LABOUR MARKET ANALYSIS

FOR

PROFESSIONAL MANPOWER IN INDIA .

by

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Certified that the dissertation entitled
"Labour Market Analysis for Professional Manpower in India"
submitted by Shri K.V. Eswara Prasad, is in fulfilment of
eight credits out of the total requirements of twenty-four
credits for the degree of Master of Philosophy of this
University. This dissertation has not been previously
submitted for any other degree of this University or any
other University and is his own work.

We recommend that this dissertation may be
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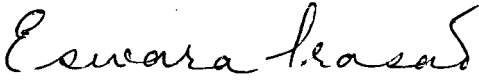Associate Professor in Economics
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CHAPTER I

INTRODUCTION

In the language of First Five Year Plan:

"The importance of professional education cannot
be over-emphasized as it trains the personnel
for the varied national tasks ahead as well as
fits people for earning a living themselves".[1]

The Third Five Year Plan comments:

"Of all the resources for development perhaps
the most fundamental at the present time is
trained manpower. Owing to the rapid advance
in science and technology and the growing
complexity of industrial and economic organi-
zation, there is increasing demand for larger
numbers of highly skilled and trained personnel
drawn from different disciplines and functioning
generally in composite teams rather than as
individuals. As the economy develops the require-
ments of individuals with more advanced and
specialized training and of scientifically trained
workers increase, while the need for persons at
lower levels of skill and for semi-skilled and
unskilled steadily diminishes".[2]

Similar sentiments have been expressed by the Education

Commission (1964-66) and by many economists. From these

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1 Planning Commission, Government of India (1952). The First
Five Year Plan, p. 548.

2 Planning Commission, Government of India (1961). The Third
Five Year Plan, p. 168.

documents one gets the idea that education (i) promotes rapid economic development; (ii) leads to more equal distribution of income; and (iii) "creates social order founded in values of freedom, social justice and equal opportunity",[3] etc.

Consequently facilities for imparting education, particularly professional and technical education have been created in the post-independent India at a tremendous phase. A very brief review of the expansion of higher education is presented here as a background for this study.

(i) The number of universities increased from 20 in 1947 to 87 in 1972, the increase being more than fourfold. Arts, science and commerce colleges increased from 548 in the year 1950-51 to 2882 in 1970-71; engineering colleges and technological institutions increased from 31 in 1950-51 to 107 in 1970-71; medical colleges increased from 34 to 176 during the same period; colleges offering instructions in agriculture increased from 16 to 57 and veterinary colleges from 7 to 23 during the first two decades of planned development. In other words, colleges for general education increased more than fivefold, engineering colleges more than threefold, medical colleges fivefold, agricultural colleges more than threefold and veterinary colleges increased threefold.

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3 Ibid., p. 573.

TABLE 1.1

NUMBER OF DEGREES AWARDED: 1952 - 67.

Degree	1952	1957	1962	1967	Av. % annual growth rate
M.Sc.(Sc.)	1,641	2,933	5,195	8,892	11.9
M.Sc.(Agrl.)	156	217	576	892	12.3
M.V.Sc.	nil	nil	69	174	-
M.B.B.S.	1,864	2,674	3,567	6,317	8.5
M.S./M.D.	113	202	525	1,115	16.5
B.E./B.Sc.Engg.*/ B.Tech. etc.	2,300	3,856	7,356	14,001	12.8
M.E./M.Sc.Engg./ M.Sc.(Tech.)	95	181	477	628	3.4

* Includes B.Sc.(Mining, Metallurgy), B.Arch. and B.Text.

Source: University Grants Commission (1972). India Pocket Book of University Education, p. 123.

TABLE 1.2

GROWTH OF EXPENDITURE ON HIGHER EDUCATION AND NATIONAL INCOME (CURRENT PRICES)

Year	National Income Rs.100 Crs.	Expenditure on (Rs. Crs.)		Expenditure on Edn. as a % of National Income	Expenditure on Higher Edn. as as a % of National Income	Expenditure on Higher Edn. as a % of total expenditure on Edn.
		Edn.	Higher Edn.			
1950-51	89.6	114.83	18.05	1.3	0.2	15.8
1955-56	93.8	189.66	36.59	2.0	0.4	19.3
1960-61	132.9	344.38	76.94	2.6	0.6	22.3
1965-66	206.2	622.02	157.15	3.0	0.8	25.3
1969-70	311.7	990.5	290.43	3.2	0.9	29.3

Source: J.L. Azad (1975). Financing of Higher Education in India, p. 33.

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(ii) The total enrolment in higher education increased from nearly 0.4 million to 3.1 million, the average growth rate being more than 10% per annum. The number of students who successfully completed their college education (in selected courses) is given in table 1.1.

(iii) Expenditure on higher education has also been increasing faster than both the total expenditure on education as well as the national income (table 1.2).

