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Macroeconomic Drivers of Poverty Reduction in Bangladesh: A Time-Series Analysis with ARDL Approach

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Abstract

Poverty reduction remains a core objective of economic development, especially in growing economies like Bangladesh. This research examines the dynamic effects of key macroeconomic factors: inflation, GDP, unemployment, and trade openness, on poverty in Bangladesh. The analysis has been performed utilizing annual time-series data from 1983 to 2023, collected from the World Bank. To assess the short-run and long-run effects of the selected macroeconomic variables on poverty, the Autoregressive Distributed Lag (ARDL) model has been employed which is flexible to accommodate variables with mixed stationary integration order, either I(0) or I(1). The optimal model ARDL(3,3,3,1,3) has been selected using minimum Akaike Information Criterion (AIC), satisfying model diagnostic properties. The Bounds test result confirms the existence of long-term cointegration of variables. Short-run estimates indicate that current trade openness significantly reduces poverty, while GDP has a delayed impact. The study findings reveal that past inflation and unemployment have significant negative effects on poverty. In the long run, the growth of GDP notably reduces poverty, whereas inflation and unemployment worsen it. Policy implications highlight the need for short-term trade and employment reforms, alongside long-term strategies focused on growth, inflation control, and structural unemployment.

Keywords: ARDL, AIC, Cointegration, Bounds test, Error correction term (ECT).

I. Introduction

Poverty is a multidimensional condition encompassing deprivation of economic resources, denial of fundamental rights, and unfulfilled human capabilities[1]. As a sustainable development principle, poverty reduction is still a worldwide concern, especially in emerging nations[2,3]. Despite progress has been made, one in ten people still live in extreme poverty worldwide, which hampers economic growth[4,5]. Developing countries like Bangladesh have focused on meeting Sustainable Development Goal (SDG) 1 of eradicating global poverty in order to strengthen their economy. Although Bangladesh has made progress in poverty reduction, the most recent *State of the Real Economy* report by the Power and Participation Research Centre (PPRC) reveals that 27.9% of the population lives below the upper poverty line[6]. This reflects an almost 10 percentage point increase from the Household Income and Expenditure Survey (HIES) 2022 estimate of 18.7%, indicating a concerning reversal in poverty alleviation[7]. Although the economy grew from 5.78% in 2023 to 5.82% in 2024, rising inequality (Gini index from 0.482 in 2016 to 0.499 in 2022) and inflation (from 9.02% in 2023 to 9.73% in 2024) have offset gains, indicating persistent economic challenges[7,8,9]. These dynamics suggest that growth alone is insufficient for poverty reduction, highlighting the need to address structural challenges. Debates persist regarding the relative influence of macroeconomic variables such as growth, inflation, unemployment, and trade openness on poverty in developing economies[10]. Economic growth can alleviate poverty by creating jobs and revenues, whereas inflation undermines purchasing power and exacerbates inequality[11,12]. Unemployment is a major cause of poverty, as the absence of stable income prevents people from meeting basic needs[8]. In contrast, trade openness may reduce poverty by promoting economic growth and job creation, though its benefits may not be evenly distributed across all segments of society[13]. Understanding these interactions is critical for designing effective policies.

Time series models such as Autoregressive Distributed Lag (ARDL), Vector Autoregressive (VAR), and Autoregressive Integrated Moving Average (ARIMA) are widely used to assess macroeconomic influences on poverty dynamics. VAR and ARIMA models require variables to be stationary at the same order and may not effectively capture long-run relationships. In contrast, the ARDL model is particularly powerful, as it can handle variables with different orders of integration. It also captures both short-run and long-run relationships among variables, making it especially suitable for policy analysis[14]. While some studies have applied ARDL to analyze poverty in other contexts, only a few numbers of research have examined its application in Bangladesh. There is a notable lack of research that investigates the short-run and long-run impacts of macroeconomic factors on poverty. No prior studies have employed the ARDL approach to analyze poverty dynamics in Bangladesh. This study addresses that gap by using ARDL to analyze the effects of inflation, GDP, unemployment, and trade openness on poverty in Bangladesh. This experiment equips policymakers with a deeper understanding of how inflation, GDP, trade openness, and unemployment impact poverty in

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both the short-term and long-term, enabling the formulation of further targeted and effective policy interventions.

