



DEMAND FOR HIGHER EDUCATION - A COMPARISON BETWEEN INDIA AND TAMIL NADU

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Abstract

Indian higher education is one of the biggest higher education systems in the world. Even though still Indian higher education is having low enrollment status with many inter-disparities to access higher education such as rural-urban, male-female, poor-non-poor, inter-caste and inter-religion. In the situation, there is needed a study is to identify factors determinant of higher education in the entire nation as well as specific state. For the purpose, the study has been concentrated on all India level as well as specific state of Tamil Nadu which is one of the forwarding states for achieving higher education. Earlier empirical studies on demand for higher education focused 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). The major objective of the study was to identify the macro-economic determinants on demand for higher education with comparison between India and Tamil Nadu. 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 India models is commonly influenced only one variable like availability of higher education facilities. It is noted point that none of the variable is significant even at 10 per cent level as in the case of Tamil Nadu. There is needed other dimensions of research study is to understand the demand for higher education in the state of Tamil Nadu.

Keywords: Higher education, Demand, India and Tamil Nadu, Comparison, Macro-economic determinants.

Higher Education in India is one of the fast growing sectors of the system. It gives skilled manpower, research innovations and sustainable development. Higher education has been remarkable achievement for the post independence; more specifically it is high growth and development of New Economic Reform period since 1990s. As a result, India has reached one of the biggest higher education systems in the world.

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 (Becker and Lewis, 1993).

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 variables such 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 (Muller 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.

Indian higher education is one of the biggest higher education systems in the world. Even though still Indian higher education is having low enrollment status with many inter-disparities to access higher education such as rural-urban, male-female, poor-non-poor, inter-caste and inter-religion. In the situation, there is needed a study is to identify factors determinant of higher education in the entire nation as well as specific state. For the purpose, the study has been concentrated on all India level as well as specific state of Tamil Nadu which is one of the forwarding states for achieving higher education. Earlier empirical studies on demand for higher education focused 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).

Methodology and Source of data

The main objective of the study is to identify the macro-economic determinants on demand for higher education with comparison between India and Tamil Nadu. 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 in India and Tamil Nadu.

Model-1: Aggregate demand function for higher education in India 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. 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.

Model-3: Aggregate demand for higher education in Tamil Nadu is based on time series data. The period of the study in this model is from 1980-81 to 2006-07. These models are explained the comparison between India and Tamil Nadu in terms of aggregate demand for higher education.

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

$$\text{GER} = f(\text{Macro-economic variables, socio-demographic variable and availability of higher education facilities})$$

General Specification of the Model (Models -1, 2 & 3)

In the present study, linear regression equation is estimated for India (Model-1& 2) and specific state of Tamil Nadu (Model-3).

$$Y = a + \beta_1 \text{peps} + \beta_2 \text{Pcnp} + \beta_3 \text{Peruemhs} - \beta_4 \text{Peruemugpg} + \beta_5 \text{Peremppus} + \beta_6 \text{heipl} + \beta_7 \text{Perbpl} + \beta_8 \text{Perlrpop} + \beta_9 \text{Perrpop} + \beta_{10} \text{Perscst} + U$$

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

a	=	Constant term
Peps	=	Public expenditure per student
Pcnp	=	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
Perrpop	=	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 and model-3. Hence, the two variables were added in demand function for major states model-2 only

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	-

Results and Interpretation: Demand Function for India Model-1

In model -1 and 2 explained the aggregate demand function of higher education for India both longitudinal and cross sectional analysis. 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	Tamil Nadu
	Model-1	Model-2	Model-3
<i>Dependent variable(s)</i>	GER	GER	GER
<i>Explanatory variables</i>			
CONSTANT	299634.7(0.27)	5.287834(2.87)	-.0644039(-0.16)
Public expenditure per Student	-27.8237(-0.87)	-0.0000730(-0.77)	.0004791(0.34)
Per capita NNP/NSDP	93.15996***(1.91)	.000203*(7.48)	.00000477(0.08)
Employment in Public sector	-15636.81(-0.22)	-.005732(-0.84)	-.0021115(-1.18)
Availability of HEIs facilities	258115.5*(3.71)	.14236*(4.22)	.1271128(1.29)
Below of poverty line	19321.84(0.77)	.0092847(0.90)	.023387(0.57)
Literacy rates	215812.8(0.71)	-.0070677(-0.36)	.3858372(0.79)
% of Rural population		-.0277766**(-2.00)	
% of SC/ST population		.0017274(0.09)	
Adjusted R²	0.3775	0.8038	0.1490
F-Statistic (P-value)	0.0001	32.88	0.1594
No. of Observations	28	60	26

() in parenthesis indicates t-value of regression co-efficient.

