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DEMAND FOR HIGHER EDUCATION IN INDIA: A STUDY ON BOTH LONGITUDINAL AND CROSS-SECTIONAL ANALYSIS

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Abstract
Earlier many empirical studies on demand for higher education focussed on factors that influenced college and university enrollment. Majority of the studies in this category are economic perspectives. The studies attempt to examine the impact of changes in tuition, income and other factors that influenced demand. Only a few studies estimated aggregate demand function on higher education. The studies included Campbell Siegel (1967), Chang and Hsing (1996) and Yang (1998). There are hardly any specific studies on estimation of aggregate demand function on higher education in the Indian context. The study has been made an earnest attempt to derive aggregate demand function for higher education in all India level as well as major states level. The major objective of the study was to identify the macro-economic determinants on demand for higher education. To examine this objective, the study has adopted both longitudinal and cross-sectional analysis. To estimate the aggregate demand function for higher education, Multivariate regression method through Ordinary Least Square Method (OLS) was used. To conclude, the study revealed that demand function of higher education for model -1(India) was influenced by per capita income, and availability of higher education facilities. On the other hand, demand function for major states was also influenced by per capita income, availability of higher education facilities and literacy rates which is positively or negatively significant in the model.
Keywords: Demand for higher education, longitudinal analysis, cross-sectional analysis, macro-economic determinants.

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Introduction:

Education means for development. It is the first and foremost element of Human Resource Development. The role of education in the economic health of the nation and the relationship between education and economic growth are increasing the focus of public debate. (Becker and Lewis, 1993). More specifically, higher education contributes to the socio-economic

development of individuals as well as the nation through dissemination of specialised knowledge, skills and trainings. For the individual, it gives higher employment opportunities and expected higher earnings in their lifetime. At the social level, it provides a wide range of increasingly sophisticated and ever changing variety of skilled and trained manpower in various sectors. Higher education is an indicator of progress and power to produce changes for moving the country along the path of socio-economic development.

Investment in higher education makes a vital contribution to accelerate the process and rate of economic growth, through increase in productivity. The rapid growth of higher education in many countries has transformed higher education from elite to mass, leading to increase in demand for higher education. We need to look at the Indian higher education system as it has been democratized. When compared to other countries, there is a large number of students from lower social-economic strata contributing to a sizeable proportion of total enrollment for higher education (Tilak, 2004).

India is one of the largest democratic countries in the world. It is the second highly populated country and possesses the third largest education system in the world in terms of number of students enrolling in schools. It also has been following democratic principles on education. It is the effect of constitutional provision given to education in general, from Directive Principles to Right to Education (RTE) Act. Consequently, the states also play a major role in the provision of education to the people. In this context, State has to be responsible in providing education from elementary to higher education. It has been spending huge amount for Universalisation of Elementary Education (UEE) to the ever-increasing 6-14 age-group population. Still, India has been unable to achieve the goal of Universalisation of Elementary Education. In the second stage too, questions of achieving Universal secondary education adds to the complexity of the problem. The state spends more on elementary education in every Annual budget. It is for this reason the state is unable to spend more on higher education. Consequently, it has been unable to meet social demand for higher education.

On the other hand, increasing social demand for higher education is fueled by a desire for higher education from large sections of people of India in the hope of attaining better quality of life and greater social equity. Even the poorest of the poor are now willing to make personal sacrifices to provide higher education to their children. Changing social attitudes

like providing opportunities for girls to obtain the highest possible levels of education, to enable them to acquire respectable status in life has increased the demand for higher education. The growth of various development sectors such as agriculture, manufacturing and services will generate additional demand for competent human resources through the higher education system.

The demand for higher education is expected to rise significantly at least in the next two decades. Impact of public policy on school education leads to increase in high school enrollment and reduction in school dropout rate, and also among special population groups, like first generation learners, women, minorities, rural population and weaker sections (SC/ST), opting for higher education. The increasing social demand for higher education is fueled by a desire for higher education from large sections of people of India in the hope of attaining better quality of life and greater social equity. It is considered as a means of upward social mobility and greater economic security, especially from the first generation learners. Even the poorest of the poor are now willing to make personal sacrifices to provide higher education for their children.

