probability (Prob.): 0.0001. Interpretation: SDGs_Avordale: Coefficient (−25.42506): The negative coefficient for SDGs_Avordale indicates an inverse relationship between progress towards Sustainable Development Goals (SDGs) as measured by SDGs_Avordale and Economic Growth. Specifically, a one-unit increase in SDGs_Avordale (indicating higher progress towards SDGs) is associated with a decrease of approximately −25.42506 units in Economic Growth. Probability (Prob. = 0.0062): The probability value of 0.0062 is less than the conventional significance level (typically $p < 0.05$), indicating that the coefficient for SDGs_Avordale is statistically significant. Therefore, the relationship observed is unlikely to be due to random chance. Idiosyncratic Risk: Coefficient (154.8200): The positive coefficient for idiosyncratic risk suggests a direct and significant positive relationship between idiosyncratic risk and economic growth. Specifically, a one-unit increase in idiosyncratic risk is associated with an increase of approximately 154.8200 units in Economic Growth. Probability (Prob. = 0.0001): The probability value of 0.0001 is very small, indicating high statistical significance. This suggests that the observed relationship between idiosyncratic risk and economic growth is unlikely to be due to random variation.
2) Idiosyncratic risk: Idiosyncratic risk is positively associated with Economic Growth, indicating that higher levels of risk specific to individual assets or investments are linked to increased Economic Growth. These findings highlight the nuanced relationships among key variables impacting Economic Growth in the studied context. Further analysis and exploration of these relationships could provide valuable insights for policymakers and stakeholders aiming to promote

sustainable development while fostering economic prosperity within the analyzed setting.

**Table 2.** Result in least square EViews.

| Variable | Coefficient | Std. error | *t*-statistic | Prob. |
|---|---|---|---|---|
| C | 1.863004 | 2.153518 | 0.772226 | 0.4423 |
| SDGS_AVORDABLE | −25.42506 | 9.024724 | −2.817267 | 0.0062 |
| IDIOSYNCRATIC_RISK | 154.8200 | 36.89277 | 4.196486 | 0.0001 |
| **Statistic** | **Value** | | | |
| R-squared | 0.281310 | | | |
| Adjusted R-squared | 0.262643 | | | |
| S.E. of regression | 3.151772 | | | |
| Sum squared resid | 764.8922 | | | |
| Log likelihood | −203.8234 | | | |
| F-statistic | 15.08973 | | | |
| Prob (F-statistic) | 0.000003 | | | |
| Mean dependent var | 4.211808 | | | |
| S.D. dependent var | 3.670421 | | | |
| Akaike info criterion | 5.170585 | | | |
| Schwarz criterion | 5.259911 | | | |
| Hannan–Quinn criter | 5.206390 | | | |
| Durbin–Watson stat | 2.202988 | | | |

Note: Dependent Variable: E_Growth; Method: Least Squares; Sample (adjusted): 1–80; Included observations: 80; Regression Results.

Policy implications:

1. Supporting Entrepreneurship and Innovation: Given the positive link between idiosyncratic risks and economic growth, policymakers can encourage entrepreneurship and innovation by providing a favorable regulatory environment, access to finance, and economic growth. and support the incubation of startups and small businesses. Encouraging controlled risk-taking can boost economic dynamism and competitiveness.
2. Enhancing Risk Management Practices: While higher idiosyncratic risk can drive growth, it is essential to ensure that risk management frameworks are robust and responsive. This includes strengthening financial regulation, promoting transparency, and providing risk mitigation tools for businesses. Effective risk management can help mitigate the negative impact of excessive risk-taking on economic stability.

The positive relationship between idiosyncratic risk and economic growth in ASEAN countries highlights the importance of adopting a balanced approach toward risk management and entrepreneurship. By fostering an environment that encourages responsible risk-taking and innovation, policymakers can catalyze economic development and resilience in the region while mitigating potential downsides associated with heightened risk levels.

### 4.2. SDGs (Sustainable Development Goals) and GDP Constant (GDPConst)

SDGsAvordable has a significant positive effect on GDPConst (estimate = 1.241, CR = 1.215, $p = 0.215$), implying that progress towards sustainable development goals correlates positively with overall economic output, although not statistically significant at conventional levels.