*denotes level of significant at .01(99) and ** denotes level of significant at .05(95) per cent,

*** denotes level of significant at 10 per cent level.

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. 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.

$$x_i, i = 1; \dots; N. \quad \dots \dots \dots \quad (1)$$

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: Summary statistics of the pooled cross-section data)

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

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

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

Gross enrollment ratio is used as dependent variable along with a set of explanatory variables in all the models exceptional of secondary and graduate level unemployment variables due to lack of availability of data in the model-2. 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, the model-2 is also used demographic variables such as percentage of rural population and SC/ST population. Demographic variables are strictly removed in the mode-1 and model-3.

Model-2 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 (*Heispl*) 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 equation. 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. Even though there is only one variable commonly influenced the demand function for higher education in the models i.e. availability of higher education facilities. It means that increasing the number of higher education institutions leads to increase the demand for higher education in the system. It shows that availability of higher education facilities is pre-dominant factor determinants of demand for higher education in all India level.

Model-3 Aggregate Demand Function for Higher Education in Tamil Nadu during 1980-81 – 2006-07

The higher education system in Tamil Nadu consists of several types of universities, affiliating, unitary and deemed universities in professional and general areas of studies. Under the universities there are colleges with constituent or affiliated or autonomous status offering under-graduate and / or post-graduate programmes in arts, science and humanities as well as professional disciplines. Many of the universities offer a large number of correspondence courses within and outside the country at under-graduate and post-graduate levels. There are also colleges for specialized studies and training in Music, Physical education, Teacher education etc. The Tamil Nadu State Council for Higher Education (TANSCHE) is a statutory policy making and advisory body concerned with the development of higher education in Tamil Nadu. Tamil Nadu has 48 universities (including Deemed and Central Universities) and 860 Colleges of Arts and

Science, Teacher Training; 358 Engineering Colleges; 264 Polytechnic Colleges and 275 Medical and Paramedical Institutions. Tamil Nadu accounts for the highest number of 24 Deemed Universities out of 110 in the country.

Tamil Nadu is one of the major states of India and a progressive state in the status of growth and performance of education in general and higher education in particular. It is high in achievement of school education at different levels such as primary, secondary and higher secondary schooling. As a result upstream higher education is expected to do better in terms of enrollment (higher demand) growth. It is a high literacy state and people in the state are aware of the value of education. It is significant to note that public policy and public spending of the state is high when compared to other states.

Distribution of Arts, Science and Special colleges in Tamil Nadu by Management

Sl. No.	Types of Colleges	Govt.	Govt. Aided	Self-financing	Total
1	Arts and Science colleges	62	133	353	548
2	Physical Education		3	10	13
3	Oriental		10	0	10
4	School of Social work		2	0	2
5	College of Education	7	14	543	564
	Total	69	162	906	1137

Source: Policy note (Demand No.20), Higher Education (2009-10), Government of Tamil Nadu.

There is a remarkably policy for reservations which provides 69 percent to Schedule Castes, Schedule Tribes and Other Backward Classes. Tamil Nadu is the only one state following highest reservation policy compare with all other states in India. It allows greater opportunities to the people from socially and economically backward groups through implementation various public policies and programmes for education especially higher education. In a situation, this context is necessary to study demand for higher education in Tamil Nadu. On the one hand, purpose of the study is to derive the aggregate demand function for higher education in Tamil Nadu through time series data for the period 1980-81 to 2006-07. On the other hand, result of regression equation of demand function of Tamil Nadu is compared with all India level.