Consequently, exponential growth in enrollment particularly during the new economic reform period raises the question of why rapid growth in aggregate demand. Pattern of growth in the enrollment for professional/technical courses raises the question of why preference is for technical courses at the individual choice level . At the same time, it analyses the variation and backwardness in accessing higher education from people of different regions, religions, social and income groups of the nation. This situation raises the questions about the determinants of demand for higher education at the all India level. In addition, this study needs to look out for socio-demographic factors and such others influencing the demand for higher education at national level.

Theoretical framework and existing literature

In general, education was often viewed as human capital. According to human capital theory, people consider education as an investment. The investment is attractive when the benefits exceed the costs associated with the education programmes. The benefits are typically expressed in terms of earnings (wage premium) connected with the (level of education) training programme; whereas the costs include tuition fee payments and foregone labour market earnings (Shultz, 1961; Becker, 1975; Blaug, 1966; Bowen, 1977). This view,

however, ignores any consumption value of schooling (Blaug, 1966). Individual students are presumed to be enrolling for higher education based on a rational educational calculus, or on an internal rate of return, equalising the costs and benefits of alternative investment (enrollment) options.

Education possesses characteristics of both consumption and investment. It is useful to distinguish consumption as an investment good. The consumption motive recognizes the fact that individuals find education useful in itself. Viewing education as such, a demand specification can be derived using standard neo-classical theory of consumer behaviour; the consumer chooses that bundle of goods and services that gives him the highest possible utility, given certain (budget) constraints. Being a consumption good the demand for higher education may vary with own price, prices of substitute commodities and income. In theory, as income and price of substitute education increases price and demand increases and vice-versa (Berger and Thomas Kostal, 2002). Income can take the form of disposable household income, own income and student loans. Demand should vary positively with income. The price of education must be viewed broadly and consists of two components, direct and indirect costs. Direct cost refers to tuition and other out-of pocket costs such as books and differential living cost. The indirect cost component in the price of education is more substantial as it entails the opportunity cost, i.e. the loss of income while going to school. Demand for education should vary negatively with these cost components. Empirical work based on this was frequently encountered in literature (Campbell and Siegel, 1967; Feldman and Hoenack, 1969 and Hoenack and Weiler, 1975).

The existing literature on the Economics of Education usually view education as an investment good, and individuals invest in higher education until the marginal rate of return from additional education is equal to market rate of interest. The rate of return is calculated from the expected costs and benefits of higher education and the market interest rate represent the cost of borrowing to finance educational investment (Galper and Dunn, 1969). The investment motive for higher education is based on human capital which assumes that (higher) education enables students to become more productive workers with a higher earning potential. Thus, cost of higher education (including current labour market conditions) and future earnings determine the demand for higher education. Thus, lower current costs and a higher stream of future earnings would be associated with higher levels of enrollment. Most of the empirical studies combine these two motives. Therefore, the demand for higher

education is a function of direct and indirect cost/prices (tuition and foregone earnings), prices of substitute education, income and a proxy for higher earnings potential from obtaining a college education. Numerous empirical studies confirm the combined approach and support the theoretical implications; i.e. positive wealth effect and different direct versus indirect costs effect (Mark Blaug, 1966; Galper and Dunn, 1969; Psacharopolus, 1973 & 1981; Hopkins, 1974: Handa and Skolink, 1975, Jackson and Weathersby, 1975; Joseph Schaafsma, 1976;). More recent studies include Kodde and Ritzen, 1984; Schwartz (1985) and Paulsen and Pogue for Japan; Huijsmen *et al* (1986) of the Netherlands; and King (1986) for Puerto Rico.(Duchesne and Nonneman, 2000).

Generally, demand function studies in higher education attempt to test the investment and consumption motives of higher education (Campbell and Siegel, 1967). They viewed that individual investment decisions in higher education on the basis of variables such as the expected cost, expected benefits and utility of educational points. In their models, financial attributes of educational institutions (e.g. tuition fee, financial aid, housing and cost of commuting) are frequently included. They found that demand for enrollment was positively associated with expected monetary and real yields from education, income and consumer price index and inversely associated with nominal and real cost of education.