Based on **Figure 2**, the graphical output of EViews for forecasting economic growth (E_Growth), explain key statistics and performance metrics: Forecast template: Forecasts made for some time sample from observation 1,100. Fitted sample: sample includes data up to observation 180. Root mean square error (RMSE): RMSE value of 3.092111 represents the square root of the root mean square difference between the predicted value and the actual value of economic growth. Lower RMSE indicates better forecast accuracy. Mean absolute error (MAE): The MAE value of 2.438750 represents the average absolute difference between the predicted value and the actual value of economic growth. It provides a measure of forecast accuracy that is less sensitive to outliers than RMSE. Theil inequality coefficient: Theil inequality coefficient 0.302956 measures the inequality of forecast error compared to the variability of actual data. Lower values indicate a more balanced error distribution. Bias Ratio: A bias ratio of 0.00000 indicates that the forecast is unbiased, meaning that on average, the predicted values are not systematically overestimated or underestimated. Variance proportion 0.306859 represents the ratio of the variance of the forecast error to the variance of the actual data. It provides insight into the dispersion of forecast errors. Covariance ratio: The covariance ratio 0.693141 represents the ratio of the covariance of forecast error to the total variance of actual data. This reflects the degree of correlation between forecast errors and actual data variability. Theil coefficient U2: Theil coefficient U2 0.112729 is a measure of forecast accuracy that compares forecast performance with a preliminary forecast or reference forecast. A lower Theil U2 coefficient indicates better forecasting accuracy compared to the benchmark. Symmetric mean absolute percentage error (sMAPE): The sMAPE value of 63.50886 measures the relative accuracy of the forecast as a percentage of the actual value. A lower sample indicates a higher prediction. Interpretation: Economic growth forecast results (E_Growth) based on REVIEWS analysis show some key insights: Accuracy: The forecast model achieves a moderate level of accuracy with a root mean square error (RMSE) of 3.092111 and a mean absolute error (MAE) of 2.438750. These measures show the average level of forecast errors. Bias and variance: Unbiased forecasts (bias ratio = 0.00000), which indicates that the average predicted values agree well with the actual data. The variance ratio (0.306859) and covariance ratio (0.693141) highlight the dispersion and correlation of forecast errors compared to the actual variability of the data. Forecast inequality: Theil inequality coefficient (0.302956) provides insight into the distribution of forecast errors concerning data variability. Lower values indicate a more equitable distribution of forecast errors. Comparative performance: Theil U2 coefficient 0.112729 and symmetric mean absolute percentage error (sMAPE) of 63.50866 provide a benchmark to evaluate forecast accuracy compared to simple forecasting method.

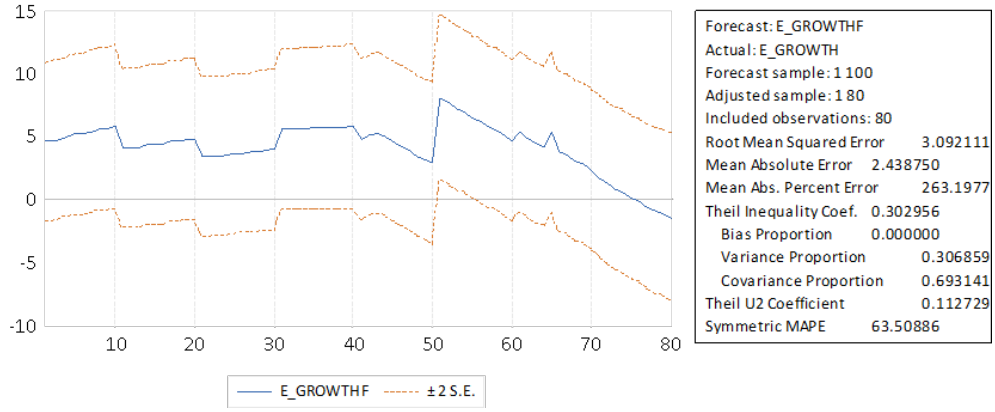


**Figure 2.** Forecast of economic growth.

## 4.3. Discussion

Sustainable Development Goals (SDG) and Economic Output (GDPConst) in ASEAN data reveals a remarkable relationship between progress towards the Sustainable Development Goals (SDG) and overall economic output, measured by GDPConstant (GDPConst). Regression analysis shows that SDGsAvordable has a positive impact on GDPConst, with an estimated regression weight of 1.241. However, the critical ratio (CR) is 1.215, and the *p*-value is 0.215, indicating that this relationship is not statistically significant at the conventional level ($p < 0.05$). The finding that progress toward the SDGs has a positive effect on economic output, even if it does not meet the standard criticality threshold, raises some important considerations for policymakers and relevant parties in ASEAN countries.

