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A STUDY ON PERFORMANCE OF MACRO LEVEL EDUCATIONAL VARIABLES IN HIGHER EDUCATION WITH REFERENCE TO INDIA

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ABSTRACT

Universities and Institutions for Higher Education are undergoing changes involving the development of new roles and missions. Governments and institutions are implementing strategies to ensure the proper performance of universities through the use of consecutive New Educational Policies. This paper attempts to examine the performance of a few macro level educational variables of higher education in the context of improved quality education system since National Policy on Education (1986). In particular, this study took the concept of Gross Enrolment Ratio (GER) to see the performance of enrolment in higher education over a period of five years from 2000-01 to 2005-06. Secondary data were collected from National Sample Survey (NSS) data, Selected Educational Statistics (SES) data, Census data, and UGC Reports 2001 – 2006. Multiple Regression analysis is used to understand the significance of explanatory variables such as public expenditure on education, student-teacher ratio, and enrolment – institution ratio on the dependent variable, that is, Gross Enrolment Ratio (GER). The selected period time taken for this study is from 2000 – 01 to 2005 – 06.

Key Words: Higher Education, Quality of Education, Indicators, and Regression Equations.

1. INTRODUCTION

The growth of institutions of higher education in India was very slow and diversification in areas of studies was very limited, before independence. After independence, the number of institutions has increased significantly. In this context, higher Education in Tamil Nadu is viewed as a long-term social investment for the promotion of economic growth, culture, social cohesion, equity and justice. The Government of Tamil Nadu has shown utmost care to strengthen the higher education system in the State to respond to the emerging demands of the new century. The educational policy (1986) statement insisting that the education is a unique investment in the present and the future. Keeping this statement in mind the Tamil Nadu Government have realised that youths who belong to socially and economically backward class need to be encouraged to access higher education in large number by offering affordable Higher Education.

2. NATIONAL POLICY ON EDUCATION – 1986

According to the 1986 Policy, Higher education provides people with an opportunity to reflect on the critical social, economic, cultural, moral and spiritual issues facing humanity. It contributes to national development through dissemination of specialised knowledge and skills. It has also a key role in producing teachers for the education system.

The policy urged to propose the large number of universities and colleges in the country for all-round improvement. As a result the 1986 policy called for launching the Open University system as an instrument of democratising education and to develop a new pattern of the Rural Universities to take up the challenges of micro-planning at grass-root levels for the transformation of the rural areas.

3. QUALITY IMPROVEMENT

Quality improvement in higher education will be brought about through restructuring academic programmes to ensure their relevance to modern market demands; domestic and global linkages with employers and external advisory resource support groups and tracer studies; greater emphasis on recruitment of adequate and good quality teachers; complete revamping of teaching/learning methods by shifting from traditional repetitive experiments to open-ended design-oriented work for encouraging invention and innovation; compulsory interactive seminar-tutorials, broadening the content of Science and engineering programmes to strengthen fundamental concepts, improving learning opportunities and conditions by updating text books and learning material; and improving self-directed learning with modern aids and development of IT network.

4. QUALITY IN HIGHER EDUAION

To assess the quality of education, it is essential to overview the following factors:

- literacy, relevance and efficiency of workforce
- performance and achievement of general education
- availability and use of modern teaching-learning materials and methods
- provision of quality teachers
- quality and duration of in-service teacher training
- delivery and relevance of curriculum
- school infrastructure and so on ...

It is very broad and difficult to measure the impact of each factor on education quality. One of the important issues is ensuring quality in a complicated and diverse system with major resource constraints. An important point to note is that the standards of education in various fields cannot be expected to be uniform throughout the country. The term standard is as dynamic as the term development. Hence, there is bound to be differences in standards depending upon the mission and goal of institutions, the availability of resources, the geographical location of institutions, management structures and so on. Various reasons are cited for such a situation including the non-availability of qualified teachers, a lack of financial resources, administrative procedures and continuous pressure to increase the intake without augmenting physical and academic facilities to name a few. While domestic regulation of standards exists, the apex-regulating bodies have not been fully successful in ensuring the maintenance of minimum standards in higher education. Quality therefore seems to be the domain of a few institutions and a few individuals. However, the policies relating to academic reforms are high priority on the agenda of UGC. The Commission has been pushing the idea of introducing a credit system, continuous evaluations and reforms in pedagogy. The Commission has been issuing guidelines to the universities for the maintenance of standards.

