An Empirical Analysis of Social Sector Expenditure and Economic Growth in India : An ARDL Approach

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Abstract

Purpose : The current analysis examined the relationships between spending in India's social sector and economic growth between 1990–1991 and 2019–2020.

Methodology : This study is based upon secondary data and includes different sections such as descriptive, unit root, cointegration, bounds tests, and autoregressive distributed lagged (ARDL) model. The variables amalgamated in the study are economic growth ; education; sports, medical, and public health ; urban development; art and culture ; social security and welfare; and gross fixed capital formation (GFCF). Analysis was conducted by using EViews 10 software.

Findings : The findings of the analysis demonstrated a significant long-term correlation between social sector spending and India's economic growth. The results demonstrated that, over time, the factors of GFCF, sports, education, and public and medical health — all had a beneficial impact on economic growth. However, in the short and long terms, social security, welfare, and urban development had a detrimental impact on economic growth.

Practical Implications : The results offered policymakers useful takeaways, highlighting the necessity of giving investments in industries like healthcare and education priority while addressing the detrimental effects of urban development and social security on economic growth. Future studies could examine the underlying causal processes of the associations that have been identified and evaluate the efficacy of particular policy measures in fostering sustainable economic development.

Originality : The study is novel because it is used to conduct a thorough analysis of the relationship between social sector spending and economic growth in India. The research added to the body of knowledge on development economics by providing in-depth insights into the dynamics of this relationship and an ARDL approach by combining a variety of social sector components and control variables.

Keywords : economic growth, social sector expenditure, medical and public health, autoregressive distributed lagged (ARDL), sports and culture

JEL Classification Codes : E62, H51, H52, H53, O4

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Economic growth and social sector spending have been found to be correlated throughout time by the development process (Khan & Bashar, 2015; Sarwar et al., 2021). The expansion of social services can be considered a special gift of economic development. The need for services increases as growth moves forward, necessitating the extension of current offerings (Alper & Demiral, 2016; Khan & Bashar, 2015). The government tries to provide significant sums of money for this purpose in an effort to meet the growing demand

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for social services (Lakshmanasamy, 2021). In this approach, development led to the extension of social services. These programs assist in eradicating things like unemployment, sickness, poverty, deprivation, and illiteracy. The United Nations Development Program (UNDP) claims that since they lack access to health care and education, the impoverished are ill-prepared to contribute positively to society. According to Binswanger (2007), empowering the impoverished is crucial for development since it guarantees them an equal chance to take part in economic activity. In order to achieve long-term economic development, human capital assets are considered to be essential (Khodabakhshi, 2011). Economic growth can be facilitated by human capital (Hakooma & Seshamani, 2017; Pelinescu, 2015; Whalley & Zhao, 2013). According to Becker (1962), investing in human capital increases a person's efficiency. The fundamental idea is that physically and intellectually healthy workers will produce more.

Thus, studies have demonstrated how human capital contributes to the explanation of either constant or variable national growth (Aka & Dumont, 2008; Kaur & Mishra, 2017; Ray & Sarangi, 2021). The acquisition of human capital is considered to be essential for economic growth and individual development in modern analyses of economic progress and advancement (Suri et al., 2011; Škare & Lacmanović, 2015). Human capital, which is a group of intangible resources, is necessary to boost production (Goldin, 2016).

Economic research has found value in the studies that highlight the role that human capital plays in economic progress. According to Schultz (1961) and Becker (1962), an individual's human capital is the knowledge, skills, competencies, and talents that they have earned from training, education, migration, and medical care. One of the most important investments in human capital, for instance, is considered to be education. Numerous studies have been conducted on the relationship between education and growth, and it is crucial to the process of economic expansion. Decision-makers are interested in the composition of government spending. The government is concentrating its efforts because it believes that funding for housing, healthcare, education, and water and sanitation will boost economic growth, lower poverty, and advance income equality (Anand & Ravallion, 1993; Cash, 2023; Gupta et al., 2002). Governments are being urged to increase their expenditure on water facilities, sanitation, healthcare, and education by international financial institutions, non-governmental organizations, and donors. Government spending on basic education should be increased in light of the anticipated social sector returns. Priorities for social services include housing, urban development, family welfare, healthcare, nutrition, education, sports, art, and culture; water and sanitation; the welfare of workers and social security; the well-being of scheduled castes and scheduled tribes as well as other disadvantaged groups; and social security and welfare of workers (Midgley, 1995). The rural development program, which focuses on reducing poverty and creating jobs, is a part of the economic services sector. Both income and capital costs may be included in this spending category.