II. Literature Review

The relationship between poverty and macroeconomic variables has been widely examined across diverse contexts using time-series and panel data techniques.

Ekpeyong reported that inflation and unemployment significantly affected short-term poverty in Nigeria, though sustained growth reduced long-term poverty[10]. Henneh found that GDP, government expenditure, and lagged poverty rates inversely influenced poverty in Ghana, while Sánchez Dávila highlighted the strong role of economic growth in reducing poverty in Latin America[15,16]. Nurdiana et al. found unemployment raises poverty in South Sulawesi, while growth and inflation have little effect[17]. Tabosa et al. showed that economic growth reduces poverty in Brazil[18].

Similarly, Ebunoluwa and Yusuf found that growth lowers poverty in Nigeria, while unemployment increases it[19]. Studies in Bangladesh, Indonesia, and Pakistan similarly indicate growth lowers poverty, while unemployment, inflation, and trade openness can worsen it[20,21,22].

Overall, empirical evidence consistently indicates that economic growth remains the most consistent driver of poverty reduction, although its effects are mediated by unemployment, inflation, and inequality.

III. Data and Variables

This study utilizes annual time series data for Bangladesh from 1983–2023, primarily sourced from the World Bank. The Ramsey Regression Equation Specification Test (RESET) indicated nonlinearity in inflation and poverty, while unemployment was linear[23]. Missing values for the nonlinear variables were imputed using Kalman smoothing[24], and unemployment gaps were estimated through linear extrapolation[25]. Diagnostic plots and summary statistics confirmed consistency with overall data patterns. The variable names along with their definitions have been presented in Table 1.

IV. Methodology

This study employs the Autoregressive Distributed Lag (ARDL) model to analyze short-run and long-run relationships between selected macroeconomic variables and poverty, based on its theoretical and operational framework detailed below.

Table 1. List of variables.

Variable	Symbol	Definition (Unit of measurement)	Source
Dependent variable			
Poverty	POV	Proportion of the population living below $3.65/day, 2017 PPP, expressed as a headcount ratio (%)	World Bank
Independent variables			
Inflation Rate	INF	Annual percentage change in the consumer price index (CPI), reflecting the rate at which general price levels in the economy are rising (%)	World Bank
Gross Domestic Product	GDP	Annual growth rate of real GDP, measuring the overall economic performance of a country (%)	World Bank
Trade Openness	TRD	Ratio of the sum of exports and imports of goods and services to GDP, indicating the degree of integration with the global economy (%)	World Bank
Unemployment	UNEMP	Share of the labor force that is without work but actively seeking employment (% of total labor force)	World Bank

Autoregressive Distributed Lag (ARDL) Model

The Autoregressive Distributed Lag (ARDL) model is a widely applied econometric approach for examining both short-run and long-run relationships among time series variables. The ARDL model may evaluate the long-run relationship between variables regardless of whether the regressors exhibit a mix of stationarity properties, being either I(0) or I(1); however, it cannot be used if any of the variables are I(2)[15]. Long-run relationships are established through the ARDL bounds testing approach to cointegration[14].