5. ACCESS TO EDUCATION

Access to education is much simpler to measure. Normally, it can be measured by:

- Gross Enrolment Ratio (GER) by level
- Net Enrolment Ratio (NER) by level
- Gross Admission Rate or Apparent Intake Rate (AIR)

- Net Admission Rate or Net Intake Rate (NIR)
- Transition Rate from Primary to Lower Secondary
- Transition Rate from Lower to Upper Secondary

These indicators can be calculated separately for boys and for girls thus, enabling to gauge the equity in access to education to some extent

6. GROWTH OF HIGHER EDUCATION AT NATIONAL LEVEL:

6.1 UNIVERSITIES AND COLLEGES

According to the UGC Annual Report 2005-2006, 355 universities including 20 Central, 216 State, 101 Deemed Universities, 5 Institutions established under State Legislation, 13 Institutes of National Importance and 18,064 colleges have existed in the Higher Education sector. Out of 216 State Universities, 60 State Universities and 2 institutions out of 5 institutions established through state legislation have not yet been declared eligible to receive central assistance under Section 12 (B) of the UGC Act, 1956 amended from time to time. During the reporting year 2005-2006, six new State Universities have been recognized under Section 2(f), of the UGC Act and seven institutions which were notified as Deemed to be Universities by the Govt. of India under Section 3 of the UGC Act, 1956 have also been included in the list of the UGC recognized Universities.

Also, one Deemed University has been converted into a state university, two state universities have been converted into central universities and the names of two state universities have been changed. As many as 439 new colleges have been established in various states during 2005-2006.

At the end of the financial year 2005-2006, the total number of colleges recognized under Section 2(f) of the UGC Act, 1956 had been 6109. Out of these, 584 colleges are not eligible to receive central assistance under Section 12 (B) of the UGC Act, 1956. During the academic session 2005-2006, the total enrolment in all courses and levels in regular stream had been 110.28 lakhs including 44.66 lakhs women students constituting 40.50%. The maximum number of women students enrolled in the state of Maharashtra.

6.2 STUDENTS ENROLMENT

During the academic year 2005-06, there were 110.28 lakhs (provisional) students enrolled on various courses at all levels in universities/colleges and other institutions of higher education as compared to 104.81 lakhs in the previous year, registering an increase of 5.2 per cent. Out of 110.28 lakhs, women students were 44.66 lakhs constituting 40.50 percent. The enrolment of women students in terms of absolute numbers, was the highest in the state of Maharashtra (6.25 lakhs) followed by Uttar Pradesh (5.29 lakhs), Tamil Nadu (3.86 lakhs), Andhra Pradesh (3.67 lakhs) etc. In terms of percentages, Kerala accounted for the highest percentage of 61 followed by Goa (59%), Punjab (52%) etc. indicating the dominance of girl students in Higher education in these states.

6.3 FACULTY STRENGTH AND RESEARCH DEGREES

In the academic year 2005-2006, the total number of teachers in universities and colleges was 4.88 lakhs as compared to 4.72 lakhs teachers in the previous year. Out of 4.88 lakhs teachers, 83.85% teachers were in Colleges and the remaining 16.15% in University Departments / University Colleges. The number of research degrees (Ph.Ds) awarded by various universities increased slightly from 17,853 in 2003-2004 to 17,898 in 2004-2005. Out

of the total number awarded in 2004-2005, the Faculty of Arts had the highest number with 7532 degrees, followed by the faculty of Science with 5549 research degrees. These two faculties together accounted for 73.09 per cent of the total number of research degrees awarded.