Higher education is not a consumer good; it is an investment and is also a means of achieving other goals of national importance, namely, accelerating economic growth, equalising income distribution and securing a decent living for people. To achieve these goals, educated (and uneducated) persons should be employed. Only through being employed, the high level manpower created through education and training, can contribute towards achieving the goals of national development.

When one looks at the problem of creating more and better employment opportunities during the past twenty years, one gets a feeling of disappointment. Every year the army of unemployed (including highly educated persons) is increasing in size.

It is extremely difficult, if not impossible, to give a correct estimate of the unemployed. In the past the Planning Commission used to present estimates of the backlog of unemployment at the beginning of every Five Year Plan. This exercise

has not been done for the latest Plan, the reason being,
"the considerable divergence of opinion regarding the appro-
priate definitions and yardsticks for measuring unemployment
and underemployment in rural and urban areas and the widely
differing magnitude of unemployment worked on the basis of
various sources such as the Census, the National Sample Survey,
and the Employment Exchange data".[4]

The Committee of Experts on Unemployment Estimates
had recommended that estimates of unemployment should be made
with multidimension[5] - age, sex, educational qualification,
region, residence, hours of work, earnings, etc. The National
Sample Survey has collected information in great details about
unemployment in the 27th round. Unfortunately the results
are not yet available for use. As a result no quantitative
review of unemployment during the past two decades is
presented.

Though experts disagree about the reliability of
unemployment estimates from any of the three sources mentioned
above - the Census, the National Sample Survey and the Employ-
ment Exchanges - they all agree that the problem is very grave.

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4   Planning Commission, Government of India (1973). The Fifth
    Five Year Plan, Vol.II, p. 267.

5   Planning Commission, Government of India (1970). Report
    of the Committee of Experts on Unemployment Estimates.

The report of the Committee on Unemployment says that,

> "unemployment and underemployment constitute some
> of the major economic and social problems in the
> country today. The magnitude as well as intensity
> of the problem of educated unemployed especially
> matriculates and graduates in the country has
> assumed serious proportions and needs separate
> study and analysis. Besides involving a huge
> wastage of the resources invested in educational
> development, the widespread unemployment of edu-
> cated persons create numerous social problems.
> Unemployed educated persons become frustrated
> and feel a strong resentment against the existing
> social order and they become a source of social,
> economic and political discontent and turmoil
> in the country".[6]

Thus the expansion of education (quantitatively
speaking) during the first two decades has been impressive.
Side by side with this impressive expansion, the problem of
educated unemployment has also been increasing in seriousness.
The governments (at the centre and states) and the people are
very much concerned about this widening gap between the
supply of and demand for high level manpower. Experts both
at national and international level are debating about the
causes and consequences and about policies to combat this
devil of unemployment.

Scope of this Study

The present study is a labour market analysis of the
professional manpower. Labour market analysis includes various

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6 Committee on Unemployment, Government of India (1973).
   Report of the Committee on Unemployment, Vol.I, p. 21; and
   idem (1972). Interim Report, p. 20.

aspects such as (a) job-search after completing full-time
schooling, (b) choice of occupation, (c) geographical
migration, (d) changing the organization, (3) investing
in on-the-job training, (f) occupational mobility, and
(g) earnings. To analyse the behaviour of the professional
manpower in all these respects is beyond the scope of this
study. Only two aspects are taken for analyses: (1) job-
search which is treated as equivalent to unemployment, and
(2) earnings.

The professional manpower is usually defined in terms
of occupation (or profession) though the incumbents of the
occupation (or profession) usually have education at master's
and doctorate levels. But due to data constraints it is
defined here in terms of qualifications. The professional
manpower covered in this study are those who possess the
following qualifications: bachelor's degree in engineering
and technology, and medicine; master's degree in science,
agriculture, veterinary science, medicine and engineering;
and doctorate degree in all the above fields except in
agriculture.

Unemployment

The incidence of unemployment is defined as the pro-
portion of the professional manpower reamining unemployed
and seeking job. Usually unemployment rate is expressed as
percentage of the labourforce which is the sum of the employed

labour and the unemployed. The definition used in this study is thus somewhat different from the usual definition. However, such definition of unemployment incidence as used here* is not completely unusual since in some demographic studies, such definition is used.

As the Expert Committee on Unemployment Estimates (1970) had suggested, this category of unemployed is cross classified by educational qualifications, division obtained in the examination, age and sex. This is astatic analysis from the supply side. Such analysis at regular intervals of time will be of much value, along with economic factors, to understand the supply and demand for professional manpower.

Earnings

The study of earnings differentials by education can be used for the following purposes:

(i) To study the efficiency with which resources are allocated in education. This is done by comparing benefits and costs of given levels or types of education. The cost-benefit analysis is done both from the point of view of individuals and the society. Cost analysis is not included in this study.

