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The Regional Nexus of Economic Growth, Income Inequality and Poverty

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Abstract

This study divides Aceh Province into three distinct regional to investigate the nexus between economic growth, income inequality, and poverty from 2011-2021. Applying the Granger causality test across 23 districts/cities, this research uncovers the distinct interplay among these pivotal socioeconomic variables. While previous studies have delved into these relationships in various contexts, the unique socio-economic backdrop of Aceh Province commands a targeted empirical exploration. Across the province, our findings indicate a bidirectional causality between economic growth and poverty, elucidating a reciprocal influence where economic dynamics and poverty levels directly affect each other. Additionally, we observe a unidirectional causality from income inequality to economic growth and poverty, demonstrating that income inequality hampers regional economic growth and exacerbates poverty levels. In regional 1, a self-sustaining causal loop is identified, where economic growth leads to changes in poverty, which then feed into income inequality, and subsequently loop back to impact economic growth. In regional 2, a bidirectional causality between economic growth and poverty is found, highlighting a relationship where economic progress alone does not effectively address poverty. Regional 3 presents a distinctive pattern, where income inequality is a precursor to poverty, which then unidirectionally impacts economic growth, suggesting that in this region, strategies to combat inequality could be pivotal in spurring economic development. These varied regional causal patterns signal the need for nuanced and region-specific policy interventions.

1. Introduction

The problem of global economic growth encompasses a range of complex challenges. One pressing issue is the persistent inequality that often accompanies growth, as benefits are not evenly distributed, leading to disparities in income and wealth. Additionally, despite overall global economic expansion, millions still live in extreme poverty, particularly in developing regional. This divergence not only hinders social cohesion but also undermines the sustainability of development and inclusivity of growth [1–3].

Developing countries like Indonesia continue to grapple with significant economic challenges, particularly related to poverty and income inequality. Regional disparities persist, with areas like Java experiencing rapid growth, while regional in both western and eastern Indonesia lag behind in basic services and infrastructure. The informal economy employs a substantial portion of the population, offering little job security or social protection.

Limited access to quality education and healthcare exacerbates the cycle of poverty, and the agricultural sector faces issues like low productivity and climate change vulnerability. Additionally, income inequality is widening, as high earners disproportionately benefit from economic growth, leaving many struggling to meet basic needs [4–10].

In regional scope, the economic growth of Aceh Province, Indonesia, has witnessed significant expansion driven by natural resource industries such as oil and gas. However, this prosperity has not been evenly distributed, resulting in pronounced income inequality and persistent poverty. The overreliance on volatile commodities, coupled with a lack of economic diversification, leaves the regional susceptible to economic shocks. Insufficient access to essential services and limited infrastructure in remote areas further exacerbate these disparities. To address these challenges, prioritizing education and skills development can empower individuals and improve their earning potential, while targeted poverty alleviation programs and improved access to credit and financial services can create a more inclusive economic landscape [11–14].

Economic growth, income inequality, and poverty are proven to be closely related, but in terms of causality, the relationship is quite complex. Economic growth has the potential to reduce income inequality. However, if the benefits of economic growth are not distributed evenly, it can exacerbate income inequality. Moreover, economic growth supposedly ameliorates poverty through various channels, but poverty exerts adverse effects on economic growth by stifling human capital development, leading to diminished productivity levels and limiting the economy's full potential. Additionally, the interlinkage between income inequality and poverty worsens the situation. High levels of income inequality can lead to persistent poverty by limiting opportunities and resources for those at the lower end of the income spectrum. Conversely, poverty can contribute to the perpetuation of income inequality by limiting the ability of individuals and families to invest in their economic advancement [15–19].

Literature also offers numerous empirical findings regarding the causal interconnection between them. Previous studies, such as those by Vo et al. [20], Abakumova and Primierova [21], and Shahbaz [22] indicate that causality exists from economic growth to income inequality and vice versa. Furthermore, prior studies by Mahembe & Odhiambo [23], Nyasha et al. [24], and Afzal et al. [25] found a bidirectional causality between economic growth and poverty. Moreover, previous studies by Ogbeide & Agu [26], and Apergis et al. [27] provide insight that income inequality does affect poverty, as well as poverty does affect income inequality.

