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Education, Poverty, and Economic Growth Nexus in Pakistan

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ABSTRACT: This study examines the correlation between education, poverty reduction, and economic growth in Pakistan for the period 1972 to 2023. The analytical procedure of Autoregressive Regressive Distributed Lag (ARDL) reveals that long-run relationships are evident in education, poverty, and economic growth. Education positively influences economic growth and is found to reduce poverty. The study emphasized the connection between economic growth, poverty, and education, highlighting the importance of education in improving socioeconomic standing and reducing poverty. The study concludes that education is a major factor contributing to Pakistan's economic growth and poverty alleviation. It advocates policies promoting economic growth and addressing poverty issues.

KEYWORDS: Education, GDP, Poverty, ARDL, Pakistan, Economic

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Introduction

Background of Study

This study explores the relationship between poverty, economic progress, and educational attainment in Pakistan. Education is a crucial component of economic growth as it lowers poverty, boosts productivity, and encourages economic growth. Pursuance of education is essential for human intellectual and skill development since being a key component of economic growth due to having a quality of self-perception, enhancement of productivity and vision, and raising living standards. It also promotes social cohesion and economic proficiency. Economists recognize the importance of education in driving development and expanding the economy. Education spending is essential to a country's prosperity.

The primary concern at the moment is raising the literacy rate, with the most widely accepted definition being "the percentage of people ages 15 to 24 who can, with understanding, read and write," as provided by UNESCO. Investment in the education sector is crucial for reducing wealth disparities, child labor, terrorism, and child labor. Education is also essential for human competency and sovereignty, as it is crucial for the uptake and dissemination of new technologies and manufacturing techniques. Investing in education has been shown to decrease poverty and boost economic growth. Studies have shown that spending on education has boosted GDP per capita, decreased poverty, and aided in the dissemination of knowledge.

Problem Statement

Education is a catalyst for economic growth due to increased employment prospects, better healthcare, lower fertility rates, technological advancements, and political stability. Pakistan has historically overlooked

education due to issues such as lower education investment, high poverty rates, inflation, income, gender, and regional inequality, poor public and private sector educational facilities, different educational systems, a society that promotes inequality, and poorly implemented educational policies. The relationship between poverty and economic growth has changed over time, with the majority of theoretical work focusing on emerging nations and absolute poverty.

In Pakistan, the connection between poverty, economic growth, and education is crucial, considering other macroeconomic factors like physical capital. Education is a critical component of both human capital and economic progress and higher authorities have consistently ignored it. By addressing these challenges, Pakistan can contribute to its economic growth and human capital development.

Research Objectives

The following objectives form the foundation of this study:

1. In the context of Pakistan's economy, to assess the effects of poverty and education on economic growth.
2. To look into the short- and long-term linkages between poverty, education, and economic advancement within the framework of Pakistan's economy.
3. To identify the causal relationship between Pakistan's economic growth, poverty, and education.

Literature Review

Education is the first step in the process of development since it lays the groundwork for raising a nation's socioeconomic standing. Numerous research on these connections between education and growth are discussed at domestic and international level.

Imtiaz et al. (2023) explored that two key components of any nation's socioeconomic climate are inequality in income and access to education. This investigation rested upon Pakistan's Economic Survey, and the WDI provided the study's data. Explanatory variables such as life expectancy, education, workforce participation rate, and income disparity were measured using the employee headcount ratio (HDR), whereas exploratory variables include life expectancy, education, and income inequality. ARDL was used to estimate empirical outcomes from 1990 to 2019. The findings of this study indicated that although economic disparity drives up poverty in Pakistan, education and labor force participation have a mitigating effect. Numerous job options were created by education, which eventually relieved Pakistan's poverty rate status. According to this study, if education investments may considerably lower poverty in Pakistan, then the government should allocate a larger portion of funds for this purpose.

Shah et al. (2021) examined that poverty reduction is recognized by the world nations to be one of the main goals of achieving economic development. In this research, Shah et al. (2021) clarified through household surveys and binomial long and standard least squares regression that large households and the occupation of the household head in the primary sector are significant and positively correlated with household poverty. In contrast, Multan Division found that household human capital is important and inversely correlated with household poverty. The economic development or per capita household income has

a significant and favorable correlation with household human capital. The study concluded that the government's employment programs help reduce poverty and promote development in the area of interest.