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* There is a category of persons in the sample who have reported as unemployed but not seeking job. This category is left out of analysis because it is voluntary unemployment. This category forms a very small percentage among males and the proportion among females is slightly higher.

(ii) To study the question of substitution between workers with different levels/types of education. This is very important for the purpose of educational planning. The present controversy between different approaches to educational planning is primarily due to different assumptions about substitutability between workers with different education.

(iii) To provide weights for different categories of labour in order to drive aggregate labour inputs either for growth accounting purpose or for assessing, over time, changes in the quality of labour.

(iv) To understand the problem of unemployment and job-search behaviour. Wage structure is crucial in studying unemployment.

(v) To understand the relative demand for various courses in education. Students/parents might use the relative profitability of different levels/types of education as a signal. Over time too, the relative rush to various courses of study changes, which could be re-explained by relative profitability of education.

(vi) To estimate the resource costs of education forgone is an important part of total cost both for the individual and society. Forgone earnings might be useful to explain differential participation rates and drop-out rates of different socio-economic groups.

(vii) To test the screening hypothesis. According to the extreme version of this hypothesis, schooling per se does not have a productive role. It is merely used as a signal to select individuals according to their ability for filling the higher paid jobs. This selection could be made by less expensive tests. If this is true, the resources spent on education are wasted from the point of view of the society.

This study does not aim at utilizing the data on earnings by education to analyse any one of the above seven uses. Rather it simply aims at analysing the earnings differentials and the factors determining them. The factors used here to explain earnings differentials are sex, age, experience, division obtained, sector, occupation and subject of education. This is done in two ways. First, earnings are presented in tabular forms corss classifying the sample by education, division and sex. This is presented in the second part of chapter II. This part also presents the education-earnings relation by means of graphs.

Tabulations do not give the statistical significance of results; further since it is presented by detailed cross classification, some cells may not contain enough observations. These limitations are removed by analysing the earnings with the help of multiple regression. The regression analysis of earnings is presented in chapter IV.

Plan of the Study

Chapter II presents the relationship between (a) education and employment opportunities and (b) education and earnings. The results are presented by means of tabulations.

Chapter III deals with the relation between duration of unemployment and education. The analysis is done by means of multiple regression techniques.

Chapter IV is devoted to earnings functions which analyse the relationship between earnings and education by means of regression method.

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CHAPTER II

EDUCATION, UNEMPLOYMENT, EMPLOYMENT AND EARNINGS

In this chapter an attempt is made to describe the relation between (i) education and unemployment, and (ii) education and earnings, with the help of tables and graphs. The data used in this study are for the year 1971 and refer to all-India. Before presenting the tables and the associations between education, employment and earnings observed from the tables, it is necessary to make some comments about the data base on which this dissertation is based.

Along with the 1961 Census, a survey was conducted to collect more information about scientific and technical personnel in India.[1] Such information has proved to be very useful for planning purposes. In 1971, the survey was extended to cover all degree holders and technical personnel.[2] A special card - Degree Holders and Technical Personnel Card - was designed to collect information and the survey was conducted by the Census of India along with 1971 Census. The cards thus collected amounted to 2.19 million, the

1 Census of India 1961, (1966). Scientific and Technical Personnel. (Monograph Series No.1).

2 Census of India 1971, (1973). Degree Hoders and Technical Personnel (Special Tables GI-GIV).

distribution of which, according to field of study for all

levels[3] of education, is given below:

TABLE 2.1

DISTRIBUTION OF DEGREE HOLDERS AND
TECHNICAL PERSONNEL: SUBJECT FIELDS

Sl. No.	Subject Fields	Total	
		Male	Female
1.	Agriculture	39,227	411
2.	Arts/Humanities	843,836	296,118
3.	Commerce	168,048	3,899
4.	Engineering and Technology	246,171	3,555
5.	Science	368,560	81,823
6.	Medicine (Allopathy)	55,144	13,263
7.	Medicine (Others)	20,390	2,778
8.	Vet. Science/Medicine	10,833	188
9.	Nursing	414	3,377
10.	Tech./Voc. Trade	18,473	1,158
11.	Others	11,244	2,441
	Total	1,782,340	409,011

Source: Census of India 1971, Degree Holders and Technical
Personnel (Special Tables GI-GIV).

3 The educational levels are, Doctorate, Master's Degree,
other Post-Graduate Degrees/Diplomas, Bachelor's Degree,
Bachelor's equivalent, Diploma, Certificate and unspecified.