The general ARDL specification is expressed as:

$$\Delta Y_t = \beta_0 + \sum_{j=1}^{p} \beta_j \Delta Y_{t-j} + \sum_{k=0}^{q} \gamma_k \Delta X_{1t-k} + \sum_{l=0}^{r} \delta_l \Delta X_{2t-l} + \sum_{m=0}^{s} \varphi_m \Delta X_{3t-m} + \sum_{n=0}^{t} \kappa_n \Delta X_{4t-n} + \theta_0 Y_{t-1} + \theta_1 X_{1t-1} + \theta_2 X_{2t-1} + \theta_3 X_{3t-1} + \theta_4 X_{4t-1} + \varepsilon_t$$

Where Y_t is the dependent variable, X_{it} $(i = 1,2,3,4)$are explanatory variables, Δ denotes first difference, $\beta, \gamma, \delta, \varphi, \kappa$ are short-run coefficients, $\theta_i (i = 0,1,2,3,4)$ are long-run coefficients and ε_t is the white noise disturbance term.

In the context of this study, the ARDL model is specified as:

$$\Delta POV_t = \beta_0 + \sum_{j=1}^{p} \beta_j \Delta POV_{t-j} + \sum_{k=0}^{q} \gamma_k \Delta INF_{t-k} + \sum_{l=0}^{r} \delta_l \Delta GDP_{t-l} + \sum_{m=0}^{s} \varphi_m \Delta TRD_{t-m} + \sum_{n=0}^{t} \kappa_n \Delta UNEMP_{t-n} + \theta_0 POV_{t-1} + \theta_1 INF_{t-1} + \theta_2 GDP_{t-1} + \theta_3 TRD_{t-1} + \theta_4 UNEMP_{t-1} + \varepsilon_t$$

Bounds Testing for Cointegration

The ARDL bounds test evaluates the existence of a long-run relationship by testing the joint significance of the lagged level variables:

$$H_0: \theta_0 = \theta_1 = \theta_2 = \theta_3 = \theta_4 = 0$$

against

$$H_1: \theta_0 \neq \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq 0$$

If the computed F-statistic exceeds the upper bound critical value, the null hypothesis of no cointegration is rejected, confirming the presence of a long-run equilibrium[28].

Error Correction Model (ECM)

Once cointegration is confirmed, the short-run dynamics are captured through the reparameterized ARDL Error Correction Model (ECM):

$$\Delta POV_t = \beta_0 + \sum_{j=1}^{p} \beta_j \Delta POV_{t-j} + \sum_{k=0}^{q} \gamma_k \Delta INF_{t-k} + \sum_{l=0}^{r} \delta_l \Delta GDP_{t-l} + \sum_{m=0}^{s} \varphi_m \Delta TRD_{t-m} + \sum_{n=0}^{t} \kappa_n \Delta UNEMP_{t-n} + \varphi ECT_{t-1} + \varepsilon_t$$

where ECT_{t-1} is the lagged error correction term and φ represents the speed of adjustment back to equilibrium after short-term shocks.

To ensure the robustness of the model, a series of diagnostic tests, i.e. Breusch-Godfrey-Bertolo LM test, Breusch-Pagan-Godfrey Lagrange Multiplier Test, Jarque-Bera normality test, and Ramsey RESET tests are conducted. These included examinations of serial correlation, heteroscedasticity, normality, and functional form. In addition, stability is assessed using the CUSUM and CUSUMSQ tests, as recommended by Pesaran[14]. The null hypothesis of parameter stability cannot be rejected if the plots remain within the 5% significance boundaries.

Stationarity Test of the Data

Prior to conducting the analysis, the stationarity properties of the data are examined. This assessment is carried out using both graphical techniques and formal unit root tests, namely the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test.

V. Results

Descriptive Statistics

Univariate analysis is performed to examine the statistical properties and trends of the variables, with descriptive statistics presented in Table 2. Poverty value varies from 29.646 to 83.100, with a mean of 64.531 and a standard deviation of 15.693. Inflation ranges between 2.007 and 11.395, averaging 6.310, while GDP growth varies from 2.416 to 7.882, with a mean of 5.298. Trade openness fluctuates between 16.688 and 48.111, with a mean of 29.663. Unemployment shows a minimum of 0.920 and a maximum of 5.000, with a mean of 3.301. Skewness coefficients indicate left-skewness in poverty, GDP, and unemployment, while inflation and trade openness are right-skewed. Kurtosis values suggest platykurtic distributions for all variables except inflation, which is nearly normally distributed.