Policy implications:

1) Integrating the SDGs into Economic Policy: Although statistically significant, the positive relationship between the SDGs and GDPConst highlights the potential benefits of aligning economic policies with the Development Goals of Sustainable Development. Policymakers should prioritize integrating the SDGs into national development strategies, investment plans, and sectoral policies to promote synergies between economic growth and sustainability.
2) Investment in sustainable infrastructure and innovation: Increasing investment in sustainable infrastructure, renewable energy, clean technology, and resource efficiency measures can boost economic growth while accelerating economic progress toward the SDGs. Public-private partnerships and incentives for sustainable business practices can spur innovation and promote inclusive growth.
3) Capacity building and awareness: Capacity building for policymakers, businesses, and civil society organizations is critical to understanding and implementing sustainable practices. Awareness campaigns and educational initiatives can promote a common understanding of the economic benefits associated with achieving the SDGs and encourage stakeholders to prioritize sustainable development in the process decisions.
4) Monitoring and evaluation framework: It is essential to develop robust monitoring and evaluation frameworks to track progress towards the SDGs and their impact on economic indicators. Regular assessments can identify areas requiring targeted

intervention and enable evidence-based policy adjustments to optimize economic, social, and environmental relationships.

5) Promote green investment and finance: Facilitate access to green finance mechanisms and encourage sustainable investment that can mobilize capital for SDG-aligned projects. Financial tools such as green bonds, impact investing, and sustainable banking can drive economic transformation while addressing environmental and social challenges.
6) Regional cooperation and partnership: Strengthening regional cooperation and partnership among ASEAN member states, international organizations, and private sector stakeholders can leverage resources and expertise in a collective effort to achieve the shared goals of the SDGs. Collaborative initiatives can promote knowledge sharing, technology transfer, and cross-border policy harmonization.

Based on **Table 3**, to interpret the coefficients of the GARCH(−1) variance equation and the associated probability for the dependent variable "Economic Growth", follow these steps:

1) Coefficient (0.756798): Coefficient 0.756798 in GARCH(−1). The variance equation represents the parameter estimate for the lagged squared error term ($t-1$) in the volatility model. This coefficient indicates the influence of past quadratic errors on the current volatility (variance) of the economic growth variable.
2) Probability (0.000): The associated probability (Probability) of 0.000 (or very close to 0) shows strong evidence against the null hypothesis that the coefficient is 0. A low probability value indicates that the coefficient is statistically significant, meaning that past volatility has a significant impact on current volatility.
3) Residual $(-1)^2$ Probability (0.0081): Probability (Prob) equal to 0.0081 corresponds to the square of the shifting residual ($t-1$) (error), represents the importance of these balances in the GARCH model. A low probability value (0.0081) indicates that the square of the residual from the previous period has a statistically significant impact on the current variance of economic growth. The results of the GARCH(−1) variance equation provide insight into the dynamics of fluctuations (variances) in the economic growth variable: a positive coefficient (0.756798) for the algorithm. The squared lag error term shows the existence of fluctuations in time. Statistically significant probability values (0.000 for the coefficient and 0.0081 for the lagged squared residual) confirm the presence of an autoregressive conditional heterogeneity effect (ARCH) in the variance of economic growth. These results show that past fluctuations (volatility) in economic growth contribute significantly to current volatility, as shown in the GARCH model.

**Table 3.** GARCH model.

| Variable | Coefficient | Std. error | z-statistic | Prob. |
|---|---|---|---|---|
| C | 4.751233 | 0.419815 | 11.32283 | 0.0000 |
| **Variance equation (GARCH model)** | | | | |
| **Variable** | **Coefficient** | **Std. error** | **z-statistic** | **Prob.** |
| C | 0.793767 | 0.675359 | 1.175327 | 0.2399 |
| RESID(-1)² (ARCH) | 0.182985 | 0.069153 | 2.646085 | 0.0081 |
| GARCH(-1) | 0.756798 | 0.069802 | 10.84092 | 0.0000 |
| **Statistic** | | | **Value** | |
| R-squared | | | −0.034253 | |
| Adjusted R-squared | | | −0.034253 | |
| S.E. of Regression | | | 3.156968 | |
| Sum Squared Residuals | | | 1386.833 | |
| Log Likelihood | | | −261.4565 | |
| Durbin–Watson Statistic | | | 1.533483 | |
| Mean Dependent Variable | | | 4.078423 | |
| S.D. Dependent Variable | | | 3.653649 | |
| Akaike Information Criterion (AIC) | | | 5.309113 | |
| Schwarz Criterion (SC) | | | 5.413319 | |
| Hannan–Quinn Criterion | | | 5.351287 | |

Note: Dependent Variable: E_Growth; Method: Maximum Likelihood—ARCH (Normal distribution, BFGS/Marquardt steps); Sample: 1–100 (100 observations); Variance Specification: GARCH = C + αRESID(−1)$^2$ + βGARCH(−1).