6.4 GROWTH IN ENROLMENT OF WOMEN IN HIGHER EDUCATION

There has been a phenomenal growth in the number of women students enrolled in higher education, since independence. Women enrolment was less than 10 per cent of the total enrolment on the eve of Independence and it rose to 40.50 per cent in 2005-2006.

The pace of growth has been particularly faster in the last two decades. The data presented in the UGC Report 2005-06 shows that the number of women enrolled per hundred men registered almost five-fold increase during the period 1950-51 to 2005-2006.

7. NON-PLAN (MAINTENANCE) AND PLAN (DEVELOPMENT) ASSISTANCE:

7.1 ASSISTANCE TO UNIVERSITIES

To meet the goals and objectives of the X Plan, the UGC provides financial assistance to Central and Deemed to be Universities, both under Development (Plan) and Maintenance (Non-plan) Assistance under various schemes / programmes while assistance to State Universities is made available only under Development (Plan) Schemes / Programmes. The maintenance (Non-plan) assistance is being provided for meeting the recurring expenditure on salaries of teaching and non-teaching staff and for maintenance of laboratories, libraries, buildings as also for obligatory payments such as taxes, telephones, postage, electricity bills etc. The objective of Development Assistance is not only to improve the infrastructure and basic facilities in the Universities but also to develop excellence in certain identified areas. The development

assistance can be utilised for the consolidation of existing infrastructure and for modernizing teaching, research and administration as also for extension and for carrying out research activities to meet the changing needs of the Universities to respond appropriately to the demands of the society.

Development (Plan) Assistance to Central Universities for the period 2005-06 was 22.73 (Rs. in Crores) and the Maintenance (Non-Plan) Assistance to Central Universities for meeting the recurring expenditure on salaries of teaching and non-teaching staff and for maintenance of laboratories, libraries, buildings, as also for obligatory payments such as taxes, telephones, postage, electricity bills etc. was Rs.878.65 cores were released.

7.2 STATE UNIVERSITIES

According to the UGC Report 2005-06 as on 31st March, 2006, there were 216 state universities, recognised by the UGC, set up under laws enacted by the legislatures of various states. At present, 119 State Universities, excluding Agriculture/Medical Universities, are eligible to receive grants from the UGC. Development grants including grants for specific purposes are provided to these eligible universities in order to facilitate the procurement of such infrastructural facilities as are not normally available to them from the State Government or any other bodies supporting them. Assistance is given for Building Staff, Books & Journals and Equipment etc.

During 2005-06, a total of Rs.65.98 crores was made available to 68 eligible State Universities. Additional grants over and above the General Plan (Development) Assistance have also been provided to State Universities under some specified programmes/schemes. During the year 2005-06, amounts to Rs.266.89 crores to 119 eligible State Universities.

7.3 DEEMED TO BE UNIVERSITIES

The section 3 of the UGC Act, 1956, provides that an Institution of Higher Education, other than a university, which is doing the work of very high standard in a specific area can be declared as an Institution Deemed to be University. Such Institutions enjoy the academic status and privileges of Universities and are able to strengthen their activities in the field of their specialization, rather than becoming a multi faculty University of a general type. During the fourth year of X Plan i.e. 2005-06, on the recommendations of the Committee, the Govt. of India, MHRD notified that the 7 institutions as Deemed to be University under Section 3 of the UGC Act, 1956.

The total number of Deemed to be Universities as on 31st March, 2006 has risen to 101. The plan (Development) Assistance provided to Institutions Deemed to be Universities was 29.35 (Rs. in crores), 2005-06. And the non-plan (Maintenance) Assistance provided to Institutions Deemed to be Universities was 87.95 for the same period.

7.4 DEVELOPMENT (PLAN) AND MAINTENANCE (NON-PLAN) GRANTS TO COLLEGES

During the Tenth Plan, the programme of development assistance to Colleges has been implemented with the following objectives:

- To provide grants to the Colleges for strengthening basic infrastructural facilities including buildings (extension/renovation/construction of new buildings) which are needed for proper instruction and for those colleges which are catering to the needs of SC/ST students.

- Removal or reduction of social disparities and regional imbalances.
- To provide special remedial coaching to academically poor performers particularly from SC/ST and Minority Communities.

