Dynamic Causal Relationship Between Human Development Index and GRDP: Evidence from Aceh, Indonesia

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ABSTRACT
Purpose – This study examines the dynamic causal relationship between the Human Development Index (HDI) and Gross Regional Domestic Product (GRDP) in Aceh Province, Indonesia.
Design/methodology/approach – Annual time-series data for 2014–2023 were analyzed using the Vector Autoregression (VAR) and Vector Error Correction Model (VECM) approaches. The analysis included ADF unit root, cointegration, Granger causality, Impulse Response Function, and Variance Decomposition tests.
Findings – The results reveal a bidirectional causal relationship between HDI and GRDP. Improvements in human development stimulate economic growth, while economic growth contributes to higher levels of human development.
Research limitations/implications – The study is limited by a short observation period and focuses only on Aceh Province and two variables, namely HDI and GRDP.
Practical implications – Policymakers should integrate economic and social development strategies by strengthening investments in education, healthcare, infrastructure, and productive sectors.
Originality/value – This study contributes empirical evidence on the dynamic interaction between HDI and GRDP in Aceh using a VAR/VECM framework, providing insights for context-specific regional development policies.

Keywords: Islamic Financial Literacy; Islamic Investment Products; Financial Inclusion; Logistic Regression.
Paper type: Research paper

I. INTRODUCTION

Economic development is no longer solely measured by increases in output or income growth, but also by the extent to which such development improves the quality of life of the community. One indicator widely used to measure the quality of human development is the Human Development Index (HDI), which encompasses dimensions of health, education, and a decent standard of living. Meanwhile, Gross Regional Domestic Product (GRDP) is used as the primary indicator to measure a region's economic performance and growth (Djadjuli, 2022).

Aceh Province has unique development characteristics compared to other regions in Indonesia. Its special autonomy status, substantial fiscal transfer funds, and post-conflict and tsunami disaster conditions make Aceh an interesting region to study. Although Aceh's GRDP tends to increase from year to year, this increase is not always accompanied by a commensurate improvement in the HDI. This raises questions about the extent to which economic growth can drive human development, and vice versa. (Zulkarnain, 2024).

Understanding the causal relationship between the HDI and GRDP is crucial for formulating effective regional development policies. If human development is proven to drive economic growth, then investment in the education and health sectors should be a top priority.

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Conversely, if economic growth is proven to have a more dominant influence on the Human Development Index (HDI), then economic policies oriented towards increasing regional output and income need to be strengthened. Theoretically, increasing GRDP is expected to drive sustainable improvements in the quality of human development (Syahzuni, 2018).

Table 1.1
GRDP and HDI

Years	GRDP	HDI
2014	49.72	78.04
2015	39.89	77.57
2016	39.60	77.31
2017	40.56	77.30
2018	41.60	76.62
2019	43.56	76.34
2020	47.05	75.78
2021	49.34	75.11
2022	52.91	74.44
2023	53.60	74.13

Source: Processed by the Author, (2025).

However, the data in Table 1.1 indicates a misalignment between GRDP and the HDI during the 2014–2023 period. On the one hand, GRDP tends to increase in the medium to long term, particularly from 2016 to 2023, with the GRDP value increasing from 39.60 in 2016 to 53.60 in 2023. This indicates an improvement in regional economic performance during this period. On the other hand, the HDI value shows a consistent downward trend throughout the observation period. The HDI was recorded at 78.04 in 2014 and continued to decline, reaching 74.13 in 2023. This condition reflects that the increase in economic activity reflected in GRDP has not been fully accompanied by improvements in the quality of human development (Ramadhani et al., 2025).

This phenomenon indicates a structural problem in the development process, where economic growth has not optimally translated into improvements in public welfare. This lack of synchronicity between GRDP and HDI raises important questions about the direction and strength of the relationship between economic growth and human development, and how the dynamics of both evolve in the short and long term. Based on this background, an empirical study is needed that can analyze the dynamic relationship between GRDP and HDI, not only from a static correlation perspective but also from the perspective of causality and inter-variable responses. Therefore, this research is crucial in examining the relationship between GRDP and HDI using a dynamic econometric approach, thereby providing a more appropriate policy basis for promoting inclusive economic development oriented toward improving the quality of life of the community.