TABLE 2.2

DISTRIBUTION OF THE SAMPLE: SUBJECT FIELDS AND EDUCATIONAL LEVELS FOR BOTH SEXES

Subject-filed	Doctorate		Post-Graduate		Graduate		Total
	Total	Sample	Total	Sample	Total	Sample	
Science	7,178	(1/5) 1,450	88,566	(1/25) 3,550			5,000
Agriculture			7,338	(1/5) 1,465			1,465
Medicine			8,624	(1/2) 4,300	44,362	(1/10) 4,400	8,700
Veterinary Science	221	(1/2) 100	1,132	(1/2) 550			650
Engineering	1,291	(1/2) 645	8,808	(1/2) 4,400	84,111	(1/20) 4,400	9,445
					Total Sample Size		25,260

The purpose of this survey was to gain an understanding of high level manpower - their stock, utilization, and their labour market behaviour such as mobility, migration, earnings, etc.

The Scientific and Technical Manpower Division of the Council of Scientific and Industrial Research has collected most of the information from the Degree Holders and Technical Personnel cards and put them on magnetic tapes. However their tapes contain information about scientists, agronomists and veterinarians having Master's degree and above, and also doctors and engineers having Bachelor's degree and above. Persons with other qualifications have not been included in the Council of Scientific and Industrial Research tapes.

The Council of Scientific and Industrial Research could not give a copy of their tapes; however they could give only a small sample of about 3% of the observations available from their tapes which forms the data-base for this study. The details of the sample are given in Table 2.2.

It should be mentioned that the 2.19 million observations collected through the 1971 survey do not measure the stock of high level manpower; this is because not all the people with degree or diploma in technical subjects have responded to the questionnaire - card. The Planning Commission has estimated that the overall response rate might be between 60 and 70 per cent and the response rate

by field of study also varied considerably as shown below:

Engineers:

Degree Holders	:	62%
Diploma Holders	:	56%
Doctors	:	48%
Nurses	:	5.5%

General Science:

Graduates	:	84%
Post-Graduates	:	86%

Agricultural Science:

Graduates	:	85%

Veterinary Science:

Graduates	:	77%

There is no way of knowing whether the non-response is randomly distributed in a given category or it is biased; the results of the analysis should be treated as applicable only to the sample under study.

The items of information collected are: (a) demographic data such as year of birth, sex, marital status, state of domicile, state of work, etc.; (b) educational qualifications with year of passing, division obtained, country from which degree obtained, subject studied, etc.; (c) work experience such as first, current and previous jobs with year of entry, sector, occupation, entry-salary and last

salary drawn from each occupation; (d) unemployment and its duration; and so on. Thus the information available is fairly rich.

Tables 2.3 and 2.4 present the activity status of the entire sample by sexes. The activity status are (i) Employee, (ii) Self-employed, (iii) Students, (iv) Trainees, (v) Apprentices, (vi) Retired, (vii) Unemployed trying for job, (vii) Unemployed not trying for job, and (ix) Unspecified. A few points may be noticed from the tables:

(a) Considering the educational categories under study, it is unlikely that the respondents would be below 20 years when completing their studies although in the extreme cases this is possible.

(b) It may be noticed that in the 'below 20 years' age group 28.3 per cent of the males and 7.5 per cent of the females are reported as retired. This may either be due to misreporting or error in coding.

(c) Also only 5.4 per cent of the males and 9.4 per cent of the females aged 'below 20 years' are reported as students/ trainees/apprentices whereas 32.9 per cent (males) and 42.8 per cent (females) among those aged between 20 and 24 years and 12.9 per cent (males) and 14.0 per cent (females) among those aged between 24 and 29 years are reported as students/ trainees/apprentices which are quite high compared to the 'below 20 years' age group. And above 30 years age upto 60 years, the percentage reported as students/trainees/apprentices

TABLE 2.3

AGE AND ACTIVITY STATUS FOR ALL EDUCATION (%)

M A L E S

	Emp-loyee	Self-empld.	Student/ Trainee/ Appren-tice	Retired	Unemp-loyed seeking job	Unempd. not seeing job	Others	All cate-gories	N
Below 20	42.1	14.8	5.4	28.3	4.6	0.5	4.3	1.7	392
20 - 24	36.4	2.0	32.9	0.1	26.1	0.4	2.2	6.9	1,584
25 - 29	70.0	4.6	12.9	--	10.4	0.6	1.5	25.7	5,904
30 - 34	86.4	8.7	2.1	0.1	1.9	0.4	0.5	23.9	5,473
35 - 39	86.8	10.7	0.4	0.1	1.0	0.2	0.7	17.0	3,905
40 - 44	85.6	12.9	0.2	0.2	0.6	0.3	0.3	10.8	2,479
45 - 49	83.5	13.6	0.5	0.2	1.0	0.4	0.8	6.0	1,377
50 - 54	78.6	17.6	--	0.6	1.0	0.5	1.6	3.4	772
55 - 59	62.0	19.1	0.2	15.7	1.1	--	1.9	2.1	471
60 & above	19.1	26.7	0.3	51.1	0.3	0.3	2.1	2.5	585
N	17,272	2,144	1,450	503	1,231	89	253	100%	22,492
%	75.3	9.3	6.3	2.2	5.4	0.4	1.1	100%	