To achieve these objectives, the UGC has been providing grants to the Colleges which fulfill the minimum eligibility conditions, and possess the necessary viability and potential and are striving for better standards to enable them to meet their basic needs. Therefore the Tenth Plan Development Grants Allocated and Paid to the Colleges for 29 States during 2005-06 was 25853.15 (Rs. in lakhs).

7.5 MAINTENANCE AND COORDINATION OF STANDARDS BY THE STATE ACADEMIC STAFF COLLEGES (ASC)

With an aim to maintain high standards of teaching in Universities and Colleges, the scheme of Academic Staff Colleges was introduced in 1986-87 by establishing 48 Academic Staff Colleges. There were 51 ASCs during 2004-05. The Commission approved to establish one more ASC in Jammu University during 2005-06, thus increasing the number of ASCs to 52. These colleges, so established, are conducting specially designed orientation programmes of four weeks duration for newly appointed lecturers and Refresher courses of three week duration for in-service teachers.

The grant of 20.04 crores released against the budget allocation of 20.00 crores, the number of courses approved/conducted were 222 Orientation and 923 Refresher Courses & 39 Workshops / 180 Orientation and 850 Refresher Courses & 35 Workshops and the number of beneficiaries were 32,000 (Approx.) during 2005-06.

8. DEVELOPMENT OF HUMAN RESOURCE

8.1 NATIONAL EDUCATION TESTING FOR TEACHING AND RESEARCH

The University Grants Commission conducts a national level test to determine eligibility for lectureship and Junior Research Fellowships (JRF) to ensure minimum standards for the entrants in the teaching profession and research in Humanities (including languages), Social Sciences, Computer Science and Applications, Electronic Science, Forensic Science and Environmental Sciences. The Test for other Science subjects is conducted by the CSIR jointly with UGC. The Tests are conducted twice a year generally in the months of June and December. For candidates who desire to pursue research, Junior Research Fellowship (JRF) is available for a maximum period of five years. The candidates who qualify for JRF in the UGC-NET, can pursue research in the UGC recognized universities and institutes. NET is being conducted at 66 centres spread across the country and in 77 subjects. The examination for JRF award is being conducted since 1984 and for eligibility for Lectureship since 1989.

8.2 MAJOR/MINOR RESEARCH PROJECTS

The financial assistance is provided to permanent, regular, working/retired teachers in the Universities and Colleges (under Section 2(f) and 12(B) of the UGC Act, 1956) to enable them to take up research work on intensive and indepth studies in specific subject areas. Research Project may be undertaken by an individual teacher or a group of teachers or by a department as a whole. It can also be undertaken by a retired teacher up to the age of 70. Priority is given to inter-disciplinary research and inter-institutional collaborative research. The quantum of assistance is a maximum of Rs. 10.00 lakhs in Humanities and Social Sciences and Rs. 12.00 lakhs in Science and Engineering & Technology for Major Research Project and

Rs.1.00 lakh per project for Minor Research Project. The assistance provided for a Major Research Project includes funding for Equipment, Books and Journals, Contingencies, Travel & Fieldwork, Hiring Technical Services, Fellowship to Research Personnel and other items needed for the project. In the case of Minor Project, funding for appointment of project staff is not provided. An Expert Committee constituted by the Commission evaluates the proposals received and the applicants themselves present their proposals before the Committee. The duration of a Major and Minor Project is normally three/two and two years respectively. The UGC regularly monitors the progress of the research projects to ensure its smooth functioning and proper utilization of grants. The UGC Regional Offices approved as many as 3544 Minor Research Projects (1576 in Science and 1968 in Social Sciences) and paid an amount of Rs.12.45 crores during 2005-06.

9. TAMIL NADU STATE COUNCIL FOR HIGHER EDUCATION (TANSCHE)

With a view improve the quality of higher education in the State, The Tamil Nadu State Council for Higher Education (TANSCHE) was established by an Act in the year 1992. And for the promotion and coordination of Higher Education at the State level and coordination of the State level programmes with those of the University Grants commission the TANSCHE has a major role to act.