Based on the problem, theoretical concepts, and empirical results from previous research in other regional as explained above, this study focuses on examining the relationship between economic growth, income inequality, and poverty. It aims to determine the causal connection between the studied variables, which has not been previously studied in Aceh Province, Indonesia. Valuable findings from this study have the potential to inform policy-making and development strategies formulated for Aceh Province, and may also hold broader implications for other regional in Indonesia facing similar socio-economic challenges. Furthermore, the findings could provide valuable lessons for other areas dealing with issues related to economic growth, income distribution, and poverty alleviation.

2. Materials and Methods

2.1. Data

This study encompasses the entire regional of Aceh Province, spanning all 23 districts/cities, over the decade from 2011 to 2021. The data was sourced from the official Statistics of Aceh Province (BPS). Within the study, the dependent variable is the economic growth rate (GROWTH), which reflects the pace of economic expansion within the province. The independent variables include poverty (POV) and the gini ratio (GINI), which represent measures of the socio-economic status and income inequality among the population, respectively. These variables are critical for examining the potential impact of socio-economic dynamics on the province's economic development trajectory.

In this study, we strategically divide Aceh Province into three distinct regional, employing a scientific rationale to explore the intricate interplay of geographical, historical, socio-economic, and cultural factors. The regional split is grounded in recognizing the Aceh's diverse landscape, allowing for a nuanced analysis of each region's unique challenges and opportunities. Historical trajectories, including settlement patterns and economic evolution, further contribute to the justification, offering insights into the disparate socio-economic landscapes. This granular approach facilitates targeted policy recommendations, ensuring a more equitable and tailored approach to development that addresses the specific needs of each regional. In conclusion, the three-regional split is scientifically motivated, providing a comprehensive framework for understanding and addressing the complexities inherent in Aceh Province's diverse socio-cultural and economic tapestry. Detailed

Figure 1. Map of Aceh Province, Indonesia, with detailed information on the regional divisions.

information for the regional of Aceh Province is illustrated in Figure 1.

2.2. Unit Root Test

Stationarity testing through unit root analysis is a prerequisite for valid regression estimation to preclude spurious regression [28]. Unit root testing verifies that the time series processes are stationary before estimating the regression model. The empirical literature emphasizes the need to establish the order of integration of the variables before assessing cointegration. Multiple unit root tests may be advisable for determining the order of integration of the time series, as the power of these tests varies with sample size. Explicitly testing and establishing stationarity and the order of integration of the time series data enables valid regression analysis and inference.

To examine the presence of unit roots, this study implemented the Augmented Dickey-Fuller (ADF) and Phillips-Perron (P-P) test. The ADF and P-P unit root tests assess the null hypothesis of a unit root against the alternative of stationarity. Implementation of these established tests enabled determination of whether the time series contain unit roots and guided appropriate differencing to induce stationarity prior to further analysis.

2.3. Johansen Cointegration Test

The Johansen [29] cointegration test is a multivariate time series technique used to detect and estimate cointegrating relationships among non-stationary variables. Application of this method enables determination of whether, and the extent to which, a set of time series converge to a shared long-run equilibrium. Identification of cointegration provides evidence of stable, long-term linkages among the variables, amidst short-run dynamics. This test is vital in economics and finance for uncovering equilibrium relationships to inform policy and investment decisions reliant on long-horizon modeling and forecasting. The Johansen test applies maximum likelihood estimation in a vector error correction model to test for cointegration rank and estimate cointegrating vectors. It provides a rigorous approach to uncover and characterize equilibrium relationships between time series.

2.4. Granger Causality Test

Utilizing panel Granger causality analysis by, we test the hypothesis that past values of predictor variable X

Table 1. Descriptive statistics.