Elchanan Cohn (1978) estimated demand for higher education in South Carolina, United States. The model employed explanatory variablessuch as educational attainment of adult population, overall rate of unemployment, rate of youth unemployment; population density, per capita income, proportion of Blacks in the population; distance, and average reading level of students. Hsing and Chang (1996) examined some of the determinants of enrollment at private colleges and universities between 1964-91. They defined demand for higher education as a function of tuition, and other costs, income, wage rate and unemployment rate. It was observed that increase in unemployment rates leads to an increase in enrollment for higher education while higher wage rates cause enrollment to decline. Yung (1998) estimated the demand for higher education for the United States during the period 1955-1965. The conventional model of demand for higher education is a function which consists of tuition, income, wage rate and unemployment.

Hopkins and Thomas (1974) used their demand function, expenditure per enrollment as one of the explanatory variables. They found that there was a significant negative association between public expenditure and private enrollment. This study used the public expenditure

per student based on public subsidy and expected positive relationship between public expenditure per student and enrollment. Income is an important factor which can influence the demand for higher education when education has a consumptive value. An alternative interpretation is that credit market problems are alleviated when the average income increases (Canton and Jong, 2004). These two views predict that a positive correlation exists between university enrollment and per capita income.

Unemployment is expected to influence income and employment expectation of students as well as opportunity costs of attending university. Since unemployment rates for upper (higher) secondary young graduates is very high, they have lower chances of getting a job and, therefore, opportunity cost of attending universities will be lower as well. Unemployment increases uncertainty, which implies an increase in the demand for higher education (Albert, 2000; Nicholas, 1989; Chang and Hsing, 1996; and Yang; 1998).

Expected employment motivates one to go for higher education as it gives security and higher earnings. The higher unemployment rate of university graduates lowers the level of demand for university education (Nicholas, 1989). Many demand studies on education have not considered supply (Mulluer and Rockerbie, 2004) and several demand functions on higher education operated with supply constraint. This study argues that greater facilities for higher education increases enrollment demand. Elchanan Cohn (1978) used independent variables such as educational attainment of adult population, density of population and proportion of black population; it gives a notion about using the socio-demographic variables in demand models. The study has employed these socio-demographic variables such as people living below poverty line, literacy rate of population, proportion of rural and deprived (SC/ST) population in the aggregate demand function for higher education.

Methodology and Source of data

The main objective of the study was to identify the macro-economic determinants on demand for higher education in all India as well as major state level. To examine this objective, important factors used to understand demand determinants are based on studies by Campbell and Seigel (1967), Cohn (1978), Hsing and Chang (1996), Yung (1998) and Buss, Parker and Rivenburg (2003). For fitting models both longitudinal and cross-sectional data were used for estimating aggregate demand for higher education.

Model-1: Aggregate demand function for higher education is based on time series data. The period of study in this model is from 1980-81 to 2008-09.

Model-2: Aggregate demand for higher education is based on pooled cross section data of major states in India for different point of time like 1993-94, 1999-2000, 2004-05 and 2005-06 (in model 2.1 & model 2.2). Demand function in this model is estimated for selection of four periods of time based on availability of data has been collected from various rounds of National Sample Survey by NSSO. In this model data, for pooled cross-sectional analysis data were collected for major states of Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

The sources of secondary data were collected from UGC Annual Reports, Selected Education Statistics (SES), Analysis of Budget Expenditure on Education, Indian Economic Survey, Manpower Profile, Selected socio-economic Indicators – India, Statistics of Indian Economy by Reserve Bank of India (RBI), Census reports and various rounds of National Sample Survey by National Sample Survey Organisation (NSSO). The collected data have been analyzed with Multivariate regression using Ordinary Least Square (OLS) method to find out the important factors that influence the demand for higher education in India as well as across state level. The basic framework of the model is

GER = f (Macro-economic variables, socio-demographic variable and availability of higher education facilities)

Formulated Hypotheses of the Study

Ten hypotheses are formulated based on the theories of demand for education and the review of earlier studies in India and abroad. These ten hypotheses are associated with the economic, social, demographic variables and supply side factors. Each one of them is stated below:

Hypothesis -1 Higher the level of per student public expenditure on higher education, higher will be the student enrollment for higher education.