II. LITERATURE REVIEW

2.1 Human Development Index

The Human Development Index (HDI) is a composite index that measures average achievements in three basic dimensions of human development: a long and healthy life, knowledge, and a decent standard of living. The HDI is widely used as an alternative indicator to income-based development measures (Mailadani & Rosintan, 2024).

2.2 Gross Regional Domestic Product

Gross Regional Domestic Product (GDP) represents the total value added of goods and services produced within a region during a specific period. GDP is commonly used to measure regional economic growth and economic performance (Kesuma et al., 2024).

2.3 The Relationship Between Human Development and Economic Growth

Endogenous growth theory emphasizes the role of human capital as a key driver of economic growth. Higher levels of education and health increase labor productivity, which in turn stimulates economic output. Conversely, economic growth provides governments with greater fiscal capacity to invest in education, health, and social infrastructure, thereby enhancing human development (Wulandari & Robertus, 2023). Human development and economic growth are closely interconnected and reinforce one another in a bidirectional relationship. Endogenous growth theory emphasizes the role of human capital as a key driver of long-term economic growth. Higher levels of education and health improve workers' knowledge, skills, creativity, and productivity, thereby increasing labor efficiency, technological innovation, and overall economic output. A healthier and better-educated workforce is also more adaptable to technological changes and capable of generating sustainable productivity gains, which contribute to higher national income and long-run economic development. Conversely, economic growth provides governments with greater fiscal capacity to invest in education, healthcare, public services, and social infrastructure, thereby enhancing human development (Wulandari & Robertus, 2023).

2.4 Previous Studies

Previous empirical studies have reported mixed results regarding the causal relationship between human development and economic growth. Some studies found a unidirectional causality from economic growth to human development, while others identified a bidirectional or reverse causality, depending on regional characteristics and methodological approaches (Ruchba & Asynur, 2023).

III. METHODS

This study uses annual time series secondary data for Aceh Province. The Human Development Index (HDI) data was obtained from the Indonesian Central Statistics Agency (BPS), while the Gross Regional Domestic Product (GDP) data was sourced from the Aceh Province Statistics Office and measured at constant prices to avoid inflation bias. The period covered was 2014 to 2023 (Dewa et al., 2021). The empirical analysis was conducted using a Vector Autoregression (VAR) framework. All data processing and estimation procedures were performed using EViews software. The methodological steps are as follows.

3.1 Extended Dickey-Fuller (ADF) Test for HDI

The Extended Dickey-Fuller (ADF) test is applied to the HDI series to check for the presence of a unit root. This test determines whether the HDI variable is stationary at a level or requires differentiation. The null hypothesis states that the series contains a unit root, while the alternative hypothesis indicates stationarity (Permatasari et al., 2022).

3.2 Extended Dickey-Fuller (ADF) Test for GRDP

Similarly, the ADF test is performed on the GRDP series to assess its stationarity properties. If the GRDP variable is found to be non-stationary at level but stationary after the first differentiation, then it is classified as a first-order integrated series, I (1) (Permatasari et al., 2022).

3.3 Selection of Optimal Lag Length

After ensuring the stationarity of the variables, the optimal lag length for the VAR model is determined using several information criteria, including the Akaike Information Criterion (AIC), the Schwarz Criterion (SC), and the Hannan-Quinn Criterion (HQ). The lag length that minimizes these criteria is selected as the optimal lag (Halim et al., 2024).

3.4 VAR Stability Test

The stability of a VAR model is evaluated by examining the roots of the characteristic polynomial. A VAR model is considered stable if all its roots lie within the unit circle. Stability is crucial for ensuring the validity of impulse response analysis and variance decomposition (Rakhmawati, 2024).

3.5 Granger Causality Test

The Granger causality test is used to identify the direction of causality between HDI and GRDP. This test examines whether past values of one variable contain information that helps predict current values of another variable (Fatin Dzahabiy et al., 2025).

3.6 Analysis of Impulse Response Function

Impulse Response Function (IRF) analysis is used to observe the dynamic response of the HDI to shocks in the GRDP and vice versa over time. This analysis provides insight into the magnitude and persistence of shock effects in a VAR system (Monika, 2017).

3.7 Variance Decomposition Analysis

Variance decomposition analysis was conducted to measure the contribution of shocks to each variable to the forecast error variance of other variables. This study presents variance decomposition results for GRDP and HDI separately to understand the relative importance of each variable in explaining fluctuations over time (Tarape & Yusuf, 2025).