To understand the effects of social sector spending on economic growth, we must highlight the implications of social spending on social development (Ghai, 2000). The United Nations Development Programme defines social sector development as "Human development that improves human capacities and expands human choices is referred to as sustainable human development." Social integration, social transfers, and social services comprise the three main aspects of social development. According to Johnny et al. (2018), social services include health and education. The three types of social transfers that lessen conflict and promote peace are social security, income, and paid employment (Ghosh, 2006).

Using the autoregressive distributed lagged (ARDL) paradigm to thoroughly examine the relationship between economic growth and social sector expenditure in the Indian setting following a review of the literature, there is a research gap. A noticeable lack of research exists that covers a wider variety of social sector expenditures, despite the fact that earlier studies have focused on particular aspects of social spending, such as education, housing, nutrition, water supply, and sanitation. Moreover, the majority of the work now in publication tends to concentrate on immediate effects, ignoring the investigation of long-term dynamics and plausible feedback mechanisms. This study closes this gap by looking at a variety of variables, but it also makes a unique contribution by being the first to investigate this relationship across the long period of 1990 to 2020. Therefore, by addressing this, the current study plugs the research gap on the dynamics of economic growth and social expenditure in India that needs further examination.

When it comes to long-term dynamics, in particular, there is still a dearth of research on the relationship between social sector expenditure and economic growth in India (Joshi, 2006). For policymakers to effectively promote inclusive growth, research employing ARDL models can yield important insights. Moreover, worldwide patterns underscore the significance of this kind of study in tackling socioeconomic inequality and formulating fair development plans. Thus, studying the relationship between spending in the social sector and economic expansion is consistent with both national development economics goals and international trends.

Review of Literature

The literature study in this paper presents a variety of arguments supporting the notion that there is a connection between economic growth and social sector spending.

The government expenditure theory of Keynes was employed in the study to establish a theoretical link between government spending and economic growth. As an exogenous cause that may be used as a tool for policy, government spending is seen by Keynes as a threat to endogenous growth theories such as Peacock–Wiseman and Wagner's, which saw public expenditure as an endogenous component of growth (Keynes, 1936). According to Keynesian economic theory, more government expenditure motivates lawmakers to enact expansionary fiscal policies, which in turn spurs economic growth. An increase in government expenditure highlights and boosts output, which raises aggregate demand and increases gross domestic product (GDP). Therefore, an increase in government spending is anticipated to result in a comparable increase in output under constant conditions. Using this theoretical framework, we forecast that government spending and economic growth in India will be positively correlated. By promoting social welfare through the adoption of pertinent political, economic, social, and legal policies and programs, governments play a crucial role in influencing the economy (Jibir & Aluthge, 2019; Sepulveda, 2015). In order to increase GDP, Keynes suggested that government expenditure may be utilized as a tool (Alshammary et al., 2022; Arestis et al., 2021; Paul & Furahisha, 2017). We create a model that considers macroeconomic factors like gross fixed capital creation and gauges economic development in connection to social sector spending based on these theoretical underpinnings. The analysis of studies on the relationship between spending in the social sector and economic expansion revealed a range of findings. Promoting growth and raising productivity requires enhancing the social sector's ability to create inclusive, healthy, and economically resilient communities (Arora, 2001; Guha & Chakraborty, 2003; Ravi & Dev, 2007). A number of studies have demonstrated the negative impact that social sector spending on health and education has on economic development. These studies have generally been attributed to problems such as bureaucratic inefficiency, corruption, and insufficient investment (Eggoh et al., 2015; Rajkumar & Swaroop, 2008). Numerous studies, including Ayuba (2014), Alam et al. (2010), Baldacci et al. (2008), Berg et al. (2018), Chadha and Chadda (2020), Khusaini (2016), Sapuan and Sanusi (2013), Soni and Jariwala (2019), and Thewissen et al. (2013), suggested that increased public investment in social sectors has a positive impact on overall economic growth.

However, several studies found a negative correlation between social sector spending and economic progress (Arjona et al., 2003; Cammeraat, 2020). The study conducted by Aydan et al. (2022) showed how health and social spending, along with the economic freedom index, influence the well-being of society positively the study was conducted across 34 OECD countries from 2013 to 2017. The study conducted by Bellettini and Ceroni (2000) for 61 countries by using panel data demonstrates a positive correlation between economic growth and social security expenditure across these countries.

Data and Methodology

The main objective of the study is to study the long-run and short-run relationship between economic growth and social sector expenditure in India. The null and alternative hypotheses are given below:

➯ **H01 :** There exists no long-run and short-run relationship between economic growth and social sector expenditure in India.

➯ **Ha1 :** There exists a long-run and short-run relationship between economic growth and social sector expenditure in India.