TABLE 2.4

AGE AND ACTIVITY STATUS FOR ALL EDUCATION (%)

F E M A L E S

	Emp-loyee	Self-empld.	Student/ Trainee/ Appren-tice	Retired	Unemp-loyed seeking job	Unempd. not seeking job	Others	All cate-gories	N
Below 20	52.8	9.4	9.4	7.5	7.5	5.7	7.5	2.3	53
20 - 24	31.9	1.1	42.8	--	16.3	3.6	4.3	12.2	276
25 - 29	61.7	4.9	14.0	--	11.6	4.2	3.6	32.4	731
30 - 34	76.8	9.4	2.8	--	4.1	4.5	2.4	22.5	508
35 - 39	70.7	17.8	0.3	--	4.6	4.6	2.0	13.5	304
40 - 44	78.3	15.0	--	--	1.1	4.4	1.1	8.0	180
45 - 49	70.1	23.7	--	--	1.0	3.1	2.1	4.3	97
50 - 54	63.0	21.7	--	--	--	6.5	8.7	2.0	46
55 - 59	53.8	30.8	--	15.4	--	--	--	1.2	26
60 & above	26.3	18.4	--	44.7	--	2.6	7.9	1.7	38
N	1,434	221	240	25	172	96	71		2,259
%	63.5	9.8	10.6	1.1	7.6	4.2	3.1	100%	

shows a declining trend which is understandable as higher the age lower the chances of a person being a student. Hence to notice only such a small percentage of the 'below 20 years' age group as students is very unlikely.

(d) In the 'self-employed' group, again the 'below 20 years' age group seems exceptional as the percentage reported to be self-employed in this age group is very high compared to the other age groups. Considering 20 - 24 years onwards the percentage reported to be 'self-employed' shows increasing trend till retirement age (60 years and above) which is understandable as a person is likely to take employee status initially to gain experience and then shift to self-employment. In view of this, the observed 14.8 per cent (males) and 7.5 per cent (females) in the 'below 20 years' age group reported as self-employed is likely to be due to misreporting or error in coding.

(e) Finally in the 'below 20 years' age group, 4.6 per cent (males) and 7.5 per cent (females) are reported as 'unemployed seeking job' while 26.1 per cent (males) and 16.3 per cent (females) among those aged 20 - 24 years and 10.4 per cent (males) and 11.6 per cent (females) among those aged 25 - 29 years have reported 'unemployed seeking job', which is high compared to the 'below 20 years' age group. This is not in line with the pattern observed for other age groups. In sum much importance should not be given to the 'below 20 years' age group.

From the tables 2.3 and 2.4 it can be seen that 5.4 per cent of males and 7.6 per cent of females have reported to be unemployed. It should be noted that only those belonging to the category 'Unemployed seeking job' have been considered as unemployed throughout this study and the incidence as well as duration unemployment observed here refers only to this particular category.

The following sections present the relationship of education to (i) incidence, (ii) duration of unemployment; (iii) age - earnings profile, and (iv) experience - earnings profiles.

1. INCIDENCE OF UNEMPLOYMENT

In tables 2.5 and 2.6 the incidence of unemployment has been further classified according to different subjects, educational qualifications, division obtained and sexes.

(a) Age and Unemployment:- The incidence of unemployment is concentrated at younger age-group, below 30 years for the educational subjects and levels. If the incidence of unemployment is distributed over different ages, 89.6 per cent of the males and 86.1 per cent of the females having M.Sc. (Science) degree, 95.3 per cent of the males having M.Sc. (Agriculture) degree, 81.3 per cent of the males with B.E. degree, 82.1 per cent with M.E. degree, and 91.1 per cent of the females with M.B.B.S. degree fall below 30 years, whereas 95.9 per cent of unemployed males with M.B.B.S. degree fall below 34 years of age.

TABLE 2.5

INCIDENCE OF UNEMPLOYMENT (%)

M A L E S

Age in years	M.Sc. (Science)				M.Sc. (Agriculture)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	11.1	4.5	15.4	9.1	--	21.1	14.3	13.9
20 - 24	20.4	26.9	34.5	25.4	15.3	44.4	46.2	29.7
25 - 29	8.2	9.9	16.7	10.2	7.6	15.2	12.3	10.8
30 - 34	--	3.4	2.5	2.4	0.4	0.9	--	0.6
35 - 39	--	1.7	2.7	1.6	--	2.1	--	1.0
40 - 44	--	--	--	--	--	--	--	--
45 - 49	--	--	--	--	2.8	--	--	1.0
50 - 54	--	--	--	--	--	--	--	--
55 - 59	--	5.6	--	2.3	--	--	--	--
60 & above	--	--	--	--	--	--	--	--
All ages	6.6	8.0	7.6	7.6	4.7	9.7	6.5	7.0
N	592	1,293	394	2,279	1,007	883	216	2,106
n(unempld.)	39	104	30	173	47	86	14	147

TABLE 2.5 (Contd.)