IV. RESULT AND DISCUSSIONS

4.1 Augmented Dickey-Fuller (ADF) Test Results

The Augmented Dickey-Fuller (ADF) test was applied to check the stationarity of the HDI and GRDP variables. The results show that both variables are not stationary at level but become stationary after the first differentiation, which means that HDI and GRDP are integrated of order one, I(1). (Permatasari et al., 2022).

Null Hypothesis: IPM has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.585493	0.0433
Test critical values:	1% level	-4.004425	
	5% level	-3.098896	
	10% level	-2.690439	

Table 4.1 Augmented Dickey-Fuller Value of HDI Statistics

Source: Processed by the Author (2025)

Based on Table 4.1, it can be seen that the ADF statistical value of the Human Development Index (HDI) variable is –1.585493. This value is greater than the critical value at the 1%, 5%, and 10% significance levels,which are –4.004425, –3.098896, and –2.690439, respectively. Thus, the null hypothesis stating that the HDI contains a unit root cannot be rejected, so it can be concluded that the HDI variable is not stationary at the level.

Before proceeding with further econometric analysis, it is essential to examine the stationarity of each variable included in the study. The stationarity test determines whether the time-series data contain a unit root, which is a fundamental requirement for selecting the appropriate estimation technique and avoiding spurious regression results. In this study, the Augmented Dickey-Fuller (ADF) test is employed at the level form with a constant specification, while the optimal lag length is determined based on the Schwarz Information Criterion (SIC). The results of the ADF unit root test for the Gross Regional Domestic Product (GRDP) variable are presented in Table 4.2.

Null Hypothesis: PDRB has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.338893	0.0054
Test critical values:	1% level	-4.004425	
	5% level	-3.098896	
	10% level	-2.690439	

Table 4.2 Augmented Dickey-Fuller Value of HDI Statistics

Source: Processed by the Author (2025).

Based on Table 4.2, the ADF statistic value for the Gross Regional Domestic Product (GRDP) variable is –0.338893. This value is greater than the critical values at the 1%, 5%, and 10% significance levels, which are –4.004425, –3.098896, and –2.690439, respectively. Therefore, the null hypothesis stating that GRDP contains a unit root cannot be rejected, and it can be concluded that the GRDP variable is non-stationary at the level.

4.2 Selecting the Optimal Lag Length

The optimal lag length was determined using the Akaike Information Criterion (AIC), the Schwarz Criterion (SC), and the Hannan-Quinn Criterion (HQ). The results indicate that lag 2 is optimal and is therefore used in subsequent VAR estimations. (Halim et al., 2024).

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-67.01681	NA	140.1657	10.61797	10.70489	10.60011
1	-33.27150	51.91586*	1.466598*	6.041769*	6.302515*	5.988174
2	-29.31455	4.870089	1.577809	6.048393	6.482969	5.959068*

Table 4.3 Optimum Lag Test Results

Source: Processed by the Author (2025)

Based on Table 4.3, it can be seen that lag 1 is recommended as the optimal lag because it is selected by most of the criteria, namely LR, FPE, AIC, and SC, which is marked with the minimum value and an asterisk (*). Although the HQ criteria recommends lag 2, overall lag 1 is more dominant and efficient, so lag 1 is determined as the optimal lag length and used in further analysis.

4.3 VAR Stability Test Results

The VAR stability test is a crucial prerequisite before proceeding to dynamic analyses such as the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD). A stable VAR model indicates that the effects of shocks diminish over time and eventually converge to a long-run equilibrium, ensuring that the estimated relationships among variables are not explosive or unstable. Consequently, the impulse response analysis accurately reflects the dynamic

interactions among the variables, while the variance decomposition provides reliable estimates of the relative contribution of each shock to fluctuations in the endogenous variables. Therefore, the confirmation that all characteristic roots lie within the unit circle validates the robustness of the estimated VAR model and supports the reliability of subsequent VECM-based dynamic analyses (Rakhmawati, 2024).

In addition, the stability of the VAR model implies that the estimated coefficients remain consistent over the sample period, indicating that the dynamic relationships among the variables are structurally reliable. This condition is particularly important in macroeconomic studies, where policy changes and external shocks may affect the behavior of economic variables over time. A stable model minimizes the risk of generating misleading forecasts and biased policy implications, thereby strengthening the credibility of the empirical findings. Consequently, the confirmed stability of the VAR model provides a solid econometric foundation for interpreting both the short-run and long-run interactions among human development, economic growth, and other variables included in the VECM framework.