Figure 1 illustrates the dynamics of the study variables. Poverty follows a steady downward path, while inflation fluctuates around a relatively stable mean. GDP growth remains volatile with shifts in average levels but no clear long-term trend. Trade openness shows a gradual upward trajectory with spikes, and unemployment rises persistently after the early 1990s before stabilizing at higher levels.

Stationarity tests

To check whether the variables are stationary, the ADF and PP unit root tests are carried out, and the results are reported in Table 3. Identifying unit roots is crucial for testing stationarity, and rejection of H_0 confirms stationarity, enabling further econometric analysis. Within the ARDL framework, this verification ensures that variables are I(0) or I(1), but not I(2), thereby satisfying the fundamental assumptions of the model. The results indicate that poverty, trade openness, and unemployment are integrated of order one, I(1), as they become stationary after first differencing. Conversely, inflation and GDP are stationary in levels, i.e., integrated of order zero, I(0). The presence of a mixture of I(0) and I(1) variables validates the use of the ARDL bounds testing framework to investigate long-run relationships.

Table 2. Descriptive statistics of variables.

Variables	Mean	Med	Max	Min	SD	Skewness	Kurtosis
POV	64.531	68.463	83.100	29.646	15.693	-0.722	2.451
INF	6.310	6.045	11.395	2.007	2.136	0.134	3.088
GDP	5.298	5.239	7.882	2.416	1.342	-0.142	2.210
TRD	29.663	28.388	48.111	16.688	9.145	0.379	2.231
UNEMP	3.301	3.620	5.000	0.920	1.228	-0.565	2.046

Fig. 1. Trend of variables included in the study.

ARDL Bounds test for Cointegration

To investigate the long-run equilibrium among the variables, the ARDL bounds testing approach[14] is employed following stationarity analysis. This method accommodates variables integrated at different levels, I(0) or I(1), but not I(2). The computed F-statistic (12.388) from the bounds test, presented in Table 4, exceeds the upper bound critical values at all significance levels, indicating statistical significance at 1%. Consequently, the null hypothesis of no cointegration is rejected, confirming a stable long-run relationship between poverty and selected macroeconomic factors in Bangladesh. This result supports the estimation of an Error Correction Model (ECM) to capture short-run dynamics and adjustment toward long-run equilibrium.

Figure 2 shows AIC values for top 20 models. Based on minimum AIC value, the optimal lag structure, ARDL (3,3,3,1,3) is chosen for this study.

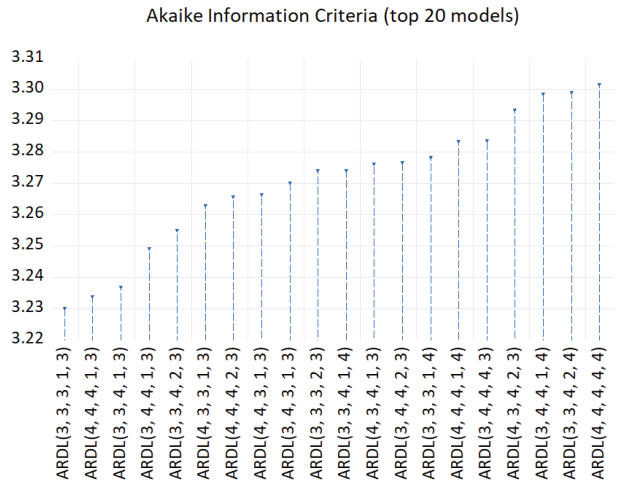

Fig. 2. Akaike information criterion model selection.

Short-run and Long-run estimates

Table 5 presents the short-term effects of key macroeconomic factors on poverty using the ARDL model (3, 3, 3, 1, 3). The first and second lagged differences of poverty have significant negative coefficients (-0.885 and -0.368), showing that past reductions continue to impact current poverty.