INCIDENCE OF UNEMPLOYMENT (%)

MALES

Age in years	B.E.(Engineering)				M.E.(Engineering)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divns.	All Divns.
Below 20	5.3	23.1	--	11.7	--	--	--	--
20 - 24	29.2	42.1	31.9	33.7	20.0	34.8	26.2	23.0
25 - 29	8.1	20.1	9.5	14.7	8.2	9.4	11.9	9.2
30 - 34	0.8	2.6	0.6	1.9	1.2	2.1	3.1	1.9
35 - 39	--	2.0	0.9	1.3	0.9	0.6	1.1	0.9
40 - 44	1.4	1.1	--	0.9	0.7	--	0.6	0.5
45 - 49	--	2.5	3.4	2.4	--	--	0.9	0.4
50 - 54	--	4.7	8.3	5.0	2.9	--	1.8	1.7
55 - 59	--	3.4	--	1.4	--	--	3.4	1.4
60 & above	--	--	--	--	--	--	--	--
All ages	10.8	12.0	4.6	10.4	4.8	3.8	4.7	4.6
N	1,419	2,317	692	4,428	2,155	873	1,364	4,392
n	153	277	32	462	104	33	64	201

TABLE 2.5 (Contd.)

INCIDENCE OF UNEMPLOYMENT (%)

M A L E S

Age in years	M.B.,B.S.			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	--	--	--	--
20 - 24	--	12.4	11.6	10.5
25 - 29	3.8	10.3	7.3	8.2
30 - 34	16.7	4.3	2.2	3.1
35 - 39	--	--	0.5	0.4
40 - 44	--	--	--	--
45 - 49	--	2.2	1.9	1.9
50 - 54	--	--	1.4	0.8
55 - 59	--	3.3	--	1.0
60 & above	--	--	--	--
All ages	1.8	6.2	4.0	4.6
N	168	1,049	1,986	3,203
n	3	65	80	148

NOTE

The incidence of unemployment for the categories M.S. & M.D., M.V.Sc. & Ph.D.(Vet.) for both sexes and M.Sc.(Agrl.), B.E., M.E. & Ph.D.(Engg.) for females have been found to be negligibly small; hence the relevant tabular columns have been excluded for the sake of convenience.

-- denotes nil observations.

TABLE 2.6

INCIDENCE OF UNEMPLOYMENT (%)

F E M A L E S

Age in years	M.Sc. (Science)					M.B.,B.S.			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.		Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	--	25.0	--	10.0		--	33.3	13.3	16.7
20 - 24	18.8	31.5	23.5	25.2		5.0	6.6	9.4	7.6
25 - 29	13.5	17.9	51.9	21.3		11.8	7.7	6.1	7.0
30 - 34	11.8	7.7	10.0	9.2		--	2.0	4.2	3.2
35 - 39	11.1	8.3	7.7	8.7		--	--	--	--
40 - 44	--	--	--	--		--	--	--	--
45 - 49	--	--	25.0	12.5		--	--	--	--
50 - 54	--	--	--	--		--	--	--	--
55 - 59	--	--	--	--		--	--	--	--
60 & above	--	--	--	--		--	--	--	--
All ages	13.8	17.1	22.9	17.3		5.9	5.6	5.2	5.4
N	138	263	96	497		51	340	440	831
n	19	45	22	86		3	19	23	45

(b) <u>Division and Unemployment</u>:- The incidence of unemployment is found to vary with division obtained for all the educational qualifications. Particularly the incidence of unemployment is more among the second divisioners than among the first or third divisioners for males, the two exceptions from this being the males with M.E. degree and females with M.Sc.(Science) and M.B.B.S. degrees. In the case of M.E. (males), second divisioners face less unemployment compared to first and third divisioners, while for females with M.Sc.(Science) degree, second divisioners face less unemployment compared to the third divisioners but more than the first divisioners; in the case of females with M.B.B.S. degrees the second divisioners face less unemployment compared to the first divisioners but more than the third divisioners.

(c) <u>Sex and Unemployment</u>:- In general it is noticed that the females are f ound to experience more unemployment compared to the males in all educational categories.

(d) <u>Education and Unemployment</u>:- Considering all educational qualifications, the incidence of unemployment for the males is the least amongs M.B.B.S. and M.E. degree holders and highest amongst the B.E. degree holders, with M.Sc.(Science and Agriculture) falling in between. If the incidence of unemployment be treated as an index for ranking any educational qualification in this study, M.B.B.S. would take the first position for both sexes as their incidence of

unemployment is the lowest and B.E. amongst the males and
M.Sc.(Science) amongst the females would rank the last.

