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Public Expenditure on Higher Education Infrastructure and Economic Growth of Haryana: An Analysis

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ABSTRACT:

Education is the process through which a person's personality evolves in the desired way by embracing various topics according to their age and demands. It is one of the crucial elements in a nation's growth of its human resources. It is one of the most powerful tools for a person since it allows them to learn new things and helps them use those things in better ways. Economic development has always been credited as being greatly influenced by education. It gives the economy the necessary training and skilled labour force needed to effectively use its resources. As a result, improving education is the fundamental path to a nation's sustained economic prosperity. Education has long caught the interest of scholars, economists, politicians, and the government since it is a crucial part of human resource development.

The present study aims to examine the relationship between public expenditure on Higher education and economic growth of Haryana and Predicting economic growth based on public expenditure through appropriate model and examine the role of public expenditure in policy making decisions of the state government. Time-series data are heavily used in our work for analysis for the time period 2011-2021. The fact that time-series data has a temporal ordering, which sets it apart from cross-sectional data, is an evident feature. Economic time-series also meet the logical criteria for being results of random variables. The research initially describes the kind and scope of higher education infrastructure over the time period taken into consideration for the study to analyse the higher education infrastructure in Haryana.

INTRODUCTION

While it is true that public spending on education has increased as a result of economic growth, it is also important to recognise that economic growth has prompted a rise in public spending on education. The government is increasing investment in the nation's education sector to raise the standard of its human resources. Governments in developing nations have made public finance for education a top priority since it is the essential component for attaining progress. The study posits that although expenditure has a role in fostering economic development, its effects are not immediate. The temporal lag between educational investments and their consequential effects on a nation's economic development is a notable factor. Based on empirical findings, it has been observed that an augmentation of one percent in public education expenditure leads to a corresponding long-term gain of 0.34% in GDP per capita. Knowledge is widely recognised as the principal catalyst for sustained economic growth, as acknowledged by various worldwide economies. Education and the allocation of resources towards human capital development are given significant importance in the national plans and policies of all countries. It has been observed that from 1980 onwards, when India's economy initiated the shift from a state-directed economic model to a pro-business system, there was a discernible positive correlation between investments in education across the elementary,

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secondary, and tertiary sectors and the country's Gross Domestic Product (GDP). The allocation of funds towards education in these countries is a direct result of economic development, encompassing both immediate and long-term perspectives. Nevertheless, it is important to note that investment in education has the potential to stimulate economic development on a global scale, although this effect may only be observed over an extended period of time.

LITERATURE REVIEW

Mulugeta, Girma (2023) conducted a study on Ethopia for the time period 1980-2018 and concluded that allocation of government funds towards the agricultural sector exerts negative effects on both long-term economic development and short-term outcomes, which are both substantial and adverse. Over the course of an extended period, investment expenditure exhibits a modest yet favourable impact on the overall trajectory of economic growth. Conversely, in the immediate term, investment expenditure exhibits a noteworthy negative effect. Complementary actions to scaled-up activities in the health sector should be the primary focus of public policy if the goal is to create a society that is both productive and healthy and that fosters economic advancement.

Sinha, Jitendra (2023) in his paper "Relationships between Economic growth and Expenditure on Social sector in India: An econometric investigation" used the time series data for the time period 1972-73 to 2021-22. Based on the research results, a significant correlation has been observed between GDP per capita and expenditures allocated towards several domains and well-being of scheduled castes and tribes. Furthermore, a direct relationship exists between GDP per capita and expenditures allocated towards social security. Conversely, it might be argued that there exists a unidirectional relationship whereby health care spending influences economic growth.

Yahya, Lateefah &Anagun, Adeyemi (2023) investigates the public education expenditure, human capital development and economic growth in Nigeria for the time period 1981-2020. The data were analysed using post-estimation econometric methods, and the statistical software EViews9 was employed to generate the findings. Based on the study's findings, the researchers propose a recommendation that entails the establishment of specialised agencies by the government. Furthermore, it has been recommended that the Nigerian government should prioritise the enhancement of the health and education sectors. This can be achieved through augmenting the financial allocation from the government and implementing incentive programmes to foster consistent and sustainable growth. This would enhance the nation's ability to expand its production of products and services.