Variable	GROWTH	POV	GINI
Mean	3.812055	17.17372	0.284704
Median	4.060000	17.65000	0.285000
Maximum	20.34000	25.50000	0.454000
Minimum	0.050000	6.900000	0.193000
Std. Dev.	1.954602	3.933863	0.037962
Skewness	2.806839	-0.403404	0.340715
Kurtosis	24.99538	2.745216	3.665442
Jarque-Bera	5432.228	7.546303	9.562973
Probability	0.000000	0.022980	0.008384
Sum	964.4500	4344.950	72.03000
Sum Sq. Dev.	962.7579	3899.771	0.363167
Observations	253	253	253

contain information that allows improved forecasting of future values of target variable Y, against the null hypothesis of no causal influence. A significant F-test on lagged values of X in a vector autoregression model including Y would provide evidence to reject the null in favor of the alternative hypothesis. This would suggest unidirectional Granger causality from X to Y. Bidirectional causality may be evident if the reverse causality from Y to X is also significant. Granger causality analysis allows examination of predictive causality between time series, shedding light on the dynamics between the variables under study [30, 31]. The econometric model of Granger causality is observed in equations 1-3.

$$\Delta Growth_{it} = \alpha_{1,i} + \sum_{k=1}^{m} \beta_{11k} Growth_{it-k} + \sum_{k=1}^{m} \theta_{12k} POV_{it-k} + \sum_{k=1}^{m} \theta_{13k} \Delta Gini_{it-k} + \varepsilon_{1,it} \quad (1)$$

$$\Delta POV_{it} = \alpha_{2,i} + \sum_{k=1}^{m} \beta_{21k} POV_{it-k} + \sum_{k=1}^{m} \theta_{22k} \Delta Growth_{it-k} + \sum_{k=1}^{m} \theta_{23k} \Delta Gini_{it-k} + \varepsilon_{1,it} \quad (2)$$

$$\Delta Gini_{it} = \alpha_{3,i} + \sum_{k=1}^{m} \beta_{31k} Gini_{it-k} + \sum_{k=1}^{m} \theta_{32k} \Delta Growth_{it-k} + \sum_{k=1}^{m} \theta_{33k} \Delta POV_{it-k} + \varepsilon_{1,it} \quad (3)$$

Where $\Delta Growth_{it}$, ΔPOV_{it}, and $\Delta Gini_{it}$ represent the first differences of time series $Growth_{it}$, POV_{it}, and $Gini_{it}$ respectively. The terms α_1, α_2, and α_3 correspond to the fixed effects which capture the individual-specific characteristics and trends that can be controlled for by taking the first difference of the respective variables. In summary, the application of the Granger causality test to our panel dataset will illuminate the intricate causative relationships between economic growth, poverty, and income inequality.

3. Results and Discussions

3.1. Descriptive Statistics

The Table 1 provides detailed statistics for three key variables: GROWTH, POV, and GINI. GROWTH has a mean of 3.81% and a slightly higher median of 4.06%, indicating a broadly distributed dataset ranging from 0.05% to 20.34%. With a standard deviation of 1.95, GROWTH shows moderate variability and right skewness (2.806839), along with high kurtosis (24.99538), reflecting outliers and a peaked distribution - confirmed by a significant Jarque-Bera statistic. POV has a mean of 17.17 and median of 17.65, spanning 6.9 to 25.5, with a standard deviation of 3.93 showing more variation than GINI but less than GROWTH. POV is left-skewed with kurtosis near normal. GINI's mean and median are nearly identical at 0.284704, with a narrow range and low standard deviation indicating clustered values, slight right skewness, and a kurtosis reflecting a sharper peak than normal. All three variables have non-normal distributions per the Jarque-Bera test. With equal observations (N=253), the data may be parallel over time or demographics. The non-normality necessitates statistical analyses accommodating such distributions. In summary, the Table 1 provides robust descriptive statistics for three non-normally distributed socioeconomic indicators.

3.2. Unit Root Test

A unit root indicates that a variable lacks stability and shows a random trend rather than returning to a consistent mean over time. Conversely, stationary variables have a steady mean and variance for stable dynamic estimation. The Granger Causality method necessitates that all data variables be stable after undergoing a first-order difference. As demonstrated in Table 2, all variables in the three-regional model became stable after this initial 1st difference. This suggests that the method can be employed, signifying that the data's

Table 2. Results of unit root test.