After running the linear regression the fitted OLS method is to test of Multi-collinearity and hetroskedasticity. In model 3, aggregate demand function for Tamil Nadu during 1980-81 to 2006-07 is explained now. The result of linear regression shows that Gross enrollment ratio (GER) data as taken in the order of first difference and used as dependent variable with a set of explanatory variables such as per

capita income, public expenditure per student, employment in organized in sector, availability of higher education facilities, percentage of below poverty line, literacy rates. Here too, none of the variable was significant even at 10 per cent level as in the case of Tamil Nadu. This model is best fit to estimate the demand of higher education. Even though these models predict that there is no variable significant at 10 per cent level.

Non-economic factors include social awareness about education, individual student's and parent's aspiration to go for higher education and demonstration effect. It is for these reasons that Tamil Nadu is one of the best states of enrollment in school education, especially up to secondary level. There is increasing the student's high performance in higher secondary schooling in terms of enrollment, appearing for examination and pass outs. All these lead to students going for higher education spontaneously. And parents are willing to send their children for higher education. It is also the reason why Tamil Nadu is one of the most forward states in terms student enrollment, enrollment in various disciplines, especially professional education. Thus, the need to analyse the individual demand for higher education is required to understand the effect of economic factors or non-economic factor on higher education. It is another dimension of research study, the socio-economic background of individual students and their household factors were studied to see how they were studied to see how they influences demand for higher education.

Comparison between India and Tamil Nadu

Here it is observed that per capita income, availability of HE facilities and literacy population influenced demand function for higher education in India. In the same way cross-sectional analyses for major states indicate that per capita income, availability of HE facilities and rural population influencing the demand for higher education in model-2. It is to be noted that rural population has negative impact on enrollment demand for higher education. It is explicit that urbanization has a positive effect on student's enrollment in higher education.

In the case of Tamil Nadu, none of the variables were significant even at 10 per cent level. This model is best fit of the model to estimate the demand function for higher function for higher education by applying the Augmented Dickey Fuller Test to find out the problem of non- stationary. Even though model predict the same result no variable is significant in the model. It means that in the state of Tamil Nadu, non-economic factors influence demand for higher education.

With regard to public expenditure on higher education, in case of major states, it is negatively related to enrollment. But the expected sign is positive i.e. greater public expenditure on higher education would lead to better enrollment for higher education. In the case of Tamil Nadu, the public expenditure is not given unexpected sign (negative) and also not even significant at 10 per cent level. Even though the result failed in the case of Tamil Nadu i.e. greater public expenditure on higher education would lead to better enrollment for higher education.

With regard to Tamil Nadu the growth in higher educational service is phenomenal. This state has been achieved remarkably progress in higher education both general and professional education. There are many colleges have

been upgraded as autonomous colleges and even the government colleges obtained autonomous status. More number of students are studying various technical and professional courses in private institutions in Tamil Nadu. All private colleges/institutions are affiliated to respective universities that are directly under the state government. The state government has also been taken serious effort to regulate fees and admission in such institutions. Both the role of public and private efforts are expanding and providing the availability of education service to fulfill overall demand for higher education in Tamil Nadu.

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, major states and specific state of Tamil Nadu 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, Model-2 represent major states during four different period of 1993-94, 1999-00, 2004-05 and 2005-06 and also Model-3 represents time series data from 1980-81 to 2006-07 for the specific state of Tamil Nadu.

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) 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 is explained the demand function for major states by influencing the significant explanatory variables such as per capita income, availability of higher education facilities and rural population 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.

To conclude, the study revealed that both longitudinal and cross sectional analysis of demand function of higher education in India models, some variables are expected sign and significant at 1 or 5 per cent level. Here, it may be observed that there is only one variable commonly influenced the demand function namely availability of higher education facilities. It predicts that increasing the higher education facilities in the system is providing opportunities for accessing (demand) higher education to all groups across all the states and nation. In the case of Tamil Nadu, there is none of variable significant even at 10 per cent level. It means that in the state of Tamil Nadu, non-economic factors influence demand for higher education. It is needed another dimension of research study, the socio-economic background of individual students and their household factors were studied to see how why they were studied to see how they influences demand for higher education in the state of Tamil Nadu.