Hypothesis -2 Greater the per capita income better will be the access to higher education.

Hypothesis -3 High level of secondary unemployment increases the enrollment for higher education.

Hypothesis -4 Higher level of graduates unemployment will lead to lower demand for higher education.

Hypothesis -5 Higher employment opportunities in public sector will lead to willingness of people in pursuing higher education

Hypothesis -6 Increasing higher education facilities in the system will lead to increase in access for higher education.

Hypothesis -7 Lower the proportion of people living below poverty line higher will be the rate of enrollment in higher education.

Hypothesis -8 Increases in the literacy rates of people will lead to greater demand for higher education

Hypothesis -9 Decreases in the proportion of rural population leads to higher level of student enrollment for higher education

Hypothesis -10 Higher the proportion of SC/ST population lower the demand for higher education.

Table 1: Expected sign from hypotheses of this study

Variable	**Expected effect**
Public expenditure	+
Per capita income	+
Secondary unemployment	+
Graduate unemployment	-
Employment in public sector	+
Availability of HE facilities	+
Below poverty line	-
Literacy rates	+
Rural population	-
SC/ST population	-

General Specification of the Model (Models -1, 2.1 & 2.2)

In the present study, linear regression equation is estimated for India (Model-1) and major states (Model-2.1 & 2.1).

$$Y = a+\beta_{1\ peps} + \beta_{2\ Pcnnp\ +}\ \beta_{3Peruemhs} - \beta_{4Peruemugpg} + \beta_{5\ Peremppus5} + \beta_{6\ heipl} + \beta_{7Perbpl} + Perlrpop + \beta_{9Perrrpop\ +}\ \beta_{10Perscst\ +} U$$

where Y= GER (Gross enrollment ratio of higher education)

a = Constant term

Peps = Public expenditure per student

Pcnnp = Per capita Income

Peruemhs = Secondary unemployment

Peruemugpg	=	Graduate unemployment
Peremppus	=	Employment in organized public sector
Heipl	=	Availability of HE facilities measured in terms of institutions per lakh eligible population
Perbpl	=	Below poverty line measured as % of population living below poverty line
Perlrpop	=	Literacy rates
Perrrpop	=	Rural population as a percentage of total population
Perscst	=	population (SC/ST) as percentage of total population
U	=	Error term

Here, it is noted point that rural population and SC/ST population is not forwarded in the model-1. Hence, the two variables were added in demand function for major states model-21 & 2.2.

Results and Interpretation: Demand Function for India Model-1

Before fitting the model, the time series data is tested for stationarity and modified appropriately using augment dickey fuller test. The fitted OLS regression is tested for multi-collinearity and hetroskedasticity. The regression result reveals that the co-efficient associated with per capita income and availability of higher education facilities was found to be important and significant at 10 per cent and 1 per cent level respectively. It means that demand for higher education is explained by variance in per capita income and availability of HE facilities. The co-efficient associated with all other explanatory variables such as public expenditure per student, secondary unemployment, public sector employment, below poverty line and literacy rates were not found to be statistically significant even at 10 per cent level.

Income is an important determinant of demand for all commodities and services. There was no exception in the demand for higher education as well. The regression result showed that per capita income gave expected sign (positive) and was statistically significant at 10 per cent as indicated above in hypothesis 2.

Supply was equally an important factor to determine demand for higher education. However, the supply side factor was generally ignored in demand studies. One important supply factor was the availability of higher education Institutions which was included in the model. The

availability of HE facilities was positively associated with enrollment and significant at 1 per cent significance. One unit (one institution per lakh 18-23 year age group population) increase in availability of HE facilities leads to an increase in enrollment demand in terms of enrollment.