9.1 FUNCTIONS OF THE COUNCIL (TANSCHE)

To advise the Government or any University/College or institution of Higher Education on any matter relating to Higher Education and research which they may refer to the Council; to forward the developmental programmes of Universities, Colleges and Institutions of higher education to the University Grants Commission along with its comments and recommendations

and monitor the progress of implementation of such developmental programme; to promote co-operation and co-ordination of institutions of higher education among themselves and explore the scope of interaction with industry and other related establishments; to suggest ways and means for augmenting additional resources for higher education in the State; to encourage and promote innovations in curriculum development, restructuring and updating of syllabi in Universities and autonomous colleges and suggest necessary reforms; to assist the University Grants Commission in respect of determination and maintenance of standards and suggest remedial action wherever necessary; and to promote and co-ordinate programmes of Universities and Colleges, set up a monitoring system and monitor its implementation are the important functions of the Council.

10. MEASURES TO INCREASE THE GROSS ENROLMENT RATIO (GER) IN TN

The Policy of Higher Education in the State of Tamil Nadu has been evolved to achieve 25% of Gross Enrolment Ratio (GER) by 2020. In order to achieve this target, the Government has taken several steps. It has been realized that the Gross Enrolment Ratio (GER) in Higher Education can be increased by offering higher education at affordable cost and by giving the opportunity to all to access Higher Education.

For this the Government have formulated various schemes such as establishing new Engineering Colleges and Arts & Science Colleges at various districts, all self-supporting courses in Government Engineering Colleges and Arts & Science Colleges have been converted into regular Courses, shift system has been introduced in Government Arts & Science Colleges (2006-2007), and Government Polytechnic Colleges (2009-2010), minimum marks for the admission in engineering colleges have been reduced to all categories of students

from the year 2007- 2008, which enabled students from rural areas to join professional courses in large number, the Common Entrance Test for admission to Professional Courses was abolished from 2007-2008, Government have introduced single window counseling system for B.Ed., admission in all Government and Government aided Colleges of Education from the year 2007-2008. By this, the admission to B.Ed., courses were made in a transparent manner and the meritorious students were benefited.

Single window counseling system is also introduced for admissions in Government Arts and Science Colleges from the academic year 2007-2008, tuition fees have been waived for all the students studying in Government Polytechnic Colleges from the year 2008-2009, tuition fees in Government Engineering Colleges have been reduced. Free Education has been provided in all Government and Government Aided Colleges up to Under Graduate level by waiving tuition fees since 2007-2008, tuition fees of all students pursuing Post Graduate Courses like M.A. / M.Sc. in Government Arts and Science Colleges have been abolished from the academic year 2010-2011.

With a view to encourage students who do not have any graduate in their families so far, to pursue professional education, the Government have decided to bear the entire tuition fee payable by these students from the academic year 2010-2011, who secure admission in professional colleges, both in Government and private engineering colleges, through the single window counseling system conducted by Government, regardless of their caste or income, free Bus Passes are issued to all the students of Government Arts & Science Colleges and Government Polytechnic Colleges from the year 2007-2008.

From the year 2007-2008, Maths, Chemistry and Physics Books are given to the students studying in Government Polytechnic Colleges, free of cost, differently abled students studying in Government and Government Aided Arts and Science Colleges, Engineering colleges, Polytechnics and the Universities are exempted from the payment of tuition fees and thus enabling them to pursue higher education and they will also be exempted from paying special fees from the academic year 2010-2011.

The above measures will have positive impact, provided the quality of higher education is ensured. Hence, in order to provide quality higher education, this Government has taken the following steps:-

- i. Qualified teachers have been appointed in Government Arts and Science Colleges on regular basis. One month induction training on teaching methods was imparted to the newly recruited teachers. This is first of its kind in India.
- ii. Choice Based Credit System was introduced in Arts and Science Colleges in order to enhance the Quality of Education.
- iii. Audio Visual Facilities were provided to all Government Arts & Science Colleges at the cost of Rs.1.15 crores.
- iv. A sum of Rs.409 lakhs has been provided to establish language labs in 63 Government Colleges. A substantial number of students from rural areas benefit from these facilities.
- v. 57 Additional Science laboratories have been constructed in Government Arts and Science Colleges at the cost of Rs.11.40 crores.