Motkuri, Venkatanarayana & Ellanki, Revathi (2023) The provision of education as a public benefit requires financial support from the state. As a concurrent topic, it necessitates the collaborative sharing of monetary, regulatory, and developmental responsibilities within a federal political system. The Indian government allocates around 4% of GDP to education spending. However, research suggests that the Union is only responsible for 1% of the cost, while the states together are responsible for 3% of the cost. The long-term aim of spending 6% of GDP on education must be equitably shared by both the federal government and each of the state governments, or else the growth of education will continue to be a pipe dream.

Sinha, Jitendra (2023) in his paper "economic growth and Public expenditure on Human capital formation in India: An econometric investigation" studied the function of human capital resources as a factor in driving production development in India. The theoretical foundation for the investigation was provided by the neoclassical augmented Solow growth theory, and panel technique was used for the investigation. According to the findings, a government that is interested in improving economic outcomes should place a high emphasis on increasing the amount of money spent on public investment and the production of human capital. Since consumer spending will primarily affect the demand side of the economy, there is a possibility that it may not convert into economic growth. The public sector should shift its focus away from industries that are in direct competition with the private sector or that stifle its growth and instead boost its investments in those sectors that will benefit the private sector.

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Nuta, Alina Cristina & Lupu, Dan (2022) conducted a study on the correlation between public expenditure allocated to education and economic growth in 11 Eastern European nations that were previously under communist regimes and are currently part of the European Union. This observation is true for five nations, where no such relationship exists, whereas in the case of six countries, a long-term association is indeed there. Furthermore, in the immediate timeframe, a combination of positive and negative outcomes becomes evident: four nations experience favourable results, but two countries encounter unfavourable repercussions.

OBJECTIVES OF THE STUDY:

- To examine the relationship between public expenditure on education and economic growth of Haryana.
- To analyze the trends and patterns in public expenditure on education in Haryana.
- Predicting economic growth based on public expenditure through appropriate model.
- To examine the role of public expenditure in policy making decisions of the state government.

RESEARCH METHODOLOGY

We employed a variety of econometric methodologies, some of which are still developing and have their roots in recent decades, to accomplish the study's goals. Time-series data are heavily used in our work for analysis.

The approaches listed below are employed in the current research to determine growth rate:

- Cointegration and Causality Analysis
- Stationary Test (Unit Root)
- Causality Using Vector Error Correction Model

SOURCES OF DATA

This study relies solely on secondary data obtained from multiple sources, including the Statistical Abstract of Haryana, Statistical Abstract of India, Economic Survey of Haryana, Economic Survey of India, Census of India, Census of Haryana, various reports from the All-India Survey on Higher Education (AISHE), and the website of the Directorate Higher Education (DHE), Haryana. The analysis of the higher education infrastructure in Haryana is separated into two distinct components in this research. In the first portion, the analysis of the expansion of higher education infrastructure is conducted by using data starting from the academic year 2010-11, considering its availability. The second component of this study examines the current state and trajectory of higher education infrastructure, using data sourced from the All-India Survey on Higher Education (AISHE) based on its availability. Finally, in order to investigate the correlation between higher education and the economic development of Haryana, a time frame of ten years, namely from 2010-11 to 2020-21, has been selected.

DATA ANALYSIS

This research aims to examine the correlation between the infrastructure of higher education and economic development in the state of Haryana, using econometric approaches. The empirical research was conducted using yearly data spanning a 10-year period from 2010-11 to 2020-21, specifically focusing on the Haryana economy. The findings obtained via empirical analysis are presented as follows:

Table 1.1: Trends of Higher Education Expenditure (HEE) and Total Education Expenditure (TEE) in Haryana

Year	Higher Education Expenditure (HEE)	Total Education Expenditure (TEE)
2010-11	200	1500
2011-12	310	1700
2012-13	320	1800
2020-21	330	2000
2014-15	440	2500
2015-16	550	3500

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2016-17	860	5000
2017-18	960	5500
2018-19	970	6000
2019-20	980	6000
2020-21	1000	6500

Descriptive Statistics

Descriptive statistics serve as a means to reveal the underlying patterns inherent in any given data collection. Table 1.2 presents descriptive statistics of the variables, including several measures of central tendency, dispersion, and distribution (specifically skewness and kurtosis).