Shaheen et al. (2021) examined the association among financial growth, education, poverty, and joblessness in Pakistan using the Generalized Method of Moments (GMM). This study considered four methods to analyze and compare the growth trajectory of Pakistan by providing an integrated methodology for the research period 1990-2020. This study determined that education affects poverty and unemployment, and these factors ultimately affect economic growth. Evidence shows that there was a substantial correlation between GDP and both the number of people alive in deficiency and school enrollment rates. The research results showed that trade and economic growth are positively impacted by unemployment, whereas it is negatively impacted by education.

Siddique (2018) defined human capital as a key factor in increasing production and accelerating economic growth. Both personal and economic development depend on having healthy human capital. This study used Johansen cointegration to examine how Pakistan's human capital quality improved from foreign aid from 1980 to 2016, in addition to the Granger causality method. Johansen's cointegration results showed a long-run association between foreign aid, human growth index, financial development, and human capital. The findings demonstrated a binary-way causal association between HDI and human investment as well as a single-way causal association between external aid and financial growth.

Afzal et al. (2011) initiated a study to inspect annually over time for consecutive year sequence information on physical gross domestic product, actual corporeal wealth inflows and output, inflation rates, as well as general education enrolment both economically and sociologically during 1970/1971 and 2008/2009. The analysis showed the relationship between education and economic growth. The findings of this research gave evidence to the hypothesis that in Pakistan, educational achievement and economic growth are positively interrelated not only over a long period but also robustly, even during short runs. Macroeconomic instability, fuelled by such factors as 8-year falling food prices, can deny both long-term growth and immediate success from the inflation assumption.

Zaman (2021) constituted a panel of nine remittance recipient countries to explore economic development. The Global Development Indicators database included data from 1990 to 2014. Panel integration techniques were used to find long-term relationships among the variables. Furthermore, ARDL models were used to verify the existence of long-run and short-run relationships. The ARDL model exposed that remittances have a positive effect on economic growth over time. The extension of economic growth is positively affected by education, energy consumption, and income. This study focuses on household final consumption.

Pasha (2023) looked at how Pakistan's growth, inequality, and poverty have changed over the last 40 years. The study concluded that decline in the food prices is main contributory towards downing poverty. However, low GDP, less than modest growth in real expenditure of the poor, and low tax collection hinder the strategies of poverty reduction.

Awan (2011) analyzed the relationship between economic development and poverty. Education was pushed as the primary weapon against poverty, with awareness of the significance of the "Education for All"

campaign and the Millennium Development Goals (MDGs). Consequently, it is imperative to examine the ways in which different degrees of educational achievement influence poverty in Pakistan. This study evaluated the contribution of employment variables, such as gender, experience, and educational attainment, to poverty, encompassing wage earners, self-employed people, employers, and unpaid family workers. The data used for this task came from the Household Integrated Economic Survey (HIES) for the years 1998–1999 and 2001–2002. The probability that an individual is destitute is the variable that a logistic model depends upon. The dependent variable was the individual's poverty, and the explanatory variables were gender, experience, and education. Experience and educational achievement were found to have a negative correlation with poverty occurrence. Higher degrees of education boosts a person's chances of not being impoverished.

Methodological Issues

Data Collection

The time series data is collected from the World Bank Development Indicators for the years 1972 to 2023.

Model Specification

The objective of the study is to find the impact of education and poverty on economic growth. The specific models are given in Eq. [1] and Eq. [2].

GDP=f (LFP, GCF, EDU, BM, TRD) [1]

GDP= Gross domestic products per capita
LFP =Labor force participation
GCF =Gross fixed capital formation
EDU = Education Index (primary, secondary, tertiary, and master)
BM = Broad Money
TRD = Trade

The description of the variables is given in Table 1.

Subsequently, model 2 is given in Eq. [2].

HCR=f (GINI, GDP, INF, EDU, BM, TRD) [2]

Table 1

Description of the Variables

Variables	Explained	Units of Measurement
GDP	Gross domestic product	% of per capita
LFP	Labor force	% of participation rate
GCF	Gross fixed capital formation	% of GDP
EDU	Education Index	primary, secondary, tertiary, and masters
BM	Broad Money	% of GDP
TRD	Trade	% of GDP
GINI	Gini's coefficient	Index
INF	Inflation	Consumer price index

Unit Root Test

Unit root test is conducted to explore the status of stationarity. It is done through the Augmented Dickey-Fuller test. The higher negative number encourages the rejection of the H_0 of non-stationarity. The description of the ADF test is given in Eq. [3].

$\Delta\gamma_t = \beta_1 + \beta_{2t} + \delta\gamma_{t-1} + \gamma i \sum \Delta y\, t - 1 +_t$ [3]

where ε is the white noise residual with zero mean and constant variance, *t* is the time trend and Δ is the differences operator.