References:

- Albert, C. (2000), 'Higher Education Demand in Spain: The Influence of Labour Market Signals and Family Background', *Higher Education*, 40 (2), 147-162.
- Analysis of Budget Expenditure on Education (Year) Ministry of Human Resources Development, (Department of Secondary and Higher Education) Planning and Monitoring Unit, New Delhi (India) <http://education.nic.in/planbudget/ABE-2007.pdf>
- Becker W.E. and Lewis, D.R. (1993) Higher Education and Economic Growth. Kluwer Academic Publisher, USA
- Beneito et al (2001) Determinants of the Demand for Education in Spain, *Applied Economics*, Vol.33 (12), 1541-1551.
- Berger and Kostal (2002). Financial Resource, Regulation and Enrollment in US public higher education, *Economics of Education Review*.21 (2002) p.101-110.
- Bhushan, Sudhanshu (2005) Knowledge Economy and Higher Education, *Indian Journal of Labour Economics (IJLE)* Vol.48 (4), Oct-Dec, Pp.869-880.
- Bishop, John (1978) The Effect of Public Policies on the Demand for Higher Education. *The Journal of Human Resource*, 12 1978, 285-307.
- Blaug, M. (1966) An Economic Interpretation of the Private Demand for Education, *Economica*, 33(1) 166-182, 1966.
- Blaug, M. (1976) The Empirical Status of Human Capital Theory: A Slightly Jaundiced Survey, *Journal of Economic Literature*, 14 (3) 1976, 827-855.
- Chang and Hsing (1996) A study of Demand for Higher Education at Private Institutions in the US: A Dynamic and General Specification, *Education Economics*, 4(3), 267-278.
- Campbell, and Siegel (1967) The demand for Higher Education in the United States, 1919-1964, *American Economic Review*, (June) 1967, 57, 482-494
- Canton and Jong (2005) The Demand for Higher in the Netherlands, 1950-1999, *Economics of Education Review*, 24 (2005) 651-663
- Cohn, Elhanan, (1978). *Higher Education Enrollment Projections*, *Review of Higher Education*1 (Winter 1978): 18-30.
- Charles T. Clotfelter and Michael Rothschild (1993) *Studies of Supply and Demand in Higher Education*, University of Chicago Press.
- Duchesne, I and W. Nonneman, (1998) The demand for higher Education in Belgium, *Economics of Education Review* 17, no. 2:211-218.
- Feldman, P. and Hoenack, S. A. (1969). Private demand for Higher Education in the United States. In *The Economics and Financing of Higher Education in the United States*. Washington, D.C.: The Joint Economic Committee, 1969.
- Galper and Dunn (1969) A short-run demand function for Higher Education in the United States, *The Journal of Political Economy*. 77 (5) 1969, 765-777.
- Handa, M.L. and Skolnik, M.L. (1975), Unemployment, Expected Returns, and the Demand for University Education in Ontario: Some Empirical Results, *Higher Education*, 4 (1), 27- 43.
- Hoenack, S.A. and Weiler, W.C. (1975). Individual demand for higher education. *Journal of Higher Education*, 1975, 46, 623-652.
- Hopkins, T.D. (1974), 'Higher Education Enrollment Demand', *Economic Enquiry*, 12 (1), 53- 65.
- India, Planning Commission (2005). Tamil Nadu Development Report. New Delhi: Planning Commission. P. 210.
- Jackson, G.A. and Weathersby, G.B. (1975), 'Individual Demand for Higher Education', *Journal of Higher education*, 66 (6), 623-651
- King, Jonathan (1993) Demand for Higher Education in Puerto Rico, *Economics of Education Review*, 12 (3) 1993, 257-265.
- Kodde and Ritzen, (1994), Integrating Consumption and Investment Motives in a Neo-Classical Model of Demand for Higher Education, *KYKLOS*, 37(4), 1984, 598-608.