To conclude, the study revealed that demand function of higher education for model -1(India) during the period of 1980-81 to 2008-09 was influenced by per capita income, and availability of higher education facilities. From the results we understand that increasing the per capita income of the nation leads to an increase in demand for higher education. In the case of income factor, almost all studies proved that income had positive effect and was significantly influencing higher education demand. Secondly, availability of higher education facilities had positive impact on demand for higher education. It means that more the number of higher education institutions like state and central universities, affiliated colleges and autonomous institutions, more was the number of students accessing higher education.

Table:1 ***Results of Demand function for higher education using Multiple regression through OLS Method***

	India	**Major States**	
	Model-1	**Model-2.1**	**Model-2.1**
Dependent variable(s)	GER	Gross Enrollment Ratio	Log Enrollment
Explanatory variables			
CONSTANT	**299634.7(0.27)**	**5.287834(2.87)**	**6.17541(17.25)**
Public expenditure per Student	-27.8237(-0.87)	-0.0000730(-0.77)	-0.0000141(-0.00)
Per capita NNP/NSDP	93.15996***(1.91)	.000203*(7.48)	.0000111(1.58)
Employment in Public sector	-15636.81(-0.22)	-.005732(-0.84)	.002720**(2.22)
Availability of HEIs facilities	258115.5*(3.71)	.14236*(4.22)	.001089(0.18)
Below of poverty line	19321.84(0.77)	.0092847(0.90)	-00011682(-0.47)

Literacy rates	215812.8(0.71)	-.0070677(-0.36)	-00070469**8(-1.77)
% of Rural population		-.0277766**(-2.00)	-.0016391(-0.46)
% of SC/ST population		.0017274(0.09)	-.0062205(-1.42)
Adjusted R^2	**0.3775**	**0.8038**	**0.8022**
F-Statistic (P-value)	**0.0001**	**32.88**	**0.1294**
No. of Observations	**28**	**60**	**60**

Model-2 Aggregate Demand Function for Major States

The study has also taken up the cross-sectional data for estimating demand function of higher education in India derived from major states of India in model 2.1 and model 2.2. The study has taken four different time periods such as 1993-94, 1999-2000, 2004-05 and 2005-06 respectively. The data collected for 15 major states in India include Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. In this way, this model got 60 observations of pooled Cross-sectional data.

Cross-sectional data are observed at a single point of time for several individuals, countries, states, etc.

xi , i = 1; : : : ;N. …… . (1)

The study is to interest lies in modeling the distinction of single individuals, and heterogeneity across individuals. Hence, the study used a Pooled OLS method.

Pooling data refers to two or more independent data of the same type. Observations are viewed as repeated measures at each point of time. So parameters can be estimated with higher precision due to an increase. The main feature of pooling data is that it takes heterogeneity into account; get individual specific estimates, to understand the dynamics of change and to minimize bias due to aggregation. (See Appendix Table: 2. Summary statistics of the pooled cross-section data)

It treats all observation as equivalent and OLS method of estimation follows as usual.

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + u_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

In this case the error term captures "everything". It has ignored time and space.

In model 2.1, Gross enrollment ratio is used as dependent variable along with a set of explanatory variables as in model 1, except secondary and graduate level unemployment variables due to lack of availability of data. In this model, per capita net state domestic product is used as income variable instead of using per capita net national product in the model-1. In addition, these models 2.1 & 2.2 are also used demographic variables such as percentage of rural population and SC/ST population.

Model 2.1: Demand Function for Major States

The estimated equation derived from pooled cross-section analysis of major states for the year 1993-94, 1999-00, 2004-05 and 2005-06. In this model, Gross enrollment ratio (GER) is used as dependent variable with a set of explanatory variables such as public expenditure per student, per capita income, employment in public sector, availability of higher education facilities, percentage of people lying below poverty line and literacy rates for estimating demand function of higher education of major states in India.

The co-efficient associated with per capita income (*Pcnsdp)* and availability of higher education facilities (*Heisp*l) was found to be positive and significant at 1 per cent level. Co-efficient associated with rural population showed expected sign (negative) and significant at 5 per cent level, whereas coefficients of other variables such as public expenditure per student (Peps), employment (*Emppus*), below poverty line (*Perbpl*), and literacy rates (*lirpop*) were not significant even at 10 per cent level.