The current analysis focuses on secondary data from publications produced by the Reserve Bank of India (RBI) and the World Development Institute (WDI) that span 30 years from 1990 to 2020. The long- and short-term relationships between spending in the social sector and economic growth were examined in this study. The current study takes into account a number of important factors, including welfare, social security, education, sports, art and culture, medicine and public health, and urban development. The variables are gauged in terms of both its revenue and capital components. The RBI state finances provided the information for each of these factors. The total cost is then calculated by combining the capital and revenue components. Within the context of research analysis, this method enables a thorough investigation of spending trends in these important sectors.

In addition, the GDP per capita (constant LCU) provided by the World Development Indicators (WDI) served as the dependent variable in the study that represented economic growth. Furthermore, the control variable gross fixed capital formation (GFCF) as a proportion of GDP was extracted using the WDI dataset. This extensive dataset makes it possible to analyze in detail the connections between economic growth and social sector spending across a range of sectors while accounting for the influence of gross fixed capital creation.

The model used in the study is given below in Equation 1.

$$GDP_t = \alpha_0 + \alpha_1 EDU_t + \alpha_2 HEL_t + \alpha_3 SS_t + \alpha_4 UD_t + \alpha_5 GFCF_t + \mu_t \qquad (1)$$

From Equation (1), GDP acts as an indicator of economic growth, measuring the overall value of goods and services manufactured within a country's borders. α_0 is constant term α_1, α_2, α_3, α_4, and α_5 are the slope coefficients of the model concerning the dependent variable and μ_t is an error term. The variables *EDU* (education, sports, art, and culture), *HEL* (medical and public health expenditure), *SS* (social security and welfare spending), *UD* (urban development expenditure), and the control variable are represented by these letters. As a percentage of GDP, gross fixed capital formation is represented by GFCF. In this study, mandatory tests were conducted before applying the primary model to better understand and depict the relationship between regressed and regressors; as a result, our model was converted to log form, as shown in the equation, to reduce the fluctuations in the data set as seen in Equation (2).

$$\text{Ln}GDP_t = \alpha_0 + \alpha_1 \text{Ln}EDU_t + \alpha_2 \text{Ln}HEL_t + \alpha_3 \text{Ln}\,SS_t + \alpha_4 \text{Ln}UD_t + \alpha_5 \text{Ln}GFCF_t + \varepsilon_t \qquad (2)$$

The ARDL Model

The study employs the ARDL technique to investigate both short- and long-term interactions as well as dynamic interactions between variables of interest. Pesaran et al. (2001) advocated a method for examining the occurrence of an interaction between the variables through the application of an ARDL model. This method offers numerous advantages: (a) The test is applied whether the variables are integrated of order $I(0)$, $I(1)$, or a combination of both since no series is integrated of order 2 ; (b) It is possible to estimate both the short- and long-term effects simultaneously without sacrificing any information ; (c) The test method is applicable to investigations of small samples, unlike most traditional multivariate cointegration procedures that are suitable for big datasets (Erdogan, 2022; Pesaran et al., 2001) ; (d) Shin et al. (1999) found that the ARDL model's adequate number of lags can resolve endogeneity and serial correlation problems. The ARDL method consists of five phases. In the first stage, the stationary of the variables is verified to ensure that they are either $I(0)$ or $I(1)$. The next step is the lag selection criterion, which is chosen based on the Akaike information criterion (AIC). The variable's cointegration relationship was then explored using the ARDL limits test (Liu et al., 2018). Next, the effects of social sector spending on economic growth are examined using both short- and long-term models. Finally, the residual diagnostic tests for heteroscedasticity, serial autocorrelation, and normality tests are undertaken (Cherni & Jouini, 2017). The stability of the model was checked by using the CUSUM and CUSUMSQ statistics.

Unit Root Test

An enhanced version of the Dicky Fuller test (Poku et al., 2022) was utilized in the study, and the Augmented Dickey-Fuller (ADF) test is the first step in determining whether the variables have unit roots or not. The H_{02} is that the Dickey-Fuller test assumes uncorrelated error terms similar to white noise terms, while the H_{a2} is that they are not. The ADF test is applied in cases when error terms might show a link between the variables. This choice is based on the observation that several macroeconomic indicators frequently show trends and have a tendency to be connected (Poku et al., 2022). This test is important since it is used both after the first difference and at the level. Furthermore, to improve robustness and consider autocorrelation problems, lag duration must be included in the ADF test (Mperejekumana et al., 2023). The ADF test is represented by generic Equation (3), which is provided below.

$$\Delta T_t = \text{₡}_0 + \text{₡} T_t + \sum_{i=k}^{op} Q_I \Delta T_{t-1} + \mathcal{E}_t \quad (3)$$

Δ represents the first difference operator, T_t signifies time, ₡_0 denotes constant, and OP denotes the maximum lag numbers on the regressed, while $\mathcal{E}_t$ denotes the white noise in the error term.