Regression Analyses

ARDL Estimate

Once the status of the unit root is validated, the cointegration is found by Autoregressive Distributed Lag (ARDL).

Results of the Study

In this study, the focus is on exploring the impact of education on economic growth and poverty. This section is allocated to know the results of the study. The unit root analysis results are given in Table 2.

Unit Root Analysis

The result of the unit root test is given in Table 2. We use unit root tests prescribed by ADF and Phillip Parron to determine whether the data falls under the assumption of stationary or non-stationary.

Table 2

Unit Root Test

Variables	Augmented Dicky Fuller I(0)	Augmented Dicky Fuller I(1)	Phillips Perron I(0)	Phillips Perron I(1)
GDP	Not Rejected			Not Rejected
GCF	Not Rejected		Not Rejected	
EDU		Not Rejected		Not Rejected
LFP		Not Rejected		Not Rejected
BM		Not Rejected		Not Rejected
TRD		Not Rejected		Not Rejected
GINI	Not Rejected		Not Rejected	
INF		Not Rejected	Not Rejected	

The unit root analyses confirm that all the series are stationary at I(0) and I(1), respectively. Therefore, the ARDL is used to regress the equations prescribed in Eq. [1] and Eq. [2].

Empirical Results

The results of bound test are given in Table 3. The findings confirm the cointegration in both the models since the computed F-statistic is greater than the table value at I(1).

Table 3

Bound Test Results

Model-I (Eq. 1)				Model-II (Eq. 2)			
F-Statistic	Significance Level	I(0)	I(1)	F-Statistic	Significance Level	I(0)	I(1)
9.48	10%	5.41	6.24	7.28	10%	3.21	4.11
	5%	4.82	7.21		5%	3.25	4.29
Conclusion: the existence of cointegration				Conclusion: the existence of cointegration			

Next to the unit root test, the short-run ARDL results are published in Table 4.

Table 4

Short Run ARDL Results (Model-I)

Variable	Coeff	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.65	0.04	-16.23	0.00
D(GDP(-2))	-0.64	0.31	-2.05	0.05
D(GDP(-3))	-0.27	0.22	-1.22	0.24
D(LFP)	-0.05	0.16	-0.32	0.75
D(LFP(-1))	0.23	0.17	1.37	0.19
D(LFP(-2))	-0.33	0.15	-2.26	0.04
D(LFP(-3))	0.36	0.12	2.95	0.01
D(GCF)	1.02	0.51	2.00	0.06
D(GCF(-1))	2.50	0.50	5.01	0.00
D(GCF(-2))	-0.65	0.35	-1.86	0.08
D(EDU)	0.91	1.29	0.71	0.49
D(EDU(-1))	2.12	2.19	0.97	0.35
D(EDU(-2))	0.27	2.46	0.11	0.92
D(EDU(-3))	-5.78	2.28	-2.53	0.02
D(BM)	-0.24	0.13	-1.86	0.08
D(BM(-1))	-0.11	0.18	-0.63	0.53
D(BM(-2))	0.31	0.15	2.16	0.04
D(BM(-3))	0.11	0.09	1.18	0.25
D(TRD)	0.35	0.15	2.34	0.03
D(TRD(-1))	0.10	0.21	0.48	0.64
D(TRD(-2))	-0.44	0.16	-2.71	0.01
CointEq	-0.48	0.22	2.15	0.02

The results make it evident that most of the series are significant. LFP is found to have a negative short-run impact on economic growth. However, GCF stands to have a positive effect on GDP. Moreover, it is crucial to note that the short-run coefficients of EDU are insignificant. Meaning that any significant impact of EDU is not traceable in the short run. The findings on BM are also similar to that of EDU. The effects of trade are also mixed while GDP is in question. Above all, the coefficient of error term is significant and correctly signed, and thus, forty-eight percent of the deviations from equilibrium are adjusted in the long run.

Likewise, Table 5 augments the long-run coefficient results.

Table 5

Long Run ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variables: GDP				
LFP	0.44	0.06	7.70	0.00
GCF	1.10	0.46	2.39	0.02
EDU	4.28	0.09	45.57	0.00
BM	0.47	0.06	7.91	0.00
TRD	0.42	0.06	7.24	0.00
C	34.69	3.67	9.47	0.00

All the variables used in Eq [1] are found to have a significant impact on GDP. Findings on EDU show that 4.28 units of increase in GDP are recorded on one unit increase in EDU. Therefore, it gives confidence to note that

GDP is to rise at the back of the education level of Pakistan. Findings are in line with Shaheen (2021), Afzal et al. (2011), Son et al. (2013), Bah (2023), and Jamel et al. (2020). Moreover, higher LFP tends to post a positive effect on GDP, similar to GCF. The impact of broad money is also found to have a linear relationship with GDP, akin to TRD. The constant of the model is also found to be significant, which shows a positive and significant part of the omitted variables. Moving towards Model-II, where the dependent variable is GDP and the core independent variable is poverty, the results are published below.