- vi. The Government has established 21 Language Laboratories in Government Polytechnic Colleges and 5 Digital Libraries in Government Engineering Colleges.

11. REVIEW OF LITERATURE

Indicator systems are frequently utilized for evaluation of Higher Education Institutions (HEIs) and they are used for doing comparisons between institutions on an intra and trans-national level (Brooks, 2005; Williams & Van Dyke, 2007; Aghion et al., 2007). In Europe, since the late 1970s there have been proposals for the construction of indicators to evaluate universities (Cave et al., 1988; Barré, 2001; Molas-Gallart, 2002; Bonaccorsi & Daraio, 2006; Lepori et al., 2007). The indicators used for institutional evaluations can be based on quantitative or qualitative empirical data (Cave et al., 1988), and are commonly applied to measure the degrees of achievement of institutional missions and objectives.

The evaluation of Higher Education (HE) systems and measurement of objectives achieved is complex. HE activity is considered as a multidimensional activity where teaching, research and knowledge transfer are combined. For this reason, there have been many methods proposed, and opinion differs about what is the most appropriate indicator system. De Miguel (1989) suggests five groups of indicators based on: (i) results (outputs); (ii) internal organizational processes; (iii) mixed or integrative criteria; (iv) organizational culture; (v) capacity for change. García Ramos (1989), following De Miguel's approach, proposes eight blocks of indicators: (i) results (outputs); (ii) link between resources and results (inputs-outputs); (iii) internal organizational processes; (iv) technical aspects of the organization; (v) cultural aspects of the organization; (vi) capacity to change; (vii) relationship of the organization and human factors; (viii) integrative criteria. Other authors have developed other

classifications (for more detail see Clark et al., 1984; Murnane, 1987; Blank, 1993; Wimpelber et al., 1989; Bricall, 2000; García-Aracil and Villarreal, 2009). Generic Evaluation models generally fall into two categories: (i) those that emphasize the evaluation typology: (a) internal evaluation versus external evaluation; (b) peer review versus evaluation based on indicators; and (ii) those that emphasize the purpose of the evaluation: (a) institutional versus program; (b) inputs, processes and output; (c) quality, equity, effectiveness, efficiency and efficacy; (d) teaching, research and management; (e) third mission activities.

12. OBJECTIVE OF THE STUDY

To predict functional relationship among the Gross Enrolment Rate (GER) and selected macro level educational variables such as public expenditure on higher education, pupil/teacher ratio and student/institution ratio at an existing environment provided by the State.

13. VARIABLES UNDER STUDY

The dependent variable, Gross Enrolment Rate (GER), can be explained by number of independent variables such as public expenditure on higher education as percentage of to GDP, pupil/teacher ratio, enrolment/institution ratio, cost of education, rate of interest on educational loan and so on so forth. In this paper only three explanatory variables are taken into account and all other variables are kept as constant. Due to time constraint variables like cost of education and rate of interest on educational loan borrowed are not taken for this study. Moreover they are different among institutions since institutions are catogrised.

Gross Enrolment Rat (GER)

The extent of higher education is generally measured by enrolment ratio/rate in higher education. Three alternative methods are used to estimate the extend of access to higher

education namely Gross Enrolment ratio/rate (GER), Net enrolment ratio (NER) and Enrolment of Eligible (EER).

The Gross Enrolment Ratio/Rate (GER) is a frequently and widely used indicator of educational advancement of a country/region. It is defined as the ratio of number of pupils enrolled in the higher education institutions, regardless of age, divided by number of persons in the relevant age group or more specifically it measures the level access of enrolment for age specific groups namely those in age group of 18 to 23. While the EER measure the level of enrolment of those who completed higher secondary level education. These three concepts thus look at the access to higher education from three different angles. This study took the concept of GER to see the performance of enrolment in higher education over a period of five years from 2001-02 to 2005-06. The GER for the developing countries is just 11.3% which is just one half of the World average of 23.2 %. The GER for countries in transition and developed countries is 36.5% and 54.6% respectively.