Model	Stationarity Test	Order	GROWTH	POV	GINI
Aceh Province	ADF	Level	0.0946	0.0003*	0.9990
		1st diff	0.0000*	0.0000*	0.0000*
	PP	Level	0.1964	0.0000*	1.0000
		1st diff	0.0000*	0.0000*	0.0000*
Regional 1	ADF	Level	0.1900	0.0057*	0.9341
		1st diff	0.0000*	0.0000*	0.0000*
	PP	Level	0.2008	0.0000*	0.9982
		1st diff	0.0000*	0.0000*	0.0000*
Regional 2	ADF	Level	0.3874	0.0455*	0.9821
		1st diff	0.0001*	0.0008*	0.0000*
	PP	Level	0.5068	0.0000*	0.9847
		1st diff	0.0000*	0.0000*	0.0000*
Regional 3	ADF	Level	0.0888	0.0275*	0.9739
		1st diff	0.0125*	0.0020*	0.0004*
	PP	Level	0.2146	0.0004*	0.9786
		1st diff	0.0000*	0.0000*	0.0000*

Note: * significance at 1% level.

Table 3. The result of Johansen co-integration test.

Model	Null Hypothesis	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
Aceh Province	R = 0*	364.5	0.0000	325.7	0.0000
	R ≤ 1*	236.6	0.0000	204.3	0.0000
	R ≤ 2*	113.3	0.0000	113.3	0.0000
Regional 1	R = 0*	218.7	0.0000	195.4	0.0000
	R ≤ 1*	133.3	0.0000	126.2	0.0000
	R ≤ 2*	43.97	0.0077	43.97	0.0077
Regional 2	R = 0*	72.89	0.0000	65.14	0.0000
	R ≤ 1*	63.07	0.0000	43.72	0.0000
	R ≤ 2*	45.78	0.0000	45.78	0.0000
Regional 3	R = 0*	72.89	0.0000	65.14	0.0000
	R ≤ 1*	40.23	0.0000	34.31	0.0002
	R ≤ 2*	23.53	0.0090	23.53	0.0090

Note: * significance at 1% level.

mean and variance remain consistently stable over time for estimating causality.

3.3. Cointegration Test

The cointegration test is essential for dynamic methods, as it signifies a long-term connection between the variables. This study utilizes the highly dependable Johansen cointegration test, which is one of the most trusted tests for identifying cointegration. As depicted in Table 3, the model encompassing all three regionals demonstrates a robust cointegration with prob. value <0.05. This leads to the conclusion that the Granger Causality estimation results are reliable, indicating a consistent long-term relationship.

3.4. Results of Granger Causality Test

3.4.1. Aceh Province in General

The outcomes of the Granger causality estimation across all 23 districts/cities in Aceh Province, as presented in Table 4 and Figure 2a, demonstrate a bidirectional causality between economic growth and poverty. This suggests that economic growth does indeed affect poverty through various channels. Similarly, poverty also has an impact on the overall potential of regional economic growth. Moreover, the findings of unidirectional causality, running from income inequality to economic growth and then to poverty, indicate that income inequality can hinder regional economic growth as well as exacerbate the level of poverty.

3.4.2. Regional 1 of Aceh Province

Regional 1 of Aceh Province comprises 8 districts and 4 cities. As shown in Table 4 and Figure 2b, the Granger causality estimation results for this regional model have identified three unidirectional causal relationships: one from economic growth to poverty, another from poverty to income inequality, and the third from income inequality to economic growth. This causal loop indicates that in Regional 1, economic growth affects poverty, which in turn impacts income inequality. This inequality

Table 4. The results of Granger causality test.

Null Hypothesis	Aceh Province		Regional 1		Regional 2		Regional 3	
	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.
POV ≠ GROWTH	2.70830**	0.0323	1.40182	0.2416	3.11545**	0.0280	2.55112***	0.0630
GROWTH ≠ POV	2.98501**	0.0209	2.88369**	0.0281	2.93518**	0.0351	0.26208	0.8996
GINI ≠ GROWTH	8.55493*	0.0000	10.3616*	0.0000	0.27918	0.8893	0.94545	0.4536
GROWTH ≠ GINI	0.33254	0.8557	0.86369	0.4898	0.55177	0.6991	1.74802	0.1698
GINI ≠ POV	2.63331**	0.0364	1.52996	0.2021	0.85820	0.4991	3.47409*	0.0211
POV ≠ GINI	0.53779	0.7082	2.66639**	0.0387	0.24324	0.9117	0.85368	0.5045

Note: *, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively.