Table 6 gives the short-run coefficient results. The findings recorded in the case of INF confirm an increase in poverty at the back of any increase in the prices. Most of the short-run impacts of BM are negative. However, at the lag of one year, a significant effect of TRD is recorded as far as HCR is concerned. The coefficient of error term is significant and correctly signed and thus show that thirteen percent of the deviations from equilibrium are adjusted in long run.

Table 6

Short Run ARDL Results (Model-II)

Variable	Coeff	Std. Error	t-Statistic	Prob.
D(HCR(-1))	-0.21	0.19	-1.13	0.27
D(HCR(-2))	-0.07	0.18	-0.42	0.68
D(HCR(-3))	-0.49	0.19	-2.54	0.02
D(GINI)	0.00	0.14	-0.03	0.98
D(GDP)	-0.07	0.06	-1.24	0.23
D(INF)	0.01	0.02	0.31	0.76
D(INF(-1))	0.02	0.02	1.08	0.29
D(INF(-2))	0.05	0.02	2.42	0.03
D(INF(-3))	0.05	0.01	4.25	0.00
D(EDU)	0.39	0.44	0.90	0.38
D(BM)	-0.13	0.73	-0.17	0.87
D(BM(-1))	-1.29	0.72	-1.78	0.09
D(BM(-2))	-1.34	0.65	-2.06	0.05
D(BM(-3))	-0.03	0.05	-0.48	0.64
D(TRD)	-0.10	0.08	-1.29	0.21
D(TRD(-1))	0.14	0.07	2.09	0.05
D(TRD(-2))	-0.05	0.04	-1.24	0.23
D(TRD(-3))	0.05	0.05	0.98	0.34
CointEq	-0.13	0.06	2.08	0.03

Likewise, Table 7 supplements the long-run coefficient results.

Table 7

Long Run ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variables: HCR				
GINI	14.85	4.31	3.45	0.00
GDP	6.03	3.90	1.55	0.14
INF	6.45	2.08	3.10	0.01
EDU	-129.47	31.70	-4.08	0.00
BM	-0.48	2.63	-0.18	0.86
TRD	9.37	3.21	2.92	0.01
C	-486.99	181.86	-2.68	0.01