Table 4.4
VAR Stability Test Results

Root	Modulus
0.116249	0.116249
0.803539	0.803539
0.091361 - 0.449044i	0.458244
0.091361 + 0.449044i	0.458244

Source: Processed by the Author (2025)

Based on Table 4.4, it can be seen that all root modulus values are below one (root < 1), namely 0.116249; 0.803539; and 0.458244 for complex root pairs, respectively. Thus, it can be concluded that the estimated VAR model meets the stability requirements and is therefore suitable for further analysis, including short-term dynamic analysis and causality testing.

4.4 Granger Causality Test Results

The Granger causality test was conducted to identify the direction of causality between HDI and GRDP. The results indicate bidirectional causality between the two variables.

Table 4.5
Uji Kausalitas Granger

Pairwise Granger Causality Tests
Date: 08/12/25 Time: 09:49
Sample: 2010 2024
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PDRB does not Granger Cause IPM	13	3.29760	0.0903
IPM does not Granger Cause PDRB		5.19859	0.0358

Source: Processed by the Author (2025)

Based on Table 4.5, it can be seen that the null hypothesis stating that GRDP does not Granger-influence HDI cannot be rejected because the probability value is 0.0903, which is greater than the 5% significance level. However, at the 10% significance level, the relationship is significant. Conversely, the null hypothesis stating that HDI does not Granger-influence GRDP is rejected because the probability value is 0.0358, which is less than the 5% significance level. This indicates that HDI Granger-influence GRDP.

Thus, the results of the Granger causality test indicate a unidirectional causal relationship from HDI to GRDP, while the causal relationship from GRDP to HDI is not found to be significant at the 5% significance level.

4.5 Impulse Response Function Analysis

Impulse Response Function (IRF) analysis indicates that a one-standard-deviation shock to GRDP causes a positive response in the HDI, which persists over the medium term. Similarly, shocks to HDI produce a positive response to GRDP, indicating a mutually reinforcing relationship. (Monika, 2017).

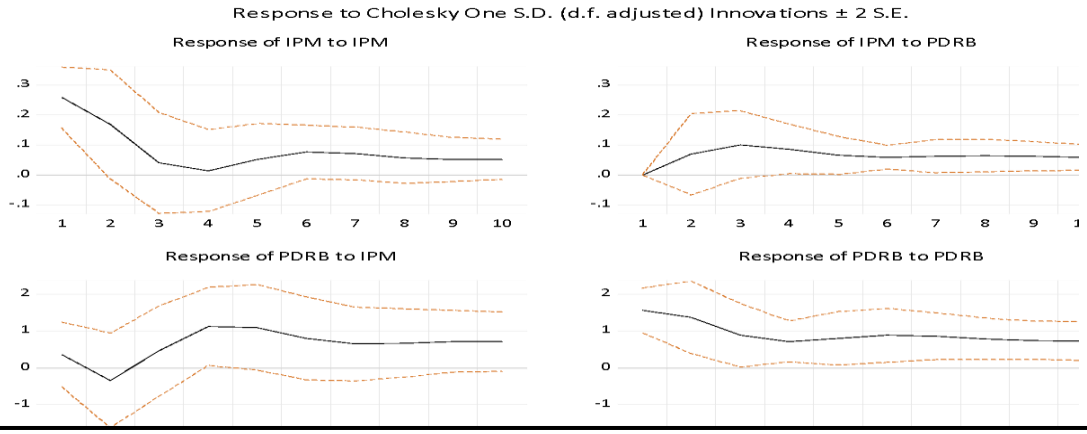

Figure 4.1 Impulse Response Test Results.

Source: Processed by the Author (2025)

Figure 4.1 shows that the IRF indicates that the HDI response to shocks to the HDI itself is positive in the initial period and tends to fluctuate before eventually stabilizing. This indicates a gradual internal adjustment effect of the HDI before returning to long-term equilibrium. Furthermore, the HDI response to shocks to the GRDP in the initial period shows positive fluctuations, which then decline and stabilize in the subsequent period. This finding suggests that shocks to economic growth impact the HDI, but these effects are temporary and weaken over the long term. Meanwhile, the GRDP response to shocks to the HDI shows a positive response after the initial period, before tending to stabilize. This indicates that improvements in the quality of human development contribute to regional economic growth, although the impact is not immediate.