2. DURATION OF UNEMPLOYMENT

In this section an attempt is made to discuss the
duration of unemployment for the educational categories
under study. Tables 2.7 and 2.8 furnish the details regarding
the duration of unemployment in mean months according to
division and age for both sexes. A few points are noteworthy:

(a) <u>Education and Duration of Unemployment</u>:- It is
found that higher the educational qualifications lesser the
duration of unemployment. Among the educational qualifications,
the duration of unemployment is lowest for M.D. degree holders
and highest among persons with M.Sc.(Science) degree. Also
the duration of unemployment is more in the case of B.E. than
M.E. or M.Sc.(Agriculture) degree holders.

(b) <u>Sex and Duration of Unemployment</u>:- In general,it
is found that the females face longer duration of unemployment
compared to the males for all ages and educational qualifications

(c) <u>Division and Duration of Unemployment</u>:- It is
found that the duration of unemployment is much influenced by
the division obtained. For males, with the exception of
M.Sc.(Science) degree holders, the duration of unemployment
is larger for the second divisioners than the first divisioners
(for all educational qualifications) and for M.Sc.(Science)
degree holders among the females.

TABLE 2.7

DURATION OF UNEMPLOYMENT: MEAN (MONTHS)

M A L E S

Age in years	M.Sc. (Science)				M.Sc. (Agriculture)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	--	--	10.00	10.00	--	18.00	--	18.00
20 - 24	12.00	11.03	10.17	11.15	5.43	10.66	7.33	8.85
25 - 29	11.87	18.24	15.20	16.10	15.00	15.00	--	15.00
30 - 34	48.00	23.00	13.00	25.14	--	18.67	--	18.67
35 - 39	--	38.00	54.00	43.33	36.00	--	--	36.00
40 - 44	--	--	--	--	49.00	--	--	49.00
45 - 49	--	--	--	--	--	--	--	--
50 - 54	--	--	--	--	--	--	--	--
55 - 59	--	2.0	--	2.0	--	--	--	--
60 & above	--	--	--	--	13.5	--	--	13.5
All ages	11.93	16.00	17.83	15.60	7.98	13.42	--	11.18
n	28	83	18	129	41	67	--	114

TABLE   2.7 (Contd.)

DURATION   OF   UNEMPLOYMENT: MEAN   (MONTHS)

M A L E S

Age in years	B.E.			M.E.		
	Hons. & I Divn.	II Divn.	All Divns.	Hons. & I Divn.	II Divn.	All Divns.
Below 20	8.00	6.77	7.00	--	--	--
20 - 24	9.69	10.01	9.79	5.81	6.57	6.04
25 - 29	14.59	15.02	14.91	8.85	11.47	9.60
30 - 34	48.00	13.87	16.00	16.00	12.75	14.56
35 - 39	--	39.00	39.00	--	4.00	4.00
40 - 44	25.00	12.00	16.33	90.00	--	90.00
45 - 49	--	--	--	--	--	--
50 - 54	--	--	--	23.00	--	23.00
55 - 59	--	--	--	--	--	--
60 & above	36.00	18.00	27.00	--	--	--
All ages	11.34	13.75	13.67	8.67	10.50	9.22
n	122	228	356	69	30	99

TABLE 2.8

DURATION OF UNEMPLOYMENT: MEAN (MONTHS)

F E M A L E S

Age in years	M.Sc. (Science)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	--	13.00	--	13.00
20 - 24	13.83	16.07	--	15.43
25 - 29	26.75	33.32	19.71	28.97
30 - 34	48.00	42.00	--	44.00
35 - 39	--	43.00	--	43.00
40 - 44	--	--	--	--
45 - 59	--	--	--	--
50 - 54	--	--	--	--
55 - 59	--	--	--	--
60 & above	--	--	--	--
All ages	24.56	28.56	19.71	26.59
n	16	41	7	64

(d) <u>Age and Duration of Unemployment</u>:- The duration of unemployment is found to increase with age for both the sexes and all educational qualifications. Irrespective of the division obtained, it is seen that as age increases the duration of unemployment also increases.

3. AGE - EARNINGS RELATIONSHIP

This section discusses the age - earnings relations for the various educational qualifications. In tables 2.9 and 2.10, the mean income obtained for different age groups are presented according to different educational qualifications, level and division obtained for both the sexes.

(a) <u>Level of Education and Earnings</u>:- It may be noted that higher the educational level of attainment, higher the average income received. Thus M.E.'s have more income than B.E.'s; a doctor with M.S. or M.D. earns more than one with just M.B.B.S.