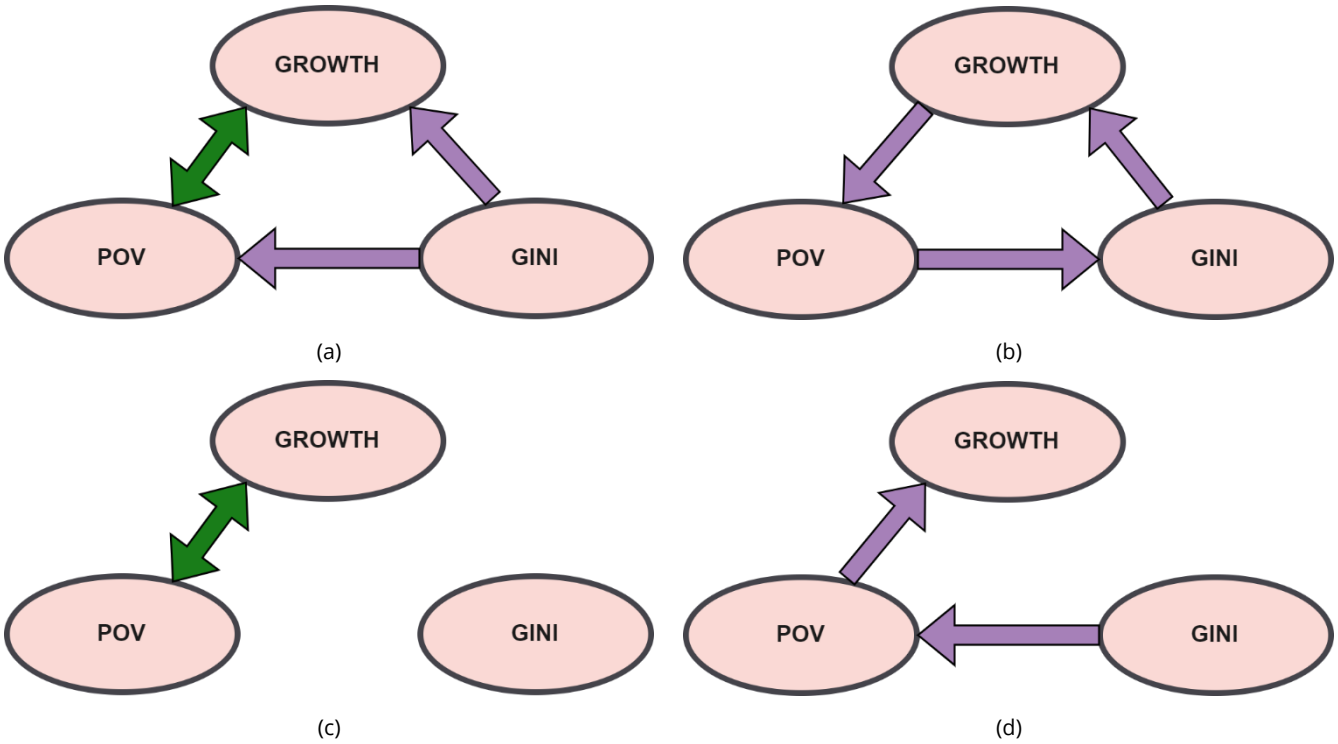

Figure 2. illustrates the Granger causality outcomes for (a) Aceh Province, (b) Regional 1, (c) Regional 2, and (d) Regional 3. Please note that (→) denotes unidirectional causality, while (↔) signifies bidirectional causality.

in income distribution then feeds back to affect the regional economic growth.

3.4.3. Regional 2 of Aceh Province

Regional 2 of Aceh Province includes six districts. As indicated in Table 4 and Figure 2c, the Granger causality results for this regional model have identified just one bidirectional causal connection, which operates between economic growth and poverty. This implies that economic growth influences poverty. Likewise, poverty exerts an impact on the overall potential for economic growth in Regional 2.

3.4.4. Regional 3 of Aceh Province

Regional 3 of Aceh Province comprises four districts and one city. As shown in Table 4 and Figure 2d, the Granger causality estimation outcomes for this regional model have identified two unidirectional causal connections: one from income inequality to poverty, and another from poverty to economic growth. This suggests that income inequality can influence poverty, which then poverty subsequently impacts economic growth in Regional 3.