Public expenditure on education (as % of GDP)

Public expenditure on education (total) is the percentage of GDP accounted for by public spending on public education plus subsidies to private education at the primary, secondary, and tertiary levels.

Student-teacher ratio refers to the number of teachers in a school or university with respect to the number of students who attend the institution. For example, a student teacher ratio of 10:1 indicates that there are 10 students for every one teacher. The term can also be reversed to create a teacher-student ratio. In the previous example, the teacher-student ratio would be 1:10.

Enrolment-institution ratio is defined as the number of intuition with respect to the number of enrolment of students who attend the institution.

14. METHODOLOGY AND DATA ANALYSIS

EViews stands for Econometric Views. It is a new version of a statistical package for manipulating time series data. It was originally the Time Series Processor (TSP) software for large mainframe computers. Although EViews was mostly formulated by economists, the program itself can also be used in other fields of study, such as sociology, statistics, finance, etc. EViews makes use of the user-friendly windows environment; most of its operations can be done with the drop-down menus. In general, EViews can perform the following jobs:

- Data Analysis and Evaluation
- Regression
- Forecasting
- Simulation

This study is using multiple regression analysis to understand the significance of independent variables on dependent variable. The dependent variable, in this study, is the Gross Enrolment Rate (GER) in Higher Education and the three selected independent variables for this study are public expenditure on higher education as percentage of to GDP, pupil/teacher ratio, and enrolment/institution ratio over a period from 2000-2001 to 2005-2006.

Method of Estimation

To estimate the parameters of the population regression function (PRF) in its nonstochastic form, that is, $Y_t = B_1 + B_2 X_{2t} + B_3 X_{3t} + U_t$

Where Y = the dependent Variable

X_2 , and X_3 = the explanatory variables

B_1 , B_2 , and B_3 = the parameters of variables

U = the stochastic disturbance term

t = the t^{th} observation,

we use ordinary least squares (OLS) method. To find out the OLS estimators, the sample regression function (SRF) corresponding to the PRF is formulated as below:

$$Y_t = b_1 + b_2 X_{2t} + b_3 X_{3t}$$

Where

Y_t = the Gross Enrolment Rate (GER) in Higher Education in percentage (depend variable)

b_1 = Constant term to be calibrated which is the estimator of B_1

b_2 , and b_3 = the estimators of B_2 and B_3

x_2, x_3, \dots = the independent variables such as input factors such as public expenditure on higher education as percentage of to GDP, pupil/teacher ratio, enrolment/institution ratio, cost of education, rate of interest on educational loan and so on so forth.

Now the estimated PRF is $\hat{Y}_t = b_1 + b_2 X_{2t} + b_3 X_{3t}$

According to the OLS principal, the values of the unknown parameters are chooses in such a way that the residual sum of the squares (RSS) $\sum e_t^2$ is as small as possible. In OLS we minimize this RSS and the minimization of $\sum e_t^2$ involves the calculus technique of differentiation. This

process of differentiation gives us the normal equations to help estimate the unknowns parameters.

The significance of the regression equation is tested on the basis of R Square value and the t-statistics value (for each of the coefficients).

Source of Data

This study utilizes the secondary data collected from various sources such as Census of India, Selected Educational Statistics (SES), Draft of Report of working Group on Higher Education for 11th Five –Year Plan, Annual Reports 2001-2006, UGC, and Analysis of Budget Expenditure on Education, MHRD. The values of dependent variable namely the Gross Enrolment Rate (GER) has taken from three sources. They are Census data, Selected Educational Statistics (SES), and NSS data. While considering all the three sources only census data is utilized because it is available for the entire period of study and reliable compare to Selected Educational Statistics (SES) and NSS data.