Let us explain the variables which were found to be significant in the regression. Availability of higher education facilities had positive co-efficient and significance at 1 per cent level. It shows that if availability of higher education institutions per 1 lakh of population in 18-23 years age group increases by one, then, Gross enrollment ratio of higher education goes up. Rural population expected sign (negative) and significant at 5 per cent level. The falling proportion of rural population to total population is seen to raise the demand for higher education. One unit fall in rural population in terms of proportion leads to an increase in one unit demand for higher education. In the era of economic reform change it has been observed

that industrialization has increased the pace of urbanization. The falling proportion of rural population is an index of urbanization. This has caused greater demand for higher education.

Here, it may be observed that the three variables namely, availability of higher education facilities, per capita income and rural population are also significant explanatory variables in explaining demand for higher education for major states in model 2.1

Model 2.2 Demand Function for Major States

The study has made another attempt in the model 2.2 that Log enrollment has used as dependent variable with a set of explanatory variables such as public expenditure per student, per capita income, employment in public sector, availability of higher education facilities, percentage of people lying below poverty line and literacy rates for estimating demand function of higher education of major states in India.

The estimated equation derived from pooled cross-section analysis of major states for the year 1993-94, 1999-00, 2004-05 and 2005-06. The linear regression shows that employment in public sector (*Emppus*) and literacy rates are influencing factors on demand for higher education in major states. The co-efficient associated with employment showed expected sign (positive) and significant at 5 per cent level. On the other hand, the coefficient of literacy rates showed unexpected sign (negative) and significant at 10 per cent level. Other variables like public expenditure, per capita income, availability of higher education facilities, below poverty line, percentage of rural and SC/ST population were not significant even at 10 per cent level. After running the regression, the fitted pooled OLS method of model 2.1 is test for multi-collinearity and VIF test.

Employment is one of the most influencing factors on demand for higher education. People prefer higher education to get job security and higher earnings. It is predicted in the linear regression that employment is positively associated with enrollment and is significant at 5 per cent level. It shows that 1 unit of increase in employment in public sector, increases the enrollment by .0027 units. In other words, if increase in employment in public sector is one thousand, it leads to an increase in enrollment by 2.72 per cent. This means that increase in employment opportunity in public sector, increases the demand for higher education due to security of job and higher earnings.

Literacy rate determines the education and health status of any society. In this regression model, literacy rate was included as one of the explanatory variables. Literacy rates expected to show a positive sign, showed a negative effect with 10 per cent level of significance. It is interesting to observe that people are aware of the importance of higher education. They are

willing to provide higher education to their children which may lead to increase in demand for higher education whether they are literate or illiterate.

Here, it may be observed that employment in public sector is positively associated with enrollment and significant with variables thus explaining demand for higher education of major states in model 2.2.

Summary and Conclusions

To understand the macroeconomic determinants of demand for higher education at macro level, this study has formulated some hypotheses based on theoretical explanation and reviewing literature on demand studies. The study collected data from various documents, reports, policy notes and periodicals at national and state levels with time series and cross-sectional data to derive demand function for higher education in India and major states by using multiple linear regression models through Ordinary Least Square (OLS) method. Model-1 represents time series data from 1980-81 to 2008-09 for India and models 2.1 and 2.2 represent major states during four different periods.

The linear regression results indicate demand for higher education in India as a function of per capita income and availability of higher education facilities. These two variables show expected positive sign and are significant at 1 or 5 per cent. Income is an important determinant on demand function of India. People from different social groups are accessing higher education based on their family income and wealth. Higher the income of the people, higher will be the demand for higher education. It implies that the increase in per capita income of individual/individual household would bring new entrants into higher education. On the other hand, they are switching over to private higher education institutions. This shows that there is a strong relationship between income and demand for higher education.