While current inflation has a positive but insignificant effect on poverty (coefficient = 0.132), coefficients for the first and second lagged differences are significantly negative (-0.419 and -0.248, respectively). This implies that while immediate inflation doesn't significantly impact poverty, its lagged effects may slow poverty rise, possibly through wage adjustments or policy responses.

Table 3. Unit root tests.

Variables	ADF unit root test		PP unit root test		Integration order
	At Level	Δ	At Level	Δ	
Poverty	5.102	-7.215***	4.713	-7.152***	I(1)
Inflation	-4.353***	-7.856***	-4.3971***	-11.813***	I(0)
GDP	-3.600**	-8.173***	-3.655***	-15.467***	I(0)
Trade	-1.417	-5.775***	-1.454	-5.780***	I(1)
Unemployment	-1.377	-5.489***	-0.781	-7.162***	I(1)

Note: **, *** indicates significance at 5% and1% respectively.

Current GDP growth has a negative but insignificant effect on poverty (coefficient = -0.272), while the first and second lagged terms show significant positive effects (0.642 and 0.373). This suggests that, in the short-run, lagged GDP growth may paradoxically increase poverty, likely due to delayed and unequal distributional effects of economic expansion.

Trade openness has a significant short-run negative effect on poverty (coefficient = -0.285), indicating that a 1% increase in trade openness immediately reduces poverty by 0.29%. Current unemployment has a positive but insignificant effect on poverty (coefficient = 0.659), whereas the first and second lagged differences have significantly negative impact (-1.540 and -1.217). This suggests that past increases in unemployment may slow short-term poverty growth.

Table 4. Bounds Test Results.

Null Hypothesis: No levels relationship		
F-statistic	12.388***	
	Critical Values	
Significance Level	**I(0)**	**I(1)**
10%	2.45	3.52
5%	2.86	4.01
1%	3.74	5.06

Note: *** indicates significance at 1%.

The error correction term is highly significant (coefficient = 0.160), confirming a stable long-run relationship among the variables. This might imply that the contribution of inflation, GDP, and unemployment manifests over a longer period or through indirect channels, which will be explored in the long- run.

Table 6 represents the long-run estimates, showing that inflation has a significant positive effect on poverty (coefficient = 0.731). This suggests that a 1% rise in inflation increases poverty by 0.73% over time, primarily by eroding purchasing power and reducing the real incomes of poorer households.

Table 5. Short-run estimates

Economic Model:
$\boldsymbol{POV = f(INF, GDP, TRD, UNEMP)}$

Variable	Coefficient	t-Statistic
$D(POV(-1))$	-0.885	-5.872***
$D(POV(-2))$	-0.368	-2.439**
$D(INF)$	0.132	1.226
$D(INF(-1))$	-0.419	-2.377**
$D(INF(-2))$	-0.248	-2.041*
$D(GDP)$	-0.272	-1.274
$D(GDP(-1))$	0.642	2.171**
$D(GDP(-2))$	0.373	1.883*
$D(TRD)$	-0.286	-3.919***
$D(UNEMP)$	0.659	1.127
$D(UNEMP(-1))$	-1.539	-2.550**
$D(UNEMP(-2))$	-1.217	-2.146**
$ECMt-1$	0.160	8.622***

Note: *, **, *** indicates significance at 10%, 5% and 1% respectively.

GDP growth has a significant negative long-run relationship with poverty (coefficient = -1.091), implying that a 1% rise in GDP reduces poverty by 1.091%. This confirms that economic growth is crucial for poverty reduction in the long run, as it creates employment opportunities and improves living standards.

Trade openness shows a negative but statistically insignificant effect on poverty (coefficient = -0.088), suggesting its impact may be indirect or require longer time horizons. By contrast, unemployment has a significant positive effect (coefficient = 1.497), indicating that a 1% rise in unemployment increases poverty by nearly 1.5%, underscoring joblessness as a major driver of poverty. The intercept is also highly significant (coefficient = -14.177), reflecting the baseline poverty level when other explanatory variables are held at zero.