Table 1.2: Descriptive Statistics of HEE AND GSDP

Statistics	HEE	GSDP
Mean	311.1892	111340.1
Median	21.1800	65453.66
Maximum	1001.850	400662.1
Minimum	50.93000	11146.63
Standard Deviation	292.1095	112408.4
Skewness	1.156429	1.259644
Kurtosis	2.960795	3.441988
Jarque-Bera	5.573804	6.814757
Probability	0.061612	0.033128
Sum	7779.730	2783503.0
Sum Square Deviation	2047871.0	3.03E+11
Observations	25	25

Source: Computation using E-Views9.5

The data indicates that the distributions of both variables exhibit a positive skew. The standard deviation is indicative of a significant level of variability. The Jarque-Bera statistic is used to assess the extent to which a distribution deviates from normalcy. The critical value of $\chi 2$ at a significance level of 5% is 5.991. Since the

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computed $\chi 2$ value for the GSDP time series is greater than the tabulated $\chi 2$ value, therefore, it may be concluded that the Gross State Domestic Product (GSDP) does not follow a normal distribution. This suggests that the GSDP distribution exhibits asymmetry with respect to its mean values. In contrast, the computed $\chi 2$ value is found to be lower than the tabulated $\chi 2$ value for the HEE time series. Therefore, it may be inferred that HEE follows a normal distribution. The hypothesis of equal expected frequencies (HEE) may be confirmed based on the fact that the p-values above the threshold of 0.05. This suggests that the distribution of HEE exhibits symmetry with respect to their mean values.

Simple Linear Regression Model

In order to examine the association between GSDPt and HEEt, a simple linear regression model is used in the following manner:

$$GSDPt = \alpha 0 + \alpha 1 HEEt + Ut \ldots\ldots\ldots\ldots (1)$$

Nevertheless, the model operates under the assumption that the spending on higher education in the present year directly impacts the Gross State Domestic Product (GSDP) in the same year, without any time delay. The outcomes of the aforementioned regression model are shown in the following table.

Table 1.3: Regression Model (GSDPt = α0+ α1HEEt + Ut)

Lag(K)	**Estimatedα_0**	**Estimatedα_1**	**t-statistic**	**R**	**R^2**	**AdjustedR^2**	**F-statistic**
Without Lag	-6891.752 (4381.356)	379.275*(10.363)	36.599	0.992	0.983	0.982	1.34E3
Note* Indicates at 1% level of significance and Figures in parenthesis show standard errors.							

The data provided indicates that the regression coefficient is 379.275, which exhibits statistical significance at the 1% level. The standard error of the regression parameter (αk) is rather small, namely 10.363. The coefficient of determination, R2, has a value of 0.983, indicating that HEE has the ability to account for over 98 percent of the observed fluctuations in GSDP, which serves as a proxy for the economic development of Haryana. However, the modified R2 value indicates that HEE has the ability to account for 98 percent of the variability seen in GSDP.

UNIT ROOT ANALYSIS

The Unit Root test is a first step in determining whether a variable has time series qualities, as was previously mentioned. As for the unit root qualities of the variable in question, we employ the ADF, PP, and KPSS tests. Since the null hypothesis of the ADF and PP tests is at odds with that of the KPSS test, the latter was developed to confirm the former's findings.

Table:1.4: Unit Root Test Results

Unit Root Test→	ADF		PP		KPSS	
Specification→	C	C&T	C	C&T	C	C&T
LNGE	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)

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LNCE	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNRE	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNESX	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNSSX	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNGSX	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNNSDP	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNDEBT	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)
LNTAXREV	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNDEFICIT	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
LNGRANTS	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
POP	I(2)	I(2)	I(2)	I(2)	I(2)	I(2)

The results of the three tests of unit root for the variables under study are reported inTable1.4. All variables are stationary at their first difference with constant and constant and trend except the variable, Government Debt, which is stationary at its level with both the constant and constant and trend and Population which is stationary at *I*(2).

COINTEGRATION ANALYSIS

It was found that all variables under consideration were not integrated at the same level. The ARDL1 model is used to find the cointegration between variables. In ARDL model, it is found that there are certain variables which are perfectly correlated with other variables indicating multicollinearity.