The GRDP response to shocks to the GRDP itself exhibits a fluctuating pattern in the initial period, but gradually converges toward equilibrium. This pattern confirms the stability of the estimated VAR system, where any shocks will subside over the long term. Overall, the IRF results demonstrate that both human development and economic growth exhibit dynamic interactions characterized by short-run fluctuations before converging toward long-run equilibrium. The responses indicate that shocks affecting either variable are not permanent but gradually dissipate over time, reflecting the self-correcting mechanism of the economic system. These findings are consistent with the theoretical expectation that improvements in human development and economic growth reinforce one another through a dynamic adjustment process, while maintaining long-run stability within the VECM framework.

4.6 Variance Decomposition of GRDP

Variance decomposition results indicate that, in the short run, variations in GRDP are largely explained by its own shocks. However, over time, shocks to HDI contribute increasingly to variations in GRDP.

Period	S.E.	PDRB	HDI
1	31.40397	3.010643	96.98936
2	42.47634	1.977707	98.02229
3	50.52937	4.553261	95.44674
4	61.74901	11.92251	88.07749
5	76.26350	19.39494	80.60506
6	92.75988	25.29260	74.70740
7	111.0071	29.99299	70.00701
8	131.2291	33.75679	66.24321
9	153.5896	36.72768	63.27232
10	178.2239	39.06230	60.93770
11	205.3313	40.90642	59.09358
12	235.1795	42.37189	57.62811
13	268.0844	43.54144	56.45856
14	304.4057	44.47805	55.52195
15	344.5513	45.23047	54.76953

Cholesky Ordering: HDI PDRB

Table 4.6
GRDP Variable
Test Results

Source: Processed by the author (2025)

Table 4.6 shows that in the first period, the variation in GRDP was largely explained by the HDI shock, amounting to 96.99%, while the contribution of the GRDP shock itself was relatively small, namely 3.01%. In subsequent periods, the contribution of the GRDP shock to GRDP variation tended to increase gradually, while the contribution of the HDI shock decreased. More specifically, in the fifth period, the contribution of the GRDP shock increased to 19.39%, while the role of the HDI decreased to 80.61%. This pattern continued until the fifteenth period, where the variation in GRDP was explained by the GRDP shock by 45.23% and by the HDI shock by 54.77%.

4.7 HDI Variance Decomposition

The variance decomposition of HDI shows that, although HDI variation is initially dominated by its own internal shocks, GRDP plays an increasingly important role in explaining HDI fluctuations in the long run. (Tarape & Yusuf, 2025)

Period	S.E.	PDRB	IPM
1	293.3266	100.0000	0.000000
2	535.0742	82.16525	17.83475
3	692.9084	72.50743	27.49257
4	805.1284	68.49517	31.50483
5	911.8306	66.11069	33.88931
6	1025.393	63.91547	36.08453
7	1146.139	61.80104	38.19896
8	1274.936	59.89913	40.10087
9	1414.659	58.22741	41.77259
10	1568.284	56.75400	43.24600
11	1738.345	55.45770	44.54230
12	1927.315	54.32754	45.67246
13	2137.862	53.35210	46.64790
14	2372.878	52.51731	47.48269
15	2635.486	51.80820	48.19180

Table 4.7
HDI Variable
Test Results

Source: Processed by the author (2025)

Table 4.7 shows that in the first period, the HDI variation was fully explained by the GRDP shock, at 100%, while the contribution of the HDI shock itself was not yet apparent. In subsequent

periods, the contribution of the HDI shock to the HDI variation began to increase gradually, although the GRDP shock remained the dominant factor. More specifically, in the fifth period, the variation in the HDI was explained by the GRDP shock by 66.11%, while the contribution of the HDI shock was 33.89%. This trend continued until the fifteenth period, where the contribution of the GRDP shock to the HDI variation decreased to 51.81%, while the contribution of the HDI shock increased to 48.19%.

DISCUSSION

Empirical results consistently demonstrate a strong and dynamic interaction between human development and economic growth in Aceh Province. Bidirectional causality suggests that policies aimed at improving human development will stimulate economic growth, while sustained economic growth will further improve human development outcomes. These findings emphasize the importance of an integrated development strategy that prioritizes both economic and social dimensions.