Table 6. Long-run estimates

Economic Model:
$\boldsymbol{POV = f(INF, GDP, TRD, UNEMP)}$

Variable	Coefficient	t-Statistic
INF	0.730724	2.736489***
GDP	-1.090699	-2.326691**
TRD	-0.087898	-1.443198
UNEMP	1.497464	2.161457**
Cons	-14.17720	-2.949040***

Note: *, **, *** indicates significance at 10%, 5% and 1% respectively.

Stability test

The diagnostic results, presented in Table 7 indicate that the LM, BPG, Jarque-Bera, and Ramsey RESET tests all produce p-values above conventional significance levels, confirming no evidence of serial correlation, heteroskedasticity, non-normality, or misspecification.

Table 7. Stability tests results

Diagnostic Test Results			
Tests		**Test statistic**	**P-value**
LM test		1.5941	0.2305
BPG test		1.5639	0.1685
JB test		0.6561	0.7203
RESET test		0.0143	0.9062
Robust Statistics			
R-squared	0.9976	Adjusted R-squared	0.9956
AIC	3.2047	SIC	3.9804
HQC	3.4807	Durbin-Watson stat	2.3206

Robustness statistics presented in Table 7 validates the model, with an adjusted R^2 of 0.9956, low AIC, SIC, and HQC values, and a Durbin-Watson statistic (2.3206) within the acceptable range, confirming strong explanatory power and well-behaved residuals.

Stability is confirmed by the CUSUM and CUSUMSQ tests, shown in Figure 3, as both plots remain within the 5% significance bounds. Overall, the model is robust, stable, and well-specified, ensuring reliable empirical estimates.

VI. Discussion

The observed difference between the macroeconomic variables' short-term and long-term effects on poverty alleviation paints an intricate and multidimensional picture. In the short-run, trade openness significantly reduces poverty by improving market access, efficiency, and employment opportunities[13]. GDP influences poverty primarily through its lagged effects, consistent with the "trickle-down" theory[11], while current inflation is largely insignificant. However, lagged inflation and past unemployment exert

significant short-term effects, reflecting delayed wage adjustments, policy interventions, and the vulnerability of jobless individuals[23]. These findings suggest that immediate poverty reduction strategies may benefit from targeted employment programs and short-term trade facilitation measures.

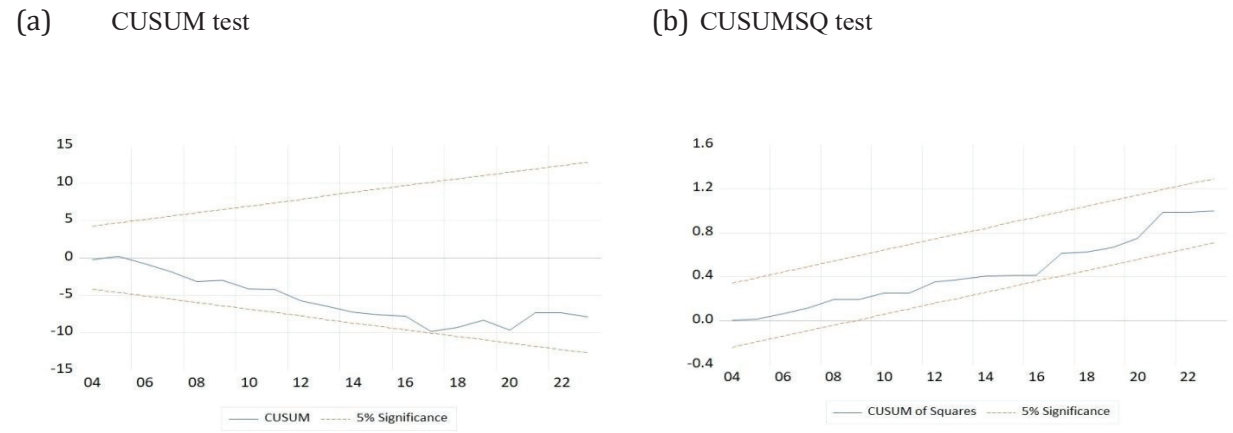

Fig. 3. CUSUM and CUSUMSQ tests.