3.5. Discussion

Despite 23 districts/cities in Aceh Province recording an average economic growth percentage of 3.81% between the period of 2011-2021, it is also experiencing high income inequality, with an average Gini ratio of 0.285. This ratio is still below 0.3, which is categorized as "high inequality in income distribution". The situation worsens when considering that, during the same period, the level of poverty is also quite high, reaching 17.28%. This indicates that, on average, 1 in 5 people in Aceh Province falls into the poor category. This interconnectedness suggests a strong causal link between these three variables, which is the main focus of this study. Our

research not only aims to examine this at a general province level, but also to provide result estimations of the causal connections in the three separate regional of Aceh Province.

In terms of Aceh Province in general, our findings indicate that there is a bidirectional causality between economic growth and poverty. This suggests that regional economic growth, which is supposed to reduce poverty through various channels, is instead hindered by poverty, exerting adverse effects that prevent even higher growth. Moreover, the findings of unidirectional causality running from income inequality to economic growth and then to poverty also show that income inequality hinders regional economic growth as well as worsens the level of poverty in Aceh Province.

Our study found an indication of an endless causal circle in Regional 1 of Aceh Province, which includes 8 districts and 4 cities, namely Sabang, Banda Aceh, Aceh Besar, Pidie, Pidie Jaya, Bireun, Bener Meriah, Aceh Utara, Lhokseumawe, Aceh Timur, Langsa, and Aceh Tamiang. In this Regional 1 model, three unidirectional causal relationships were found: one from economic growth to poverty, then from poverty to income inequality, and finally from income inequality to economic growth. This causal loop indicates that in Regional 1, economic growth affects poverty, which in turn impacts income inequality, and then this inequality feeds back, affecting the regional economic growth, creating an endless cycle effect between the three variables.

At Regional 2, which includes six districts namely Aceh Jaya, Aceh Barat, Nagan Raya, Aceh Barat Daya, Aceh Selatan, and Simeulue, we found a similar bidirectional causality between economic growth and poverty, just like in Aceh Province in general. This indicates that in Regional 2, economic growth is less effective in reducing poverty, and instead, poverty exerts adverse effects on the regional economy, hindering the attainment of higher growth.

Finally, in regional 3, which comprises four districts and one city, namely Aceh Tengah, Gayo Lues, Aceh Tenggara, Subulussalam, and Aceh Singkil, it was found that there are two unidirectional causal relationships: one from income inequality to poverty, and the other from poverty to economic growth. These findings clearly indicate that the main problem in this region is income inequality, which worsens the level of poverty and hampers the regional economy from achieving sustainable and better growth.

4. Conclusions and Policy Recommendations

This study's comprehensive analysis of Aceh Province reveals complex causal interdependencies between economic growth, income inequality, and poverty across its three regionals. In Regional 1, a self-perpetuating causal loop is identified, wherein economic growth influences poverty, subsequently affecting income inequality, which in turn impacts regional economic growth, creating an enduring cycle. Furthermore, Regional 2 mirrors the bidirectional relationship between economic growth and poverty observed in Aceh Province at large, indicating a limited effectiveness of economic growth in alleviating poverty, with poverty exerting adverse effects on regional economic progress. Additionally, in Regional 3, income inequality emerges as a central concern, with unidirectional causality from income inequality to poverty and from poverty to economic growth.

Based on the findings, it is crucial to implement a multi-pronged policy approach formulated to the specific dynamics observed in each regional model. In Regional 1, where an endless causal loop between economic growth, poverty, and income inequality exists, targeted interventions should focus on breaking this cycle. This could involve implementing measures to promote inclusive economic growth, such as targeted investments in infrastructure, education, and healthcare, alongside policies to alleviate poverty and reduce income inequality through social safety nets and progressive taxation. In Regional 2, where economic growth is less effective in reducing poverty, efforts should be directed towards enhancing the quality and inclusivity of growth, potentially by incentivizing industries with higher employment generation and ensuring that growth is spread across different sectors. Lastly, in Regional 3, where income inequality is identified as the main issue, policies should prioritize measures to address this disparity, including targeted redistribution programs, improved access to education and skills development, and support for small and medium-sized enterprises to create more equitable economic opportunities.