The Estimation Technique (ARDL) Model

The general equation for the ARDL model is given below:

$$\Delta \text{Ln}GDP_t = \alpha_0 + \sum_{i=1}^{M} \alpha_{1i} \Delta \text{Ln}GDP_{t-i} + \sum_{i=1}^{S} \alpha_{2i} \Delta \text{Ln}EDU_{t-i} + \sum_{i=1}^{F} \alpha_{3i} \Delta \text{Ln}HEL_{t-i} + \sum_{i=1}^{G} \alpha_{4i} \Delta \text{Ln}SS_{t-i} + \sum_{i=1}^{H} \alpha_{5i} \Delta \text{Ln}UD_{t-i} + \sum_{i=1}^{i} \alpha_{6i}$$
$$\Delta \text{Ln}GFCF_{t-i} + \theta_1 \text{Ln}GDP_{t-i} + \theta_2 \text{Ln}EDU_{t-i} + \theta_3 \text{Ln}HEL_{t-i} + \theta_4 \text{Ln}SS_{t-i} + \theta_5 \text{Ln}UD_{t-i} + \theta_6 \text{Ln}GFCF_{t-i} + \mathcal{E}_t \quad (4)$$

In Equation (4), α_0 is the constant intercept term, Δ represents the first difference operator M, S, F, G, and H represent lag order, $\alpha_{1i}, \alpha_{2i}\ldots,\alpha_{6i}$ the short-run coefficients and represent $\theta's$ represent the long-run slope coefficients, and $\mathcal{E}$ represents the error term sign (Koondhar et al., 2021; Mensah et al., 2019; Singhal et al., 2023).To assess the presence of long-run cointegration among variables, we conducted a test to examine the null hypothesis indicating the absence of cointegration I, i.e., $H_{03} = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ was used to test against the alternative hypothesis, i.e., $H_{a3} = \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$. The F-test is used to determine the presence or absence of a long-term cointegration between the variables (Cherni & Jouini, 2017). A bound F-test approach was assessed based on the critical value reported by Pesaran et al. (2001). Whether or not time series are included, significant degrees of connection correlate to two crucial values: A difference at the level is shown by $I(0)$, while the first difference is represented by $I(1)$ (Koondhar et al., 2021). We have access to the upper and lower boundaries of the values UBC and LBC in addition to the critical values (Cherni & Jouini, 2017; Koondhar et al., 2021). In cases where the F-statistic is larger than the critical value associated with a given level of significance, the conclusion is to accept the alternative hypothesis (H_{a3}). If the F-statistic critical value is less than that of the lower limit, the alternative hypothesis (H_{a3}) is rejected (Narayan, 2004). As long as the F-state is retained under both the (UBC) and (LBC), the result will be inconclusive (Ha & Ngoc, 2021; Koondhar et al., 2021). Using the AIC criterion of the ARDL model, we computed the long-run relationship between the variables. The short-term association between variables will be investigated using the error correction term (ECT_{t-1}) following the analysis of the long-term relationship (Ha & Ngoc, 2021; Kaur & Mishra, 2017; Koondhar et al., 2021). Short-run correlation analysis was performed using Equation 5.

$$\Delta \text{Ln}GDP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta \text{Ln}GDP_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta \text{Ln}EDU_{t-i} + \sum_{i=1}^{n} \alpha_{3i} \Delta \text{Ln}HEL_{t-i} + \sum_{i=1}^{n} \alpha_{4i} \Delta \text{Ln}SS_{t-\text{i}} + \sum_{i=1}^{n} \alpha_{5i} \Delta \text{Ln}UD_{t-i} + \sum_{i=1}^{n} \alpha_{6i}$$
$$\Delta \text{Ln}GFCF_{t-i} + \propto ECT_{i-1} + \gamma_t \quad (5)$$

The ECT_{i-1} in Equation (5) represents an error correction term that recognizes the speed of adjustment and illustrates how the long-run equilibrium is reached in a short interval of time. According to Koondhar et al. (2021), the ECT_{i-1} should be zero to minus one (2021). The stability and diagnostic tests were used to confirm the model's quality and fit; for this, the study used autocorrelation, normality, and heteroscedasticity. The stability of the model was examined by employing both the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ). Both the AR features polynomials proposed by Brown et al. (1975) and Koondhar et al. (2021).