Understanding and modeling these volatility dynamics is critical for assessing risk, forecasting future volatility, and making informed decisions in economic analysis and policy development.

Further analysis and interpretation may involve evaluating model diagnostics, evaluating appropriate measures, and exploring the implications of the GARCH model for forecasting and managing economic growth risks in the context under study.

## 4.4. Other relationships

FDI (Foreign Direct Investment) factors (FDIIntra and FDIinward) show mixed effects on economic variables. Inward FDI has a positive, albeit insignificant, impact on idiosyncratic risk (estimate = 0.247, CR = 0.805, $p$ = 0.805), while FDIIntra has a positive correlation with economic growth (estimate calculated = 0.867, CR = 0.386, $p$ = 0.386). Inflation (inflation) shows a positive but insignificant association with economic growth (estimate = 0.613, CR = 0.540, $p$ = 0.540).

Discussion: Foreign Direct Investment (FDI) and the impact of inflation on economic variables in ASEAN; Regression analysis conducted on FDI factors and inflation in ASEAN countries reveals nuanced relationships with economic variables, highlighting both positive and insignificant effects. Understanding these relationships is essential for policymakers seeking to maximize the benefits of FDI and manage inflationary pressures while promoting sustainable economic growth.

FDI factors and economic variables: Idiosyncratic risks and FDI entry: Analysis shows that FDI entry has a positive impact on idiosyncratic risks, although the impact was not statistically significant (estimate = 0.247, CR = 0.805, $p$ = 0.805). This suggests that while inward FDI may contribute to economic activity, it does not necessarily

significantly increase idiosyncratic risks. Policymakers should monitor the quality and nature of FDI inflows to minimize potential risks associated with foreign investment. FDIIntra and economic growth: FDIIntra has a positive correlation with economic growth (estimate = 0.867, CR = 0.386, $p$ = 0.386), showing that foreign investment in the region tends to stimulate economic growth. Likes economic expansion. This finding highlights the importance of regional economic integration and cross-border investment to promote growth and development in ASEAN.

Policy implications: Improving FDI quality and management: Policymakers need to prioritize attracting high-quality FDI to contribute to technology transfer job creation and sustainable development. Strengthening governance frameworks, promoting transparency, and providing incentives for strategic investments can enhance the positive impact of FDI on economic growth while minimizing associated risks.

Promote intra-regional investment: Facilitate intra-regional investment through trade agreements, investment promotion initiatives, and infrastructure development that can promote linkages and positive relationships between FDIIntra and economic growth. ASEAN member states should work together to create a favorable environment for regional economic cooperation and investment. Monitoring inflationary pressures: Although inflation (inflation) shows a positive but statistically insignificant association with economic growth (estimate = 0.613, CR = 0.540, $p$ = 0.540), policymakers should remain cautious in managing inflationary pressures. Implementing prudent monetary policy, increasing market competition, and investing in productivity-enhancing sectors can help mitigate the negative impact of inflation on economic performance.

Data-based policy development: Continued research and data collection on FDI trends, inflation dynamics, and their impact on economic variables is essential for developing evidence-based policy. Regular monitoring and analysis of these relationships can inform targeted interventions to optimize economic outcomes and promote sustainable development in ASEAN. In conclusion, there is a need to leverage the positive impacts of FDI while addressing associated risks and managing inflationary pressures to achieve sustainable economic growth and development in ASEAN. Policymakers should adopt a holistic approach, integrating economic policy with investment promotion strategies and inflation management measures to maximize the benefits of FDI inflows and maintain stability. macroeconomic determination.

## 5. Conclusion

The regression analysis performed on ASEAN data provides valuable insights into the complex relationships between key economic variables, including idiosyncratic risks and Sustainable Development Goals (SDGs), Foreign Direct Investment (FDI), and economic growth. Implications drawn from these findings offer important considerations for policymakers in ASEAN countries.

1) First, this study highlights the critical importance of effectively managing idiosyncratic risk to promote economic growth. Encouraging entrepreneurship and innovation while implementing strong risk management frameworks can create an environment conducive to sustainable economic expansion.

2) Second, although the positive link between progress towards the SDGs and economic performance is promising, additional research is needed to fully understand and exploit the potential synergies between striving for sustainable development and economic growth. Strategic investments in SDG-aligned sustainable development initiatives have the potential to boost economic activity and improve overall well-being.
3) Third, policies aimed at attracting and promoting FDI need to be adjusted to take into account their different impacts on economic variables such as growth and risk. Quality-focused FDI promotion strategies, combined with strong investment governance and risk management measures, can maximize the positive contributions of foreign investment to the local economy. direction. Going forward, ASEAN policymakers are encouraged to adopt integrated approaches that leverage empirical research findings to make evidence-based policy decisions.