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References

1. Soava, G., Mehedintu, A., and Sterpu, M. (2020). Relations between income inequality, economic growth and poverty threshold: new evidences from EU countries panels, *Technological and Economic Development of Economy*, Vol. 26, No. 2, 290–310.
2. Amar, S., and Pratama, I. (2020). Exploring the link between income inequality, poverty reduction and economic growth: An ASEAN perspective, *International Journal of Innovation, Creativity and Change*, Vol. 11, No. 2, 24–41.
3. Lechheb, H., Ouakil, H., and Jouilil, Y. (2019). Economic Growth, Poverty, and Income Inequality, *The Journal of Private Equity*, Vol. 23, No. 1, 137–145.
4. Permadi, Y. A. (2018). Growth, Inequality, and Poverty: An Analysis of Pro-Poor Growth in Indonesia, *Jurnal Ekonomi Kuantitatif Terapan*, Vol. 11, No. 2, 216–233.
5. Yusuf, A. A., and Sumner, A. (2015). Growth, poverty, and inequality under Jokowi, *Bulletin of Indonesian Economic Studies*, Vol. 51, No. 3, 323–348.
6. SUPARMAN, S. (2022). Relationship Between Economic Growth, Income Inequality and Poverty by Provinces in Indonesia: Panel Data Regression Approach, *International Journal of Environmental, Sustainability, and Social Science*, Vol. 3, No. 1, 103–108.
7. Idroes, G. M., Syahnur, S., Majid, M. S. A., Idroes, R., Kusumo, F., and Hardi, I. (2023). Unveiling the Carbon Footprint: Biomass vs. Geothermal Energy in Indonesia, *Ekonomikalia Journal of Economics*, Vol. 1, No. 1, 10–18. doi:10.60084/eje.v1i1.47.
8. Muzzakar, K., Syahnur, S., and Abrar, M. (2023). Provincial Real Economic Growth in Indonesia: Investigating Key Factors Through Spatial Analysis, *Ekonomikalia Journal of Economics*, Vol. 1, No. 2, 40–50. doi:10.60084/eje.v1i2.66.
9. Noviandy, T. R., Idroes, G. M., Maulana, A., Hardi, I., Ringga, E. S., and Idroes, R. (2023). Credit Card Fraud Detection for Contemporary Financial Management Using XGBoost-Driven Machine Learning and Data Augmentation Techniques, *Indatu Journal of Management and Accounting*, Vol. 1, No. 1, 29–35. doi:10.60084/ijma.v1i1.78.
10. Hardi, I., Dawood, T. C., and Syathi, P. B. (2021). Determinants Comparative Advantage of Non-Oil Export 34 Provinces in Indonesia, *International Journal of Business, Economics, and Social Development*, Vol. 2, No. 3, 98–106. doi:10.46336/ijbesd.v2i3.137.
11. . M., Nailufar, F., Andriani, D., . M., and Firdaus, R. (2023). Income Inequality Between Districts and Their Impact on Poverty in Aceh Province, *International Journal of Academic Research in Business and Social Sciences*, Vol. 13, No. 2. doi:10.6007/IJARBSS/v13-i2/16409.
12. Zulham, T., Muhammad, S., and Masbar, R. (2015). The Impact of Special Autonomy on the Convergence of Regional Economic Growth in Aceh, Indonesia, *Aceh International Journal of Social Science*, Vol. 4, No. 1.
13. Nurlina, Safuridar, and Maula, Z. (2021). Analysis of Inclusive Economic Development Index and Poverty in Aceh Province, Indonesia. doi:10.2991/aebmr.k.210616.020.
14. Sasmita, N. R., Phonna, R. A., Fikri, M. K., Khairul, M., Apriliansyah, F., Idroes, G. M., Puspitasari, A., and Saputra, F. E. (2023). Statistical Assessment of Human Development Index Variations and Their Correlates: A Case Study of Aceh Province, Indonesia, *Grimsa Journal of Business and Economics Studies*, Vol. 1, No. 1, 12–24.
15. Wolde, M., Sera, L., and Merra, T. M. (2022). Causal relationship between income inequality and economic growth in Ethiopia, *Cogent Economics & Finance*, Vol. 10, No. 1, 2087299.