Analysis and Results

Descriptive Statistics

Table 1 presents an overview of the summary statistics of the data pertaining to the selected variables of the model, detailing the mean, median, maximum and minimum values for each variable. Additionally, standard deviation, skewness, and Kurtosis are provided for the variables. They are ensuring the mean and median values of each variable fall within their respective bounds, which is used for assessing data consistency and suitability for estimation. The data are considered adequate for study estimation if the mean and median align with the variable's maximum and minimum values.

Unit Root Test

Table 2 exhibits the outcomes of the ADF test for all pertinent variables at both levels as well as the first difference forms. We can conclude from the results that we fail to reject the null hypothesis H_{02} of a unit root for all variables at the level form and accept the alternative hypothesis H_{a2} except LUD, which is stationary at level $I(0)$. This indicates that the variables are stationary in the first order (1). Given that all variables show stationarity at $I(1)$, our next step is to assess whether they exhibit cointegration or not. It is a standard requirement for ARDL models to

Table 1. *Descriptive Statistics*

Mean	10.85620	11.41864	10.04054	8.923518	9.116010	3.359946
Median	10.81986	11.22469	9.780572	9.073541	9.307465	3.351071
Maximum	11.57706	13.17863	11.91768	10.95222	11.40620	3.578308
Minimum	10.25805	9.668398	8.482602	7.237059	6.697034	3.150978
Std. Dev.	0.417650	1.092474	1.071342	1.052640	1.579120	0.126432
Skewness	0.192155	0.078823	0.321865	0.169230	–0.112853	0.073191
Kurtosis	1.797185	1.789355	1.845282	2.192963	1.628543	1.826549

Table 2. ***Results of the Augmented Dickey-Fuller (ADF) Test***

Variables	Level		Ist Difference	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LGDP	2.165408	–3.132006	–5.015543*	–5.037704*
LHEL	0.878330	–1.617234	–3.633854**	–3.633854**
LEDU	0.840346	–3.109572	–3.176295**	–3.758166**
LSS	0.696651	–2.175789	–4.515920***	–4.361928**
LUD	–0.622598	–3.888708**	–5.136414***	–5.038319
LGFCF	–1.218282	–3.056974	–6.225271***	–6.371810***

Note. ***, **, * represents the 1%, 5%, and 10% level of the significance.

have stationary variables at *I*(0) and *I*(1). As a result, we may examine the data using the ARDL approach, as demonstrated by writers who have already estimated the ARDL model (Bashir & Ayoub, 2023; Soni & Jariwala, 2019).

Critical values with an intercept at the level are (–3.679322, –2.967767, –2.622989) at the 1%, 5%, and 10% significance levels, respectively. At the first difference, the intercept is (–3.689194, –2.971853, –2.625121), and the intercept and trend are (–4.309824, –3.574244, –3.221728). The crucial values have to be less than the table value at a certain level of significance.

Table 3 presents the ARDL bounds test results; *F*-statistics was calculated at a 10% level of significance, which is larger than UBC (critical upper bound)- *I*(1). The results indicate that there is a long-run relationship between variables and hence refute the null hypothesis, accepting the H_{03}. At a 10% level of significance, the computed value of the *F*-statistics is 3.107071, which is greater. This implies that the variables have a long-term relationship. It is said that cointegration exists when the *F*-statistics is higher than the *I*(1) at any level of significance.

The study used the ARDL model to derive the long-run and short-run coefficients as well as the accompanying error correction model (ECM) after the bunds test confirmed that the variables are co-integrated (Pesaran

Table 3. ***ARDL Bounds Test***

F Bounds Test		H01 : There exists no relationship at the level.		
Test Statistic	Value	*I*(0)	*I*(1)	Sig.
F-stat.	3.107071	2.08	3	10%
K	5	2.39	3.38	5%
		2.7	3.73	2.5%
		3.06	4.15	1%

Table 4. ***Long-Run Coefficient Estimation Based on the ARDL***

Variables	Coefficients	S. Error	*t*-Statistic	*p*-value
LHEL	0.266942	0.07445	3.585519	0.0037***
LEDU	0.224854	0.109223	2.058671	0.0619*
LSS	–0.067529	0.028879	–2.338377	0.0375**
LUD	–0.061718	0.030634	–2.014688	0.0669*
LGFCF	0.674541	0.188433	3.57975	0.0038***

Note. The ***, **, and * specify the level of significance of 1%, 5%, and 10%.

et al., 2000). The best lag choices were determined to be the ARDL (2, 2, 2, 2, 0, 2) by applying the AIC to the variables. Table 4, which is provided below, shows the long-run coefficients. The results display that all the variables are statistically significant. The coefficients of LSS and LUD are negative, and the coefficients of LHEL, LEDU, and LGFCF and positive along with the economic growth. The coefficient of LHEL and LEDU are statistically significant at 1% and 5% levels of significance, and it implies that with a 1% increase in LHEL and LEDU expenditure, the growth rate of the economy will increase on an average by 0.266942 and 0.224854% in the long run. With an increase in one percent of LGFCF, economic growth will increase by 0.674541 at a 5% level of significance of 1%, i.e., with the increase in one percent of GFCF, economic growth will rise by 0.674541.