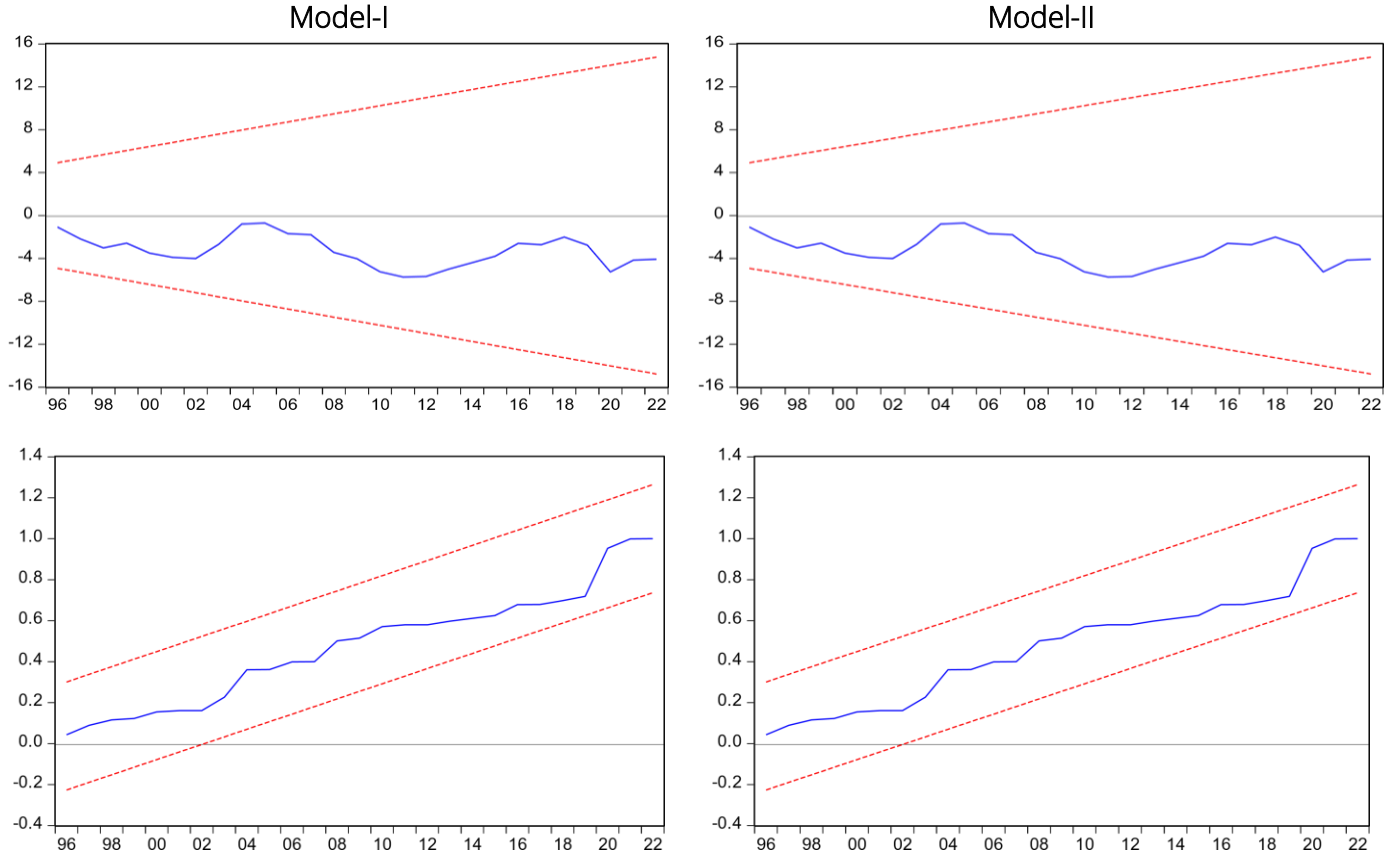
The long-run coefficient results on GINI substantiate that inequality leads to poverty. GINI's coefficient is substantial in reflecting poverty (Li & Kang, 2024; Sahoo et al., 2024). The results of this study validate that a unit increase in GINI's coefficient tends to increase poverty by 14.85 units. Similarly, akin to short-run results, the increase in price level also posts a significant rise in poverty. However, the effects of education are recorded to be negative. Some researchers believe that the relationship between education and poverty is multifaceted (Gewirtz, 2017). Therefore, it gives confidence to state that an increase in the level of education transforms the poverty figures into a downward inclination. Quality education is necessary to achieve the targets (Sarjito, 2024). The effects of TRD are recorded to increase poverty, which is surprising. The reason may be that TRD is based on information technology and is highly mechanized. Therefore, the reward for work is mostly taken by the capital-intensive base, and the people who are victims of poverty remain in a state of poverty.

Stability Analyses

Figures 1 and Figure 2 display the CUSUM and CUSUM Squares test graphs, which are used to verify the stability of the model. Given that the computed lines fall inside the crucial boundaries at the 5s% level of significance, the CUSUM and CUSUM Squares tests. The suggested models are unstable if the lines reach the critical boundaries. The outcomes show that the models are statistically stable and do not contain any structural breaks.

Figure 1

CUSUM and CUSUM Squared Test



Conclusion and Recommendations

The study emphasized the connection between economic growth, poverty, and education, highlighting the importance of education in improving socioeconomic standing and reducing poverty. It examined the relationship between GDP per capita, labor force participation rate, broad money, and commodity trade. The ARDL test was used to examine the causative relationship and short and long-term connections between education poverty and economic growth. The bound test validated that long-run cointegration was evident in both models. Education was found to positively affect GDP. Moreover, LFP, GCF, BM, and TRD were also detected to positively affect GDP. It is significant to note that the impact of education on poverty was negative. More education led to the fade of the shadow of poverty. Poverty was also found to rise at the back of income inequality and inflation.

As a policy commendation, the following submissions are recommended:

- The government should rely upon education to favor economic growth.
- Reducing poverty by increasing education should be a top priority for the government and policymakers.
- The government, which focuses on reducing poverty and intends to achieve higher economic growth, should create room for better education facilities within the country so that macroeconomic stability is achieved.
- The study also suggests that the government must prioritize education in order to advance economic development.
- Poverty reduction, economic growth, and better education should be considered supplementing one another thus sensitive approach is required to address the socioeconomic disturbances through better education and learning.

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