- Kothari.V. N. & Panchamuki .P. R. (1975) *A Survey Of Research in Economics of Education in India*, survey sponsored by the Indian Council of Social Research, New Delhi, August 1975.
- Li, Wenli (2007) Family Background, Financial Constraint and Higher Education attendance in China *Economics of Education Review*,26,2007, 725-735.
- Mueller and Rockerbie (2005) Determining Demand for University Education in Ontario by type of Student, *Economics of Education Review*. 24. 2005, 469-483.
- Nicholls (1984) The Demand for Tertiary Education: An Australian Study, *Higher Education*, 13 (4). 1984, 369-377.
- Philip, Altbach, G (1993), The Dilemma of Change in Indian Higher Education, *Vol.26(1), Perspectives on Higher Education in India*, (Jul., 1993), pp. 3-20.
- Psacharopoulos, George (1979) A Quantitative Analysis of Demand for Higher Education, *Higher Education*, 1979, 159-177.
- Radner, R. and Miller, L.S. (1970) Demand and Supply in U.S. higher Education: A Progress Report, *The American Economic Review*, 60(2) 326-334.
- Schaafsma, Joseph(1976) The Consumption and Investment Aspects of the Demand for education, *The Journal of Human Resources*, Vol.2, 1976, 233-242.
- Schultz (1963), Investment in Human Capital- A Conceptual Analysis, *Meenakshi Mudranalaya, Meerut, New Delhi*.
- Srinivasan, J. (2010) *Demand for Education in India: A Sub Regional Study*. New Delhi: Book Well Publishers
- Thorat, Sukhadeo (2006) Higher Education in India, Emerging issues Relates to Access, Inclusiveness and Quality, Nehru Memorial Lecture, University of Mumbai, Mumbai, Nov, 24, 2006.
- Tilak, J.B.G (2005) Higher Education: A Public Good or A Commodity For Trade? Commitment to Higher Education or Commitment of Higher Education to Trade, 2nd Nobel Laureates Meeting in Barcelona, Friday,2, December 2005.
- Tamil Nadu. Department of Higher Education (2009-2010) Report
- Vaizey, John. (1962) Education as a Public or Private Good? *Education, London, Faber and Faber, ltd., pp. 28-36*.
- Yang, Yung (1998) Estimating the Demand for Higher Education in the United States of America 1965-95. Available at www.cscy.edn/indiv/yangy.

APPENDIX

Model -1 Demand of Higher Education in India

1.1 Diagnostics of the Time Series Data

To examine whether time-series data is stationarity or non-stationarity this study uses Augmented Dickey-Fuller (ADF) test.

The Dickey-Fuller (DF) test for examining the order of integration of a time series is based on the regression.

$$DX_t = \alpha_0 + \delta X_{t-1} + \varepsilon_{1t} \quad \dots\dots\dots(1)$$

where D is the first difference operator and ε_{1t} is white noise error term. The augmented Dickey-Fuller (ADF) test is based on the regression:

$$DX_t = \alpha_0 + \delta X_{t-1} + \sum_{i=1}^p \alpha_i DX_{t-i} + \varepsilon_{2t} \quad \dots\dots\dots(2)$$

where the length of p is chosen in such a way that ε_{2t} becomes white noise. The null hypotheses that the variable X_t has non-stationarity is rejected in both the equations if δ is found to be negative and statistically significant once the order of integration of the time-series variables is identified.

Applying this ADF test in the data, the results are reported in the following table as below.