The short-run results are presented in Table 5. The coefficient of the ECM was found to be negative and highly significant, supporting the evidence that economic growth and social sector expenditure are stable over the long run. Based on the value of the coefficient, deviations from the long-run equilibrium will be corrected by 58% in the following year. The short-run coefficient of $D(LSS(-1))$ is positive in the short run and statistically significant, meaning that with an increase in 1 percent expenditure on LSS, the economic growth will rise by 0.032547. The elasticity perimeter of $D(LHEL(-1))$, $D(LEDU(-1))$ is –0.184632, –0.196187. This indicates that with a 1% increase in *LHEL* and *LEDU* expenditure, the economic growth will decline by 0.184632, 0.196187 % in the short run. The control variable, GFCF, negatively impacts economic growth in the short run, but the coefficient is statistically significant; that is, with the increase in the 1% of GFCF, the economic growth will decline by 0.032547.

Table 5. *Estimation of Short-Run Coefficients Using the ARDL*

Variables	Coefficient	S. Error	*t*-Statistic	*P*-value
C	2.650607	1.299563	2.039614	0.064*
D (*LGDP*(–1))	0.453209	0.240721	1.882713	0.0842*
D (*LHEL*)	0.063803	0.077374	0.82461	0.4257
D (*LHEL*(–1))	–0.184632	0.074824	–2.467538	0.0296**
D (*LEDU*)	0.327136	0.095169	3.437426	0.0049***
D (*LEDU* (–1))	–0.196187	0.095808	–2.047706	0.0631*
D (*LSS*)	–0.009383	0.009214	–1.01836	0.3286
D (*LSS* (–1))	0.032547	0.011632	2.797971	0.0161**
D (*LUD*)	–0.035917	0.014633	–2.454505	0.0303**
D (*LGFCF*)	0.27093	0.091327	2.966581	0.0118**
D (*LGFCF* (–1))	–0.193382	0.075478	–2.562087	0.0249**
CointEq (–1)	–0.581948	0.101886	–5.711764	0.0001***

Note. ***, **, and * specifies the level of significance of 1%, 5%, and 10%.

Diagnostic Test

According to Bashir and Ayoub (2023) and Mendali and Das (2018), the stability of the underlying model has a significant impact on the consistency of the empirical data. A little inconsistency persists even after the CUSUM, CUSUMQ, and inverse root tests verify the model's fitness. The study employed stability tests to verify the model's suitability and quality (Table 6). Although the alternate hypothesis (H_{a4}) states that the residuals are not normally distributed, the results support our rejection of the H_{a4}. The null hypothesis states that the residuals are normally distributed (H_{04}). Therefore, based on the Jarque–Bera test of normality, we conclude that the residuals follow the normal distribution. The LM test confirms that the residuals do not suffer from the problem of serial correlation. The H_{05} is that there is no serial correlation, while the H_{a5} is that there is a serial correlation. We reject

Table 6. *Results of Diagnostic Tests*

Tests	*F*-Statistics	*P*-value
Heteroscedasticity test	0.3129	0.2907
Serial correlation LM test	0.3519	0.1367
Normality test	14.94486	0.000569

the H_{05} since there is a serial correlation in it, and the data shows that there is no issue with serial correlation because $p > 0.05$. Additionally, the data demonstrate that heteroscedasticity is not an issue. We utilized the Breusch – Pagan Godfrey test for this. According to the hypothesis (H_{06}), heteroscedasticity is an issue. The findings verify that we reject the H_{06} and determine that there is no issue with heteroscedasticity and an inverse root of an autoregressive polynomial graph (AR) by using VECM. This indicates that the model fits the data that is shown in this article (Koondhar et al., 2021). As a result, the results are trustworthy.

Results of Stability Tests

We utilized cumulative sum of squares (CUSUMSQ) and (CUSUM) to verify the robustness of the ARDL model and to ensure the stability of our results (Al Qudah et al., 2020; Bashir & Ayoub, 2023). Figure 1 shows the outcomes of CUSUMSQ and CUSUM. The figure suggests that our estimated model is stable, and there is no statistically significant confirmation of structural instability in CUSUMSQ and CUSUM. The hypothesis (H_{07}) is that the coefficients of the model are not stable. Suppose the value falls beyond critical bounds at a 5% level of significance. In that case, we conclude that the model is stable and reject the H_{07} hypothesis and accept the H_{a7}. The results of the ARDL models indicate a long-run nexus between LGDP, LHEL, LEDU, LSS, LUD, and LGFCF. It has been difficult to confirm this association, but some researchers employed CUSUM and CUSUMSQ tests to determine the stability and goodness of their models (14, 15). Moreover, Figure 2, which is employed in the investigation, implies that our model is appropriate and well-fitting.