TABLE-1: SUMMARY OF DATA UNDER STUDY

Year	Gross Enrolment Rate (GER) in Higher Education (%) Yi			Public Expenditure in Higher Education as % to GDP	Pupil/Teacher Ratio	Enrolment/Institution Ratio
I	SES	NSS	Census	X1	X2	X3

2000-01	8.5	NA	14.2	0.81	20	639
2001-02	8.9	NA	14.4	0.63	20	653
2002-03	9.1	NA	14.6	0.69	20.4	953
2003-04	9.3	NA	14.8	0.62	21	576
2004-05	9.5	12.3	15	0.66	22	594
2005-06	9.7	12.8	15.2		22.6	596

Source: (1) The enrolment projections for the SES data is based on the time series regression model, for the NSS data is based on the growth rates of 3.7% for the period 1983-2004/5 and for the Census data is based on the growth rate of 4.15 % for the period 1991-2001.

(2) UGC Report2005-2006.

MULTIPLE REGRESSION TABLES

Our objective is to predict the Y on the basis of three X variables. Using the technique of regression (Eviews3) the following results are obtained.

Regression Model

$$Y (\text{Census}) = 8.536061 - 1.31543X_1 + 0.325169X_2 + 0.000346X_3$$

In the above model it is revealed that the dependent variable Y (GER based on Census data) is inversely related with one independent variable X1 (Public Expenditure in Higher Education as % to GDP) and directly related with other two independent variables X2 and X3 (Pupil/Teacher Ratio and Enrolment/Institution Ratio).

From the above model it is found that the Gross Enrolment Rate (GER) and the Public Expenditure in Higher Education are inversely related. The reason is various factors to be taken in to account while evaluating the negative relationship between Gross Enrolment Rate (GER)

and Public Expenditure in Higher Education. The negative relationship does not imply the actual investment poured into higher education from various sources. The study limits itself to that of Government direct intervention and does not take into account the educational loans lended by banks for higher education.

Regression statistics

Table-2 reports the results of the linear models for the entire dataset of macro level variables of higher education of Indian over a period 2000-01 to 2005-06. The adjusted R Square for this model is 0.987893 which shows that the model is perfectly fit and the independent variables well explain the variance from the mean. Thus it is concluded that the variations in public expenditure on higher education as percentage of to GDP, pupil/teacher ratio, and enrolment/institution ratio (independent variables X) explains 98.7 percent of the variation in the Gross Enrolment Rate (GER) (the dependent variable Y).

Table-2: Regression statistics for the model

Regression Statistics	
R Square	0.987893
F	27.19805594
Significance F	0.1398159
Observations	5

15. Summary and conclusions

This research article examines the significant effect of independent variables on the dependent variable for selected period of time. At national level Government of India has taken several measures along with University Grant Commission (UGC) which were briefly presented in the paper to enrich the quality in higher education. At State Government level also measures have been taken along with Tamil Nadu State Council for Higher Education (TANSICHE) to bring improvement in quality in higher education. Under these circumstances this study reveals the following findings:

- i) the dependent variable Gross Enrolment Rate (GER) is positively related with the independent variables Pupil/Teacher Ratio and Enrolment/Institution Ratio in the model. From this it is understood that the increment in Pupil/Teacher Ratio and Enrolment/Institution Ratio certainly increases the Gross Enrolment Rate (GER) but compare with Enrolment/Institution Ratio, Pupil/Teacher Ratio has more influence on Gross Enrolment Rate (GER) ,
- ii) the relationship between of the dependent variable Gross Enrolment Rate (GER) and the independent variable Public Expenditure on Higher Education which is inversely related. Number of reasons has been identified for negative relationship. They are: i) the disinvestment policy of Government in higher education, ii) there is difficult to get informations to ensure whether the fund disbursement solved the stated purpose in higher education, iii) the commitment of households are decreasing while increasing public expenditure on education through providing free education which are

unavoidable for various reasons like political and social point of view in developing nations like India.

In the context of public expenditure on education, high private costs induce a large gap in outcome indicators, and country with high-enrolments but low public expenditure on education face serious difficulties maintaining quality higher education. However, a policy shift towards more direct intervention by the Government will be a boost for higher education.

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