Table 1.5: Cointegration Test Result from ADRL Model (based on AIC)

Sr. No.	Model Specification	Optimal Lag	F-statistic	Result
1	F_{lnGE}(lnGE | lnNSDP,lnDEBT,lnTaxRev)	(1,1,0,1)	8.1732*	C
	F_{lnNSDP}(lnNSDP | lnGE,lnDebt,lnTaxRev)	(1,0,0,1)	3.5910*	C
	F_{lnDebt}(lnDebt | lnNSDP,lnGE,lnTaxRev)	(0,0,0,0)	---	NP
	$F_{lnTaxRev}$(lnTaxRev | lnNSDP,lnDebt,lnGE)	(1,1,0,1)	0.7747	NC
2	F_{lnCE}(lnCE | lnNSDP,lnDEBT,lnTaxRev)	(1,1,0,1)	5.3476*	C

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	F_{lnNSDP}(lnNSDP | lnCE,lnDebt,lnTaxRev)	(1,0,1,0)	0.9589	NC
	F_{lnDebt}(lnDebt | lnNSDP,lnCE,lnTaxRev)	(1,0,1,0)	1.2106	NC
	$F_{lnTaxRev}$(lnTaxRev | lnNSDP,lnDebt,lnCE)	(1,0,1,0)	3.8168*	C
3	F_{lnRE}(lnRE | lnNSDP,lnDEBT,lnTaxRev)	(1,1,1,1)	11.1920*	C
	F_{lnNSDP}(lnNSDP | lnRE,lnDebt,lnTaxRev)	(1,1,1,0)	0.2870	NC
	F_{lnDebt}(lnDebt | lnNSDP,lnRE,lnTaxRev)	(0,0,1,0)	----	NP
	$F_{lnTaxRev}$(lnTaxRev | lnNSDP,lnDebt,lnRE)	(0,0,1,0)	----	NP
4	F_{lnESE}(lnESE | lnNSDP,lnDEBT,lnTaxRev)	(1,0,0,1)	3.3732**	C
	F_{lnNSDP}(lnNSDP | lnESE,lnDebt,lnTaxRev)	(1,1,0,1)	4.8404*	C
	F_{lnDebt}(lnDebt | lnNSDP,lnESE,lnTaxRev)	(1,0,0,0)	4.3301*	C
	$F_{lnTaxRev}$(lnTaxRev | lnNSDP,lnDebt,lnESE)	(1,1,0,1)	1.0693	NC
5	F_{lnSSE}(lnSSE | lnNSDP,lnDEBT,lnTaxRev)	(1,1,0,1)	6.2631*	C
	F_{lnNSDP}(lnNSDP | lnSSE,lnDebt,lnTaxRev)	(1,1,1,0)	5.1306*	C
	F_{lnDebt}(lnDebt | lnNSDP,lnSSE,lnTaxRev)	(0,0,0,0)	----	NP
	$F_{lnTaxRev}$(lnTaxRev | lnNSDP,lnDebt,lnSSE)	(1,1,0,1)	0.5800	NC
6	F_{lnGSE}(lnGSE | lnNSDP,lnDEBT,lnTaxRev)	(1,1,0,1)	7.0325*	C
	F_{lnNSDP}(lnNSDP | lnGSE,lnDebt,lnTaxRev)	(1,1,0,,1)	0.1226	NC
	F_{lnDebt}(lnDebt | lnNSDP,lnGSE,lnTaxRev)	(0,0,0,0)	NP	NP
	$F_{lnTaxRev}$(lnTaxRev | lnNSDP,lnDebt,lnESE)	(1,0,0,1)	6.6960*	C

Note: (i) **,* indicates F- Statistics is significant at 10 & 5% level. The null hypothesis is that there is no cointegration. (ii) Critical Bounds for the F-Statistics has taken from Pesaran et al. (2001), p.300, the critical Values at 5 % level for Upper and Lower Bound are 3.48 and 2.26 and the critical bounds at 10% level for Upper and Lower bound are 3.01 and 1.90; the critical bounds at 1% level for Upper and Lower bound are 3.07 and 4.44 (iii) C and NC stands for cointegration and No cointegration. NP indicates that the F- Statistic is not

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present for that particular Model. Notes: Critical values derived from Pesaran et al (2001).

Results of different models in Table 1.5 are as follows: (i): No intercept and no trend with lag (ii). NP- Not presented because of positive error correction. (iii) in Model 3, revenue expenditure was included and there was only one cointegration vector (F_{lnRE}) and all the other variables did not show any cointegration when specified as dependent variable in the ARDL system equation; (iv) there were three cointegrating vector (F_{lnESE}, F_{lnNSDP} and F_{lnDebt}) and no cointegration was found when tax revenue was taken as dependent variable in the ARDLSystem for model specification. It implies that government expenditure on Economic Services, NSDP and PublicDebt have co-movements in the long run; (v) there were two cointegrating vectors ($F_{lnSSX}$and F_{lnNSDP}, $F_{lnGSE}$and $F_{lnTaxRev}$in model 5 and 6 respectively). There are 12 cointegrating vectors for 24 equations in 6 Models and the remaining equations of the Model showed either no cointegration or inconclusive as the F-Stat. was between the upper and lower bound of the critical values of the ARDL Model. Moreover, in some cases, the F-Stat were not present due to positive error correction term. Finally, the study incorporated only those Models, which has a cointegration or co-movement in the long run between the different determinants.