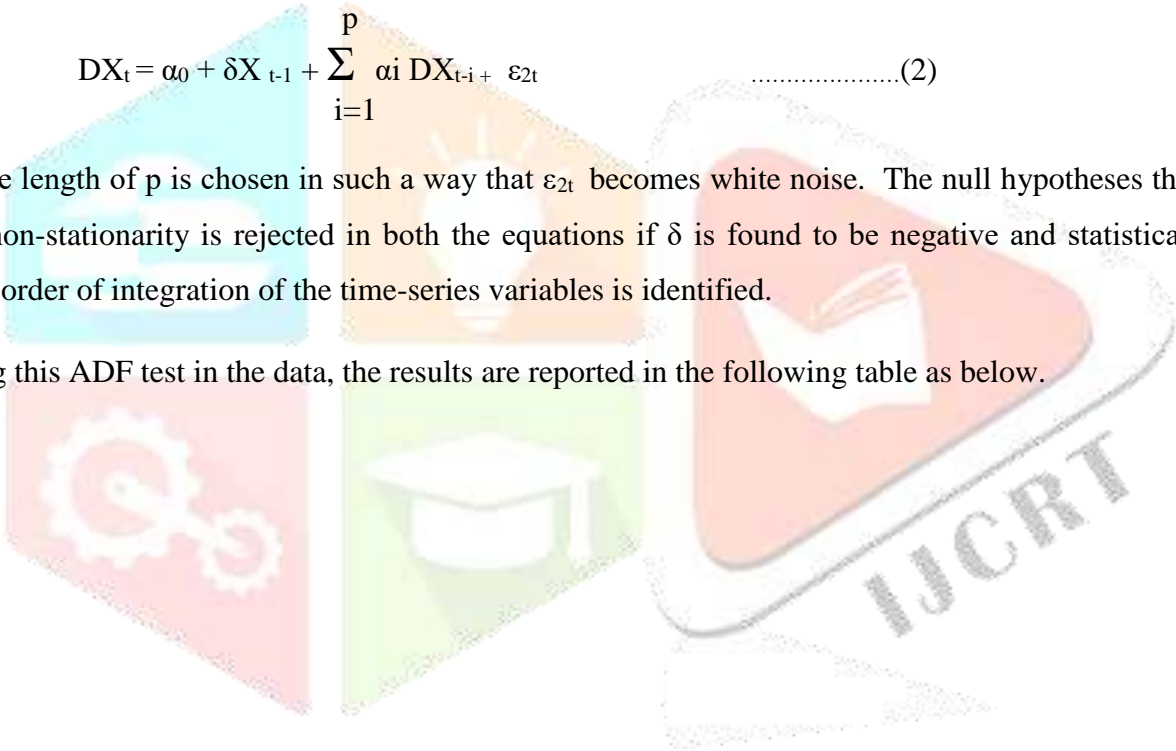


Table: 1.1 Result of Test for Stationarity using augment dickey fuller

VARIABLE(S)	ADF Statistics at level	ADF Statistics at 1st difference	Critical Value (0.010)	Critical Value (0.05)	Critical Value (0.10)	Order of Integration	Remarks
Higher Education Enrolment (heer)	4.099	-4.161	-3.736	-2.994	-2.628	1(1)	Stationary
Log Enrollment (lenroll)	0.071	-8.141	-3.736	-2.994	-2.628	1(1)	Stationary
Gross Enrollment Ratio (ger)	5.091	-3.15	-3.736	-2.994	-2.628	1(1)	Stationary
Public Expenditure per Student(peps)	-0.196	-6.024	-3.736	-2.994	-2.628	1(1)	Stationary
Per capita net national product(pcnp)	3.422	-3.174	-3.736	-2.994	-2.628	1(1)	Stationary
No. of HEIs per lakhs population (heisl)	4.626	-1.559	-3.736	-2.994	-2.628	1(1)	Stationary
Percentage of BPL population (pbpl)	0.477	-5.87	-3.736	-2.994	-2.628	1(1)	Stationery
Percent of literacy rate population (lirpop)	0.982	-1.439	-3.736	-2.994	-2.682	1(1)	Stationery

The table 4.5.1 explicitly shows that there is a problem of non-stationary at this level on applying the Augmented Dickey Fuller Test. But when the variables are used in difference the series in non-stationary is converted into stationary form. Thus, the null hypothesis for all the variables is rejected at 10% significance level.

1.2 Diagnostics of Fitted OLS Method

Test for Multicollinearity and Heteroskedasticity

Model is checked for both the problems and they are corrected for the same. The test of multi-collinearity was applied and the value of VIF and TOF state that there is no problem of multi-collinearity. However, on applying the test of heteroskedasticity using Camernon & Trivedi's decomposition test, the results suggest that the model exhibits these problems. The null hypothesis states that there was no heteroskedasticity against the alternative hypothesis of heteroskedasticity. The results obtained are as follows:

Cameron & Trivedi's decomposition of IM-test

Source	Chi2	df	p
Heteroskedasticity	28.00	27	0.4110
Skewness	4.37	6	0.6266
Kurtosis	.	1	.
Total	.	34	.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

The Breusch-Pagan test is designed to detect any linear form of heteroskedasticity.

H0: Constant Variance

Variables: fitted values of D. enroll

Chi2 (1) = 2.70

Prob > Chi2 = 0.1000

Breusch-Pagan / Cook-Weisberg tests the null hypothesis that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. For example, in the default form of the `hettest` command shown above, *the alternative hypothesis states that the error variances increase (or decrease) as the predicted values of Y increase, e.g. the bigger the predicted value of Y, the bigger the error variance*. A large chi-square would indicate that heteroskedasticity was present. In our case, the chi-square value was small, indicating heteroskedasticity was probably not a problem (or at least that if it was a problem, it wasn't a multiplicative function of the predicted values). But, it was not statistically significant. Hence, we estimated the robust standard errors to take care of this problem.