Figure 1. *Results of CUSUM, CUSUMSQ, and AR Polynomial*

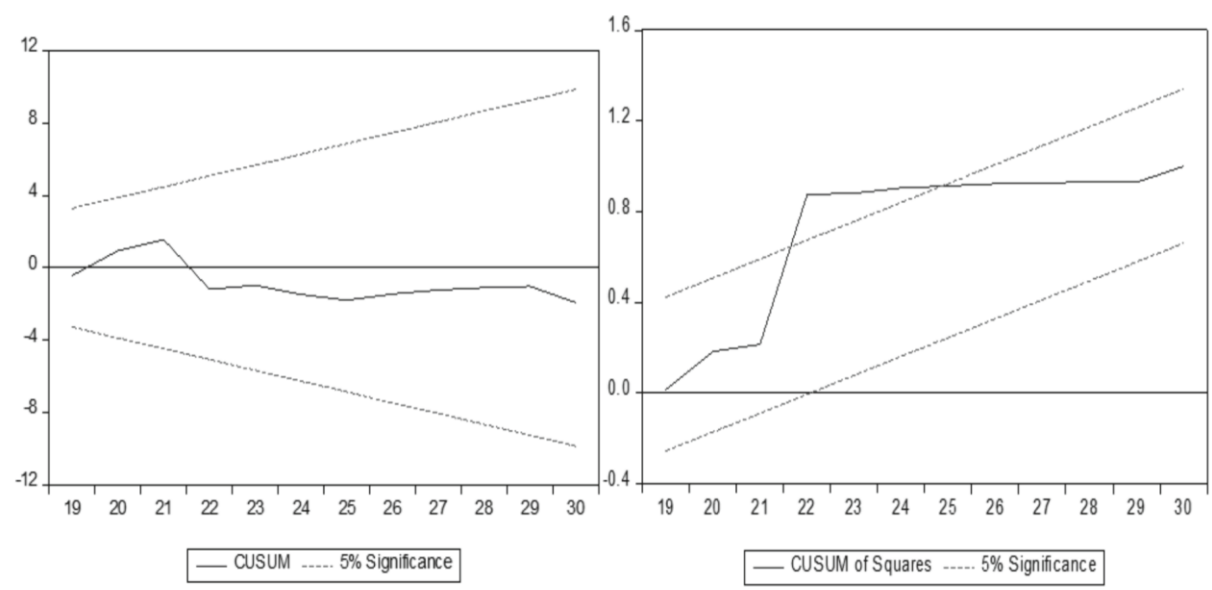
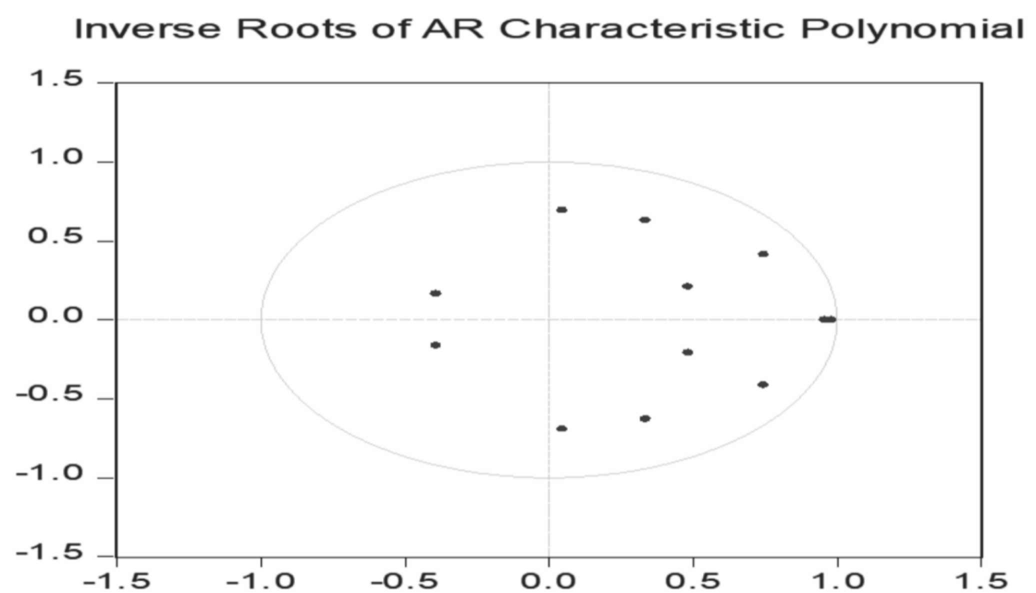