CONCLUSION

Using a 10-year forecast ranging from 2010-2011 to 2020-2021, this paper examines the connection between Haryana's higher education infrastructure and the state's economic growth. The empirical results show a link between Haryana's higher education infrastructure and the state's actual economic growth, and this link holds true both in the short and long terms. The report also shows that there is a two-way street between Haryana's economic growth with its higher education infrastructure.

The present study has undertaken to examine the causality between public expenditure and economic growth further investigated that the causality runs from growth to public expenditure. This shows that growth is the cause of public expenditure in Haryana. The study recommended that the government should increase the expenditure on transportation, infrastructure, education and other social and economic services so that the government expenditure can lead to the growth of the state. Pre- and post-reform analysis of the study concluded that government interventions during the pre-reform period were causing growth whereas after reform period public expenditure is not leading the growth.

REFERENCES

[1]. Mulugeta, Girma. (2023). Effect of Public Expenditure on Economic Growth in the Case of Ethiopia. The Scientific World Journal. 2023. 1-14. 10.1155/2023/9305196.

[2]. Sinha, Jitendra. (2023). Relationship between Economic Growth and Expenditure on Social Sector in India: An Econometric Investigation. INDO-ASIAN JOURNAL OF FINANCE AND ACCOUNTING. 4. 81-101. 10.47509/IAJFA.2023.v04i01.04.

[3]. Yahya, Lateefah &Anagun, Adeyemi & Olubunmi, Bello. (2023). Public Education Expenditure, Human Capital Development and Economic Growth in Nigeria. 9. 20-30. 10.5281/zenodo.7788842.

[4]. Motkuri, Venkatanarayana & Ellanki, Revathi. (2023). Public Expenditure on Education in India: Trends and Centre-State Allocations. Journal of Development Policy and Practice. 8. 1. 10.1177/24551333231163949.

[5]. Sinha, Jitendra. (2023). Economic Growth and Public Expenditure on Human Capital Formation in India: An Econometric Investigation. 5. 141-158. 10.47509/AJEF.2023.v05i02.03.

[6]. Nuta, Alina Cristina & Lupu, Dan & Nuţă, Florian Marcel. (2022). The impact of public education spending on economic growth in Central and Eastern Europe. An ARDL approach with structural break. Economic Research-EkonomskaIstraživanja. 36. 1-18. 10.1080/1331677X.2022.2086147.

[7]. Goel, M.M. & Walia, Suraj (2011), “Education and Economic Growth in Haryana (India): Using Granger Causality Approach” in international journal, Journal of South Asian Studies, Vol.17-1 (2011).

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(6), 360-368 | ISSN:2251-6727

[8]. Goel, M.M. & Walia, Suraj (2011), "Higher Education: An Engine of Economic Growth in Post Reform India" Research Journal Social Sciences, Panjab University, Chandigarh. Vol. 19, No.3 (2011).

[9]. Goel, M.M. &Walia, Suraj (2015) "Indian Higher Education: Trends, Growth & Challenges" International Journal, Voice of Research, Volume 3, Issue 4, March 2015, PP: 33-38.

[10]. Goel, M.M. &Walia, Suraj (2017) "Higher Education and Economic Growth in Haryana: An Application of Cointegration and Vector Error Correction Model (VECM) Approach" Multi-Disciplinary International Research Journal, Asian Resonance, Volume VI, Issue III, July 2017.

[11]. Walia, Suraj (2015), "Higher Education in India: Progress & Emerging Issues" The Indian Economic Journal (Journal of The Indian Economic Association) special issue, December 2015.

[12]. World Bank (2004),"Attaining the Millennium Development Goals in India: Role of Public Policy and Service Delivery", Human Development Unit, South Asian Region, June.

[13]. World Bank (2006), "Economies of Education" http://www.worldbank.org/ education/economicsed/.