16. Nuruddeen, T., and Ibrahim, S. S. (2014). An empirical study on the relationship between poverty, inequality and economic growth in Nigeria, *Journal of Economics and Sustainable Development*, Vol. 5, No. 26, 20–24.
17. Ferreira, F. H. G. (2010). Distributions in motion: economic growth, inequality, and poverty dynamics, *World Bank Policy Research Working Paper*, No. 5424.
18. Hardi, I., Ringga, E. S., Fijay, A. H., Maulana, A. R. R., Hadiyani, R., and Idroes, G. M. (2023). Decomposed Impact of Democracy on Indonesia's Economic Growth, *Ekonomikalia Journal of Economics*, Vol. 1, No. 2, 51–60. doi:10.60084/eje.v1i2.80.
19. Hardi, I., Idroes, G. M., Hardia, N. A. K., Fajri, I., Furqan, N., Noviandy, T. R., and Utami, R. T. (2023). Assessing the Linkage Between Sustainability Reporting and Indonesia's Firm Value: The Role of Firm Size and Leverage, *Indatu Journal of Management and Accounting*, Vol. 1, No. 1, 21–28. doi:10.60084/ijma.v1i1.79.
20. Vo, D. H., Nguyen, T. C., Tran, N. P., and Vo, A. T. (2019). What factors affect income inequality and economic growth in middle-income countries?, *Journal of Risk and Financial Management*, Vol. 12, No. 1, 40.
21. Abakumova, J., and Primierova, O. (2018). Globalization, growth and inequality: testing causality and asymmetries., *Economic & Managerial Spectrum/Ekonomicko-Manaz? E´ Rske Spektrum*, No. 2.
22. Shahbaz, M. (2010). Income inequality-economic growth and non-linearity: A case of Pakistan, *International Journal of Social Economics*, Vol. 37, No. 8, 613–636.
23. Mahembe, E., and Odhiambo, N. M. (2019). Foreign aid, poverty and economic growth in developing countries: A dynamic panel data causality analysis, *Cogent Economics & Finance*, Vol. 7, No. 1, 1626321.
24. Nyasha, S., Gwenhure, Y., and Odhiambo, N. M. (2017). Poverty and economic growth in Ethiopia: A multivariate causal linkage, *The Journal of Developing Areas*, Vol. 51, No. 1, 343–359.
25. Afzal, M., Malik, M. E., Begum, I., Sarwar, K., and Fatima, H. (2012). Relationship among education, poverty and economic growth in Pakistan: An econometric analysis, *Journal of Elementary Education*, Vol. 22, No. 1, 23–45.
26. Ogbeide, E. N. O., and Agu, D. O. (2015). Poverty and income inequality in Nigeria: Any causality?, *Asian Economic and Financial Review*, Vol. 5, No. 3, 439.
27. Apergis, N., Dincer, O., and Payne, J. E. (2011). On the dynamics of poverty and income inequality in US states, *Journal of Economic Studies*, Vol. 38, No. 2, 132–143.
28. Hardi, I., Idroes, G. M., Utami, R. T., Dahlia, P., Mirza, M. A. F., Humam, R. A., Chairunnisa, R., Hardia, N. A. K., and Mahdani, R. (2023). Dynamic Impact of Inflation and Exchange Rate in Indonesia's Top 10 Market Capitalization Companies: Implications for Stock Prices, *Indatu Journal of Management and Accounting*, Vol. 1, Nos. 2 SE-Articles, 51–59. doi:10.60084/ijma.v1i2.110.
29. Johansen, S. (1988). Statistical analysis of cointegration vectors, *Journal of Economic Dynamics and Control*, Vol. 12, Nos. 2–3, 231–254.
30. Hardi, I., Saputra, J., Hadiyani, R., Maulana, A. R. R., and Idroes, G. M. (2023). Decrypting the Relationship Between Corruption and Human Development: Evidence from Indonesia, *Ekonomikalia Journal of Economics*, Vol. 1, No. 1, 1–9. doi:10.60084/eje.v1i1.22.
31. Idroes, G. M., Hardi, I., Nasir, M., Gunawan, E., Maulidar, P., and Maulana, A. R. R. (2023). Natural Disasters and Economic Growth in Indonesia, *Ekonomikalia Journal of Economics*, Vol. 1, No. 1, 33–39. doi:10.60084/eje.v1i1.55.