Secondly, availability of higher education also plays a prominent role in determining the demand function. It means that people demand higher education based on availability of higher education facilities in their local environment. It is obvious that income of the people plus availability of higher education facilities has a prominent influence on demand function. The availability of higher education facilities for all types in the country stood at 12.4 per lakh population. On analyzing the 28 states for College-population index(C-PI), it was found that 14 states have lower than the national average (12.4). The distribution of districts across the states by C-PI shows that there is inter-district disparity in the availability of higher education facilities in India. (Sachidanand Sinha, 2008). It has policy implication to increase the number of colleges in states and districts which have lower than national average level. It

is obvious that income of the people plus availability of higher education facilities had a prominent influence on demand for higher education in India.

In a similar way the study has used pooled cross-sectional analysis on demand function for Indian major states during different time periods like, 1993-94, 1999-2000, 2004-05 and 2005-06. Demand functions of major states (model 2.1) showed that per capita income and availability of higher education facilities are positively associated with enrollment. Rural population was negatively associated with enrollment. There is a strong possibility to predict that rural population has a low demand for higher education. It means that rural people are living in poor socio-economic conditions and are suffering without basic amenities. They are living in backward conditions. On the other hand, people from socio-economic well to do families with rural background have greater willingness and ability to pay for higher education.

The linear regression results of aggregate demand function for higher education at national level proved to strengthen the theoretical explanation and the hypothetical expectations made for the purpose of this study. The study also used appropriate statistical test before fitting the model. To conclude, the study revealed that demand function of higher education for model - 1(India) was influenced by per capita income, and availability of higher education facilities. The model 2.1 & 2.2 are explained the demand function for major states by influencing the significant explanatory variables which might be positively or negatively significant. One of the limitations of this study was that one or two variables showed unexpected signs. Some data collected by researchers were used as proxy in certain variables in the models for which data were not available in time series and cross-sectional data. Otherwise, this study could provide a fruitful (suitable) direction towards policy making on demand for higher education with respect to Indian context.

Notes

Description of Dependent and Explanatory Variables

Dependent Variable: Gross Enrollment Ratio of higher education

GER is total higher education enrollment divided by specific eligible age group (18-23) population of India (All states and UTs). Total Enrollment includes students enrolled in various discipline like arts, science, commerce, education, engineering/technical, medicine, agriculture, veterinary, law and others in HEIs in India. It also consists of different levels such as graduate, post-graduate, research and diploma/certificate courses. In this study, the

eligible population are from the age group of 18-23 in computing Gross Enrollment Rate. It is a six-year age cohort. In recent years there is considerable debate on age cohort and many prefer to use 5 year age cohort as well. However, in this study we have taken six-year age cohort of population. Eligible population has been drawn from single age population figures available in census reports of 1981, 1991 and 2001. Due to non-availability of Census 2011, on individual age of population, the projected population of India and its States of 2001-2026 is used. Projected population figure available for 15-19 and 20-24 age cohort is taken. On the assumption of uniform distribution of population the population in the age cohort 18-23 was determined. It also pointed out that population projection for selected years and for intervening years has been projected using Compound Annual Average Growth Rate (CAGR). It is apportioned appropriately to get 18-23 age group of the population.

Explanatory Variables

(i) Economic Variables

Public Expenditure per student

It is estimated by dividing the public expenditure on higher education by total enrollment. Public expenditure consists of total Plan and Non-plan expenditure meted out to universities and other higher education and a similar plan and non-plan expenditure for technical education of all the states plus central total plan and non-plan expenditure of these two categories in revenue account. University and other higher education includes direction and administration, assistance to universities, government colleges, assistance to non-government colleges, scholarship and other expenditure in revenue account. Technical education expenditure includes direction and administration, technical schools, polytechnics, assistance to university for technical education, assistance to non-government colleges, engineering colleges and institutions, scholarships, training and other expenditure. A time series of public expenditure is obtained from analysis of budgeted expenditure published yearly by the MHRD, Government of India. It is a flow variable. To obtain public expenditure per student annual public expenditure is divided by total number of students enrolled, which is a stock variable that refers to September 30^{th} of every year.

Per capita Income

For aggregate demand function (Model I) the per capita income is obtained from Economic Survey for various years. For aggregate demand function (Model II) for per capita income of different states, data is drawn from Economic survey and Handbook of Indian economy,

Reserve Bank of India for the years 1987-88, 1993-94, 1999-2000 and 2005-06. Data of NSDP is converted to base year 1993-94.