This study has found that GDP has a negative and significant long-run effect on poverty, suggesting that economic growth contributes to poverty reduction over time. This supports the pro-poor growth hypothesis proposed by Dollar and Kraay [29], which argues that economic growth benefits the poor proportionally. Moreover, this study's finding shows consistency with the findings of Henneh[15] and Sa´nchez Da´vila[16]. In contrast, long-term inflation and unemployment significantly exacerbate poverty, reflecting structural issues such as inflation eroding real income and prolonged unemployment limiting earning capacity[11,12]. Trade openness, while effective in the short-run, appears insufficient for sustained poverty reduction without complementary domestic policies and infrastructure. This nuance encourages future research to explore indirect pathways, such as technology diffusion, labor market reforms, and social safety nets, through which trade openness might affect poverty over extended periods.

VII. Conclusion

According to this study, the ARDL (3,3,3,1,3) model proves to be a reliable tool for examining both the short-run dynamics and long-run equilibrium relationships between poverty and key macroeconomic variables. By capturing these interactions, the model offers deeper structural insights that can guide effective policy formulation. This study results suggest that sustainable poverty reduction in Bangladesh requires policy implementations aimed at maintaining robust GDP growth, ensuring price stability, and lowering unemployment, while also fostering trade openness through strategies that enhance domestic competitiveness. However, the study has certain limitations, including unavailability monthly or quarterly data, the omission of regional differences, and the exclusion of potentially important factors such as income inequality and social expenditure. Future research should therefore consider incorporating broader datasets and additional variables to provide a more comprehensive understanding of the macroeconomic drivers of poverty.

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References

1. Moatsos, M., and A. Lazopoulos, 2021. Global Poverty: A First Estimation of Its Uncertainty. *World Development Perspectives*, **22(C)**.
2. Kaidi, N., S. Mensi, and M. Ben Amor, 2019. Financial Development, Institutional Quality and Poverty Reduction: Worldwide Evidence. *Social Indicators Research*, **141(1)**, 131–156.
3. Zhu, Y., S. Bashir, and M. Marie, 2022. Assessing the Zionship Between Poverty and Economic Growth: Does Sustainable Development Goal Can Be Achieved? *Environmental Science and Pollution Research*, **29(19),** 27613–27623.
4. United Nations, 2015. *Goal 1: End Poverty in All Its Forms Everywhere*. United Nations Sustainable Development Goals. Available at: https://www.un.org/sustainabledevelopment/poverty/ (Accessed: 24 June 2026).