Test of Autocorrelation

Durbin-Watson d-Statistic (7, 28) = 2.519121

This value of DW Test as 2.52 indicates, the model does not suffer from autocorrelation.

Test of Multicollinearity – VIF Test

Problems arise in regression when the predictors are highly correlated. In this situation, there may be a significant change in the regression coefficients if we add or delete an independent variable. The estimated standard errors of the fitted coefficients are inflated, or the estimated coefficients may not be statistically significant even though a statistical relation exists between the dependent and independent variables.

Data analysts rely on these facts to check informally for the presence of multicollinearity. `estat vif`, another command for use after `regress`, which calculates the variance inflation factors and tolerances for each of the independent variables. The variance inflation factors calculates the tolerances of each of the independent variables. The VIF test results are reported in the following Table.

Variable	VIF	1/VIF
peps.D1	1.06	0.940269
pcnnp.D1	1.17	0.85432
empt.D1	3.54	0.282361
heispl.D1	1.22	0.81758
prbpl.D1	1.2	0.83312
prlit.D1	3.76	0.265681
Mean VIF	1.99	

With mean value of VIF, 1.99, there is no problem of multi-collinearity with regard to OLS method.

Most analysts rely on informal rules of thumb applied to the VIF ;(Chatterjee and Hadi, 2012). According to these rules, there is evidence of multi-collinearity if: The largest VIF is greater than 10 (some choose a more conservative threshold value of 30). Going by this rule of thumb, it can be said, the model does not suffer from multi-collinearity.

Model -2 Demand for Higher Education of Major States (Model 2.1 & 2.2)

Model-2 Summary statistics of the pooled cross-section data

Variable	Obs	Mean	Std. Dev.	Min	Max
States	60	8	4.356954	1	15
Year	60	1050.25	962.3053	93	2005
heer	60	523422.7	341497	98749	1506702
logenroll	60	5.632167	0.2835495	4.99	6.18
ger	60	7.121833	2.569971	1.41	12.65
peps	60	10955.28	12414.58	584	98203
pcndsdp	60	12346.17	8513.115	1019	30690
empus	60	26.508	26.72545	4.06	86
heispl	60	12.00183	6.575814	1.4	30.9
prbpl	60	26.05017	15.47011	3.61	80.37
prlit	60	66.06867	11.08633	41	92.27
rural	60	70.80533	11.87558	38.38	90
scst	60	24.59783	8.950336	8.1	52.7

Model 2.1: Diagnostics of Pooled OLS Method

Cameron & Trivedi's decomposition of IM-test

Source	Chi2	df	p
Heteroskedasticity	40.95	44	0.6032
Skewness	8.89	8	0.3519
Kurtosis	0.12	1	0.7335
Total	49.95	53	0.5936

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

H0: Constant Variance

Variables: fitted values of ger

Chi2 (1) = 2.70

Prob > Chi2 = 0.1000

Like model 1, though Chi-square value is small yet statistically not significant. So we estimated robust Standard Error.

Test of Multicollinearity –VIF Test

Variable	VIF	1/VIF
peps	1.12	0.895111
pcndsdp	2.55	0.391501
empt	1.29	0.777167
heispl	1.52	0.655769
prbpl	1.38	0.725949
prlit	2.48	0.403228
rural	1.3	0.766289
Scst	1.3	0.769664
Mean VIF	1.62	

With mean value of VIF, 1.62, there is no problem of multicollinearity with regard to pooled OLS method.

Model 2.2 Diagnostics of Pooled OLS Method

After running the linear regression, multicollinearity and heteroskedasticity using VIF test and Cameron & Trivedi decomposition of IM- test was checked.

Cameron & Trivedi's decomposition of IM-test

Source	Chi2	df	p
Heteroskedasticity	40.70	44	0.2568
Skewness	3.39	8	0.9077
Kurtosis	2.62	1	0.1054
Total	55.71	53	0.3733

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

H0: Constant Variance

Variables: fitted values of log enroll

Chi2 (1) = 0.21

Prob > Chi2 = 0.6486

Low chi-square but not statistically significant and hence, we have go to robust SE.