Figure 2. ***Results of Inverse Roots of AR Characteristics Polynomial***



Conclusion

The study employs the ARDL bounds cointegration technique to examine the connection between expenditure in the social sector and economic growth from 1990 to 2020. The long-run elasticity slope coefficients from the ARDL model reveal significant impacts of medical and public health (LHEL); education, sports, art, and culture (LEDU); and gross fixed capital formation (LGFCF) on economic growth (LGDP). Significantly, the coefficients for LHEL and LEDU are positive, indicating a 1% increase in the fields of medicine and public health (LHEL); education, sports, art, and culture (LEDU); and gross fixed capital formation (LGFCF) would, on average, result in long-term increases in economic growth of 0.266942%, 0.224854%, and 0.674541%. On the other hand, long-term economic growth will decrease by 0.067529 and 0.061718, with a 1% increase in social sector spending on welfare, social security, and urban development. When analyzing the correlation between economic growth and social sector expenditure in the short term, the ECM-1 coefficient reveals a significant negative link, suggesting a steady relationship over the long term between economic growth and social sector expenditure. Short-run coefficients highlight that variations from the long-run equilibrium are corrected by 58% in the following year. Furthermore, the elasticity parameters show that a 1% rise in LHEL and LEDU expenditure led to a short-run increase in economic growth, while a rise in LSS expenditure led to a fall in economic growth by its elasticity coefficient. In the short term, the control variable exhibits a favorable association with economic growth.

Policymakers ought to focus on raising spending on healthcare, education, and cultural development due to the significant positive relationship with these sectors. This investment may promote long-term, sustainable economic growth. Governments that implement policies that encourage both public and private investment in infrastructure projects may be able to generate long-term economic development. The negative relationship between urban development, social security, and welfare (LSS) suggests that overspending in these areas could inhibit economic advancement. The allocation of resources in urban development, social security, and welfare programs should be reevaluated by politicians to ensure the best possible use of it without impairing economic progress. It is evident from our model that around 58% of long-term equilibrium deviations are corrected within the next year, indicating that policymakers should be vigilant about short-term fluctuations and promptly address any possible destabilizing forces. Moreover, creating policies that successfully promote long-term economic development requires preserving stability, monitoring short-term dynamics, and accounting for slope elasticity coefficients.

Limitations of the Study and Scope for Further Research

It is important to consider the limitations of this research when evaluating the findings. First, while estimating social sector spending and its effect on economic growth, the adoption of assumptions unique to the ARDL model's application may lead to biases or restrictions. Additionally, the model ignores unobservable components like externalities, which are the results of efforts in policy and the state of the world economy. Also, this study has limitations when it comes to investigating the relationship between housing, water sanitation, nutrition, and other social sector spending determinants. However, it might offer more expansions that are observable.

Since the results of the time series analysis could be distorted by factors that are not fully understood, more research into the relationship between social sector spending and economic growth may be required. Since it illustrates how these variables change over time, a longitudinal study may offer far more insightful information on the links between these factors. In addition, by incorporating other social sector categories, the study broadens the scope of future research. For instance, more studies on the subjects of labor, labor welfare, nutrition, sanitation, and water supply might be included. In conclusion, additional studies will be needed to determine the efficacy of different policy measures aimed at increasing social sector expenditure and how they affect economic growth. To determine the relevance of the findings or whether other contextual factors are affecting them, for example, research conducted across other nations or regions may be conducted. Furthermore, carrying out research in specific domains such as education, healthcare, and infrastructure could provide customized policy insights to promote economic growth and development.

Authors' Contribution

The study work was completed with the substantial assistance of both authors indicated in this document. The topic's idea and the sections on the introduction and literature review were created by Dr. Tosib Alam. Mr. Irshad Ahmad Para greatly aided the idea, planning, analysis, and interpretation of the data. Dr. Tosib Alam wrote the first draft of the manuscript and made significant edits where needed. Since they were not personally involved, both authors have committed to accepting personal responsibility for their contributions and making sure that any doubts about the work's integrity or accuracy are duly addressed, looked into, and recorded in the literature.

Conflict of Interest

The authors confirm that they have no affiliations or engagements with any organization or entity that holds financial or non-financial interests in the subject matter or materials discussed in this manuscript. The authors declare no conflicts of interest.

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