5. Akhtar, Q., S. Butt, and M. Niaz, 2024. Time Series Analysis of Poverty Reduction Indicators: Case of Pakistan, India and Bangladesh. *Qlantic Journal of Social Sciences and Humanities*, **5(2)**, 170–183.
6. Shameem, N., 2025. Poverty in Bangladesh: How Poor Are the Poor? A Dive Beyond the Line. *The Daily Star*, 1 September 2025. Available at: https://www.thedailystar.net/opinion /views/news/ how-poor-are-poor-dive-beyond-line-3975616
7. Bangladesh Bureau of Statistics (BBS), 2023. *Report on the Household Income and Expenditure Survey 2022*. Ministry of Planning, Dhaka, Bangladesh.
8. Xinhua News Agency, 2024. *Bangladesh's Economy Projected to Grow 5.82 Percent in FY 2023–24*. Xinhua News Agency, Beijing, China.
9. The Business Standard, 2024. FY24 Inflation Soars to 13-Year *High.* The Business Standard, Dhaka, Bangladesh.
10. Ekpeyong, P., 2023. Econometric Analysis of the Impact of Inflation, Unemployment, and Economic Growth on Poverty Reduction: A Novel Application of Asymmetric Technique. *Asian Journal of Economics and Empirical Research*, **10(1)**.
11. Ravallion, M., 2001. Growth, Inequality and Poverty: Looking Beyond Averages. *World Development*, **29(11)**, 1803–1815.
12. Easterly, W. and S. Fischer, 2001. Inflation and the Poor. *Journal of Money, Credit and Banking*, **33(2)**, 160–178.
13. Winters, L. A., 2004. Trade Liberalisation and Economic Performance: An Overview. *The Economic Journal*, **114(493)**, 4–21.
14. Pesaran, M. H., Y. Shin, and R. J. Smith, 2001. Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, **16(3),** 289–326.
15. Henneh, O. F., 2023. Impact of Economic Growth on Poverty Reduction: Evidence from Ghana. *Texila International Journal of Management*, **9(2)**.
16. Sánchez-Dávila, E., 2023. The Impact of Economic Growth and Social Expenditure on Poverty Reduction: Panel VAR Analysis for Some Latin American Countries, 2000–2019. *Investigación Económica*, **82(324)**, 51–71.

    Nurdiana, N., M. Hasan, N. Arisah, A. S. Riesso, and D. F. Hasanah, 2020. An Analysis of the Effect of Economic Growth, Inflation, and Open Unemployment on Poverty in South Sulawesi Province. *Journal of Research in Business and Management*, **8(9),** 14–17.
18. Tabosa, F. J. S., J. A. de Araujo, and A. P. Sales, 2020. Conditions of Environmental Degradation in Brazilian Countryside Areas. *Journal of Agricultural Studies,* **8(3)**, 397-419.
19. Ebunoluwa, O. O., and W. A. Yusuf, 2018. Effects of Economic Growth on Poverty Reduction in Nigeria. *IOSR Journal of Economics and Finance (IOSR-JEF)*, **9(5)**, 25–29.
20. Chani, M. I., Z. Pervaiz, S. A. Jan, A. Ali, and A. R. Chaudhary, 2011. Poverty, Inflation and Economic Growth: Empirical Evidence from Pakistan. *World Applied Sciences Journal*, **14**, 1058–1063.
21. Uddin, M. M., 2015. Causal Relationship Between Agriculture, Industry and Services Sector for GDP Growth in Bangladesh: An Econometric Investigation. *Journal of Poverty, Investment and Development*, **8**.
22. Susanto, J., 2014. Impact of Economic Growth, Inflation and Minimum Wage on Poverty in Java. *MEDIA*, **22(1)**.
23. Ramsey, J. B., 1969. Tests for Specification Errors in Classical Linear Least-Squares Regression Analysis. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, **31(2)**, 350–371.
24. Avanzi, F., Z. Zheng, A. Coogan, R. Rice, R. Akella, and M. H. Conklin, 2020. Gap-Filling Snow-Depth Time Series with Kalman Filtering-Smoothing and Expectation Maximization: Proof of Concept Using Spatially Dense Wireless Sensor Network Data. *Cold Regions Science and Technology*, **175**, 103066.
25. Little, R. J. A. and D. B. Rubin, 2019. *Statistical Analysis with Missing Data*. 3rd ed. Hoboken, NJ: John Wiley & Sons.
26. Fields, G. S., 2011. Labor Market Analysis for Developing Countries. *Labour Economics*, **18**, 16–22.
27. Pesaran, M. H. and Y. Shin, 1995. An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. Cambridge Working Papers in Economics No. 9514, Department of Applied Economics, University of Cambridge, Cambridge, UK.
28. Narayan, P. K., 2005. The Saving and Investment Nexus for China: Evidence from Cointegration Tests. *Applied Economics*, **37(17)**, 1979–1990.
29. Dollar, D., and A. Kraay, 2002. Growth Is Good for the Poor. *Journal of Economic Growth*, **7(3)**, 195–225.