V. CONCLUSION

This study concludes that there is a dynamic, bidirectional causal relationship between HDI and GRDP in Aceh Province in both the short and long term. Therefore, policymakers should adopt an integrated development strategy that simultaneously promotes economic growth and human development. Policy implications include prioritizing public spending on education and health, increasing labor productivity, and ensuring that economic growth is inclusive and people-centered.

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REFERENCES

Dewa, A., Wiguna, A., & Iskandar, D. D. (2021). Negara-Negara Asean Tahun 2009-2018. 10, 148–161.

Djadjuli, R. D. (2022). Peran Pemerintah Dalam Pembangunan Ekonomi Daerah Dinamika : Jurnal Ilmiah Ilmu Administrasi Negara. Dinamika : Jurnal Ilmiah Ilmu Administrasi Negara, 5(2), 8–21. https://jurnal.unigal.ac.id/dinamika/article/view/1409/1156.

Fatin Dzahabiy, A. S. S., Harini, S., & Juhari, J. (2025). Uji Kausalitas Granger dalam Menganalisis Hubungan Indeks Pembangunan Manusia, Tingkat Pengangguran Terbuka, dan Kemiskinan. Jurnal Riset Mahasiswa Matematika, 4(4), 149–160. https://doi.org/10.18860/jrmm.v4i4.30406.

Kesuma, A. R., Rinanda, F. A., Astafira, I., Afriani, N., Fadlirhohim, R. D., Lestari, T. S. A., & Sifriyani, S. (2024). Pemodelan Produk Domestik Regional Bruto (PDRB) di Indonesia Periode 2018-2021 dengan Analisis Regresi Data Panel. *ESTIMASI: Journal of Statistics and Its Application*, *5*(2), 216–229. https://doi.org/10.20956/ ejsa.v5i2.27522.

Halim, R. F., Sudarno, S., & Tarno, T. (2024). Pemodelan Antar Variabel Ekonomi Secara Simultan Menggunakan Pendekatan Vector Error Correction Model (Vecm). *Jurnal Gaussian*, *12*(3), 414–424. https://doi.org/10.14710/j.gauss.12.3.414-424.

Mailadani, D. A., & Rosintan, L. (2024). Determinan Indeks Pembangunan Manusia (IPM) di Indonesia Tahun 1990-2021. *Ekonomikawan: Jurnal Ilmu Ekonomi dan Studi Pembangunan*, *24*(1), 1–9. https://doi.org/10.30596/ekonomikawan.v24i1.19358.

Monika, A. K. (2017). Polusi da Pertumbuhan Ekonomi: Sebuah Analisis Impulse Response Function. *Statistika dan Aplikasinya*, 170–178. https://stis.ac.id/sipadu/pegawai/upload_jurnal/file_1517382748.

Permatasari, R., Mariani, S., & Sugiman, S. (2022). Pemodelan dan Peramalan Runtun Waktu Nonlinier dengan Metode Exponential Smooth Transition Autoregressive (ESTAR). *Indonesian Journal of Mathematics and Natural Sciences*, *45*(1), 20–29. https://doi.org/10.15294/ijmns.v45i1.36371.

Rakhmawati, D. (2024). Analisis Stabilitas Model Vector Autoregression (Var) Pada Data Suku Bunga Bi Dan Inflasi. *Jurnal Lebesgue : Jurnal Ilmiah Pendidikan Matematika, Matematika dan Statistika*, *5*(3), 1912–1925. https://doi.org/10.46306/lb.v5i3.758.

Ramadhani, P., Noviar, H., Ariani, D., Badli, S., & Ertika, Y. (2025). *Jurnal Ekonomi dan Bisnis Determinasi Indeks Pembangunan Manusia di Provinsi Aceh : Kajian Empiris Data Panel Kabupaten / Kota*. *2*, 1–13.

Ruchba, S. M., & Asynur, A. T. (2023). *Jurnal Kebijakan Ekonomi dan Keuangan Analisis tingkat kemiskinan di Provinsi Riau Tahun 2010-2022*. *2*(1), 92–97. https://doi.org/10.20885/JKEK.vol2.iss1.art11.

Syahzuni, B. A. (2018). *The Correlation Of The Human Development Index (Hdi) Towards Economic Growth (Gdp Per Capita) In 10 Asean Member Countries*. *02*(02), 40–46.