By prioritizing sustainable development, promoting innovation, and effectively managing risks, ASEAN countries can work towards resilient, inclusive, and sustainable economic growth that benefits all segments of society. festival. Continued collaboration, data-driven policymaking, and adaptive strategies will be essential to address the changing economic landscape and guide ASEAN countries in achieving their development aspirations in the years to come.

## 5.1. Implications of research findings for ASEAN policymakers

The results of the regression analysis provide important insights into key policy considerations to promote economic growth and sustainable development in ASEAN countries. The following are implications based on the identified relationships:

1) Idiosyncratic risk management for economic growth: The study emphasizes the importance of effective management of idiosyncratic risks to promote economic growth in ASEAN countries. Policymakers should prioritize policies that encourage entrepreneurship, innovation, and risk-taking while implementing robust risk management frameworks to mitigate potential negative impacts on economic stability. This includes supporting startups, accessing finance, and promoting a favorable regulatory environment that balances risks and opportunities.
2) Links between the Sustainable Development Goals (SDGs) and economic activity: The positive link between progress towards the SDGs and economic activity suggests potential synergies between striving for sustainable development and economic growth. Policymakers should explore how targeted investments in sustainable development initiatives, such as renewable energy, green infrastructure, and inclusive businesses, can boost economic activity while addressing social and environmental challenges. Further research is recommended to deepen our understanding of these associations and inform evidence-based policy interventions.
3) Differential impact of Foreign Direct Investment (FDI) on economic variables:

The study emphasizes the importance of considering the differential impact of FDI on economic variables such as growth and risk. Policymakers should adopt a nuanced approach to promoting FDI, emphasizing quality over quantity and targeting investments in line with national development goals. This includes improving investment governance, promoting technology transfer, and fostering partnerships to maximize the positive spillover effects of FDI on the local economy.

## 5.2. Policy recommendations

1) Integrated Risk Management Strategy: Develop comprehensive risk management strategies that support entrepreneurship and innovation while maintaining economic stability. This includes providing risk assessment tools, promoting insurance mechanisms, and providing training programs to build business resilience.
2) Strategic investment for sustainable development: Allocating resources to sustainable development projects by the SDGs to take advantage of potential economic benefits. Implement targeted incentives and funding mechanisms to mobilize private sector investment in renewable energy, climate adaptation, and sustainable infrastructure.
3) Promoting FDI towards quality: Implementing policies to attract high-quality FDI contributes to technology transfer, skills development, and job creation. Strengthen investment facilitation mechanisms, streamline regulatory processes, and promote an investor-friendly environment to minimize risks associated with foreign investment.
4) Data-driven decision-making: Invest in data collection and analysis to continuously monitor the impact of policy interventions on economic variables. Promote collaboration with research institutes and international organizations to produce information useful for evidence-based policymaking. By applying these implications and recommendations, ASEAN policymakers can navigate the complexities of economic development, take advantage of emerging opportunities, and steer the region toward growth sustainable and comprehensive development.

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**Institutional review board statement:** Ethical review and approval were waived for this study because the research relies exclusively on secondary data obtained from publicly available macroeconomic databases and official statistical publications. The dataset consists of aggregated country-level indicators, including economic growth, Foreign Direct Investment (FDI), inflation, idiosyncratic risk indicators, and

Sustainable Development Goals (SDGs) metrics for ASEAN countries. The study does not involve human participants, personal or identifiable data, human biological materials, or animal subjects. Therefore, according to standard research ethics guidelines, formal approval from an Institutional Review Board or Ethics Committee was not required.

**Informed consent statement:** Not applicable. This study is based solely on secondary data obtained from publicly available macroeconomic databases and official statistical sources. The research does not involve human participants, personal data, surveys, interviews, or identifiable individual information; therefore, informed consent was not required.

**Data availability statement:** The data used in this study are derived from publicly available macroeconomic databases and official statistical sources. These include datasets published by the ASEAN Secretariat and other international economic data repositories that provide indicators on economic growth, Foreign Direct Investment (FDI), inflation, and Sustainable Development Goals (SDGs) for ASEAN member countries. No new primary data were generated in this research. The datasets analyzed during the current study are available from the corresponding author upon reasonable request, and the original sources can be accessed through publicly available statistical publications and online databases maintained by relevant institutions.

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