Unemployment

Job seekers data is considered as proxy for unemployment at different levels of education like Matric/SSLC, Secondary/Higher Secondary/PUC/Intermediate, Graduates and Post-graduates. The unemployment data is classified secondary unemployment and graduate unemployment. ***Secondary unemployment*** includes the number of persons who studied Matric (secondary) and higher secondary school and are registered in employment exchange. ***Graduate unemployment*** consists of number of persons who are registered in employment exchange as undergraduates and post-graduates.

One limitation of this is that it has been taken from a live registration in employment exchanges of the states. Some of them may be working or engaged in self-employment but reported as seeking employment. Others may be pursuing higher studies or might not have registered with employment exchange offices. Some may not be interested in government jobs and hence not registered while working in private jobs. This data is used in regression model for India - model I and III respectively. Data on ***Unemployment rates for major state*s** have been taken from the reports of National Sample Survey on *Employment and unemployment situation in India*. They relate to usual status of individuals both males and females residing in rural and urban areas. This is used in model II.

Public sector employment

The actual number of persons employed in organized public sectors (0-9) such as Agriculture, forestry, fishing and hunting, Mining and quarrying, Manufacturing, Electricity, gas and water, Construction, Wholesale and Retail trade and restaurants and hotels, Transport, storage and communications, Financing, insurance, Real Estate and business services and community, social and personal services are considered.

(ii) Availability of Higher Education facilities

It refers to the number of higher education institutions available per lakh specific age group (18-23) population. Higher education institutions consist of Central universities, State universities, Deemed universities, affiliated colleges, and other institutions of national importance at state and national levels.

(iii) Socio-demographic variables

Socio-demographic variables are considered in this study as followed by Cohn (1972). The variables are fitted to the model as percentage of people lying below poverty line, literacy rates, proportion of rural population and the proportion of SC/ST population. All these data are in thousands except literacy rate data and percent of people below poverty line. The data is projected through compound average growth rate (CAGR) and these are included as explanatory variables on demand for higher education in India as well as major states.

Below poverty line

Poverty is one of the major problems of India. It is the root cause of many socio-economic problems including population explosion, low enrollment, and unemployment and child labour and rising graphs of crimes (Anjana Mazumdar, 2011). This makes India home to the world's largest proportion of the poor, also in the percentage of people living below poverty line. The percentage of poverty fluctuates between 30 to 40 per cent in the case of Tamil Nadu, Assam, Meghalaya and North-eastern states (Anjana Mazumdar, 2011). The state and all India-level poverty ratios estimated by Planning Commission is used. This data is used for India as well as major states.

Literacy rates

Literacy is another proper indicator of economic development. According to Census 2011 of India, a person in the age limit of seven and above, who can write and read with understanding in any of the languages, is considered as a literate. Literacy levels are estimated by census of India for the years 1981, 1991, 2001 and 2011. Literary rates are not available for the state of Assam and Jammu & Kashmir for 1981 and 1991.

Rural population

The rural–urban distribution is 68.84 and 31.16 per cent respectively. The level of urbanisation increased from 27.81 per cent in census 2001 to 31.16 per cent in census 2011, while the proportion of rural population declined from 72.19% to 68.84%. So decline in the share of rural population (or increase urbanisation) to the total may lead to increase in demand for higher education. This variable refers to the ratio of rural population to the total population. The rural population variable from the census is estimated for the years 1981, 1991, 2001 and 2011. It has been derived as the ratio of rural to the total population. The annual data is estimated using Compound Average growth rate (CAGR) for the period of study.

SC/ST population

Scheduled Castes and Scheduled Tribes are deprived groups of Indian society in terms of social, cultural and economic activities. According to census 2011, Scheduled castes at 16.6 per cent and Scheduled Tribes at 8.6 per cent in India, together formed a quarter of the total population. This variable refers to the ratio of SC/ST population to the total population. The share of Schedule Castes (SC) and Schedule Tribes (ST) population is based on the census reports for the years 1981, 1991, 2001 and 2011. The annual figures were estimated through Compound Average growth rate (CAGR).

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