(b) <u>Subject Category and Earnings</u>:- For all ages, the highest earnings are obtained for those with M.E. among the males and M.S./M.D. among the females; M.Sc.(Agriculture) among the males and M.Sc.(Science) among the females, receive the lowest income compared to all other educational qualifications.

(c) <u>Sex and Earnings</u>:- It may be noted that considering any particular age-group, educational qualification and division, males earn more than the females.

TABLE 2.9

AGE, EDUCATION, DIVISION AND MEAN EARNINGS (Rs.)

M A L E S

| Age in years | Ph.D. (Science) | M.Sc. (Science | | | |
		Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	3750.00	910.00	515.00	--	594.00
20 - 24	--	433.58	398.95	368.00	410.63
25 - 29	710.00	590.63	466.07	374.10	495.78
30 - 34	1256.00	611.03	560.19	454.20	561.58
35 - 39	2095.00	870.00	626.42	546.36	714.60
40 - 44	1352.50	827.74	709.77	785.17	749.52
45 - 49	1161.11	1104.00	970.35	593.33	965.20
50 - 54	1120.00	1712.73	967.08	1470.00	1215.95
55 - 59	1670.00	2260.00	1062.31	1755.00	1422.38
60 & above	1900.00	1058.00	928.00	1630.00	1099.17
All ages	1390.00	697.97	581.20	568.94	612.39
N	31	438	965	170	1573

TABLE 2.9 (Contd.)

AGE, EDUCATION, DIVISION AND MEAN EARNINGS (Rs.)

M A L E S

Age in years	M.Sc. (Agriculture)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	916.25	485.56	430.00	673.88
20 - 24	412.35	362.96	--	390.49
25 - 29	478.88	458.47	425.00	470.04
30 - 34	551.97	505.00	606.67	530.71
35 - 39	736.20	601.43	475.00	658.99
40 - 44	717.63	703.01	550.00	700.43
45 - 49	832.26	774.00	735.00	797.57
50 - 54	1326.96	985.39	--	1203.61
55 - 59	1082.50	1233.33	--	1173.00
60 & above	400.00	570.00	--	485.00
All ages	601.85	555.04	549.33	578.93
N	758	676	30	1467

TABLE 2.9 (Contd.)

AGE, EDUCATION, DIVISION AND MEAN EARNINGS (Rs.)

M A L E S

Age in years	M.B.,B.S.				M.S. & M.D.			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	--	537.50	--	537.50	1306.00	--	--	1306.00
20 - 24	596.66	532.86	--	552.60	600.00	475.00	340.00	422.50
25 - 29	643.60	613.02	--	616.90	588.82	640.48	640.00	618.50
30 - 34	--	661.68	690.00	662.42	957.61	730.60	900.00	823.68
35 - 39	810.00	729.32	540.00	734.26	1019.25	883.19	650.00	928.02
40 - 44	792.86	803.81	725.00	796.00	1170.37	1029.55	710.00	1077.92
45 - 49	630.00	852.86	--	833.48	1348.89	1131.25	--	1224.52
50 - 54	1116.00	1037.33	375.00	995.00	1567.27	1300.00	--	1389.09
55 - 59	1251.43	2078.00	--	1595.83	2640.00	1153.00	--	1400.83
60 & above	--	640.00	--	640.00	3000.00	1080.00	--	1400.00
All ages	798.42	690.72	604.00	701.08	1082.89	917.69	645.00	979.86
N	47	442	10	509	166	264	4	439

TABLE 2.9 (Contd.)

AGE, EDUCATION, DIVISION AND MEAN EARNINGS (Rs.)

M A L E S

Age in years	M.V.Sc.			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	--	--	--	--
20 - 24	350.00	400.00	--	375.00
25 - 29	521.11	510.005	530.00	519.13
30 - 34	540.76	551.59	516.67	543.62
35 - 39	659.15	569.14	519.00	624.54
40 - 44	806.88	683.53	661.43	729.00
45 - 49	1025.00	773.64	800.00	875.50
50 - 54	2356.67	780.00	740.00	1636.36
55 - 59	1403.33	--	--	1403.33
60 & above	--	--	--	--
All ages	684.54	600.25	593.75	648.21
N	194	120	16	335

TABLE 2.9 (Contd.)

AGE, EDUCATION, DIVISION AND MEAN EARNINGS (Rs.)

M A L E S

Age in years	B.E.				M.E.				Ph.D.
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	
Below 20	853.33	605.56	--	704.67	967.69	831.67	--	924.74	--
20 - 24	507.90	446.89	360.00	488.21	628.17	405.56	--	599.13	--
25 - 29	697.40	551.20	450.00	614.49	748.04	593.94	--	713.84	740.00
30 - 34	1008.12	761.92	677.50	828.56	956.15	817.97	705.00	916.60	1102.50
35 - 39	1263.47	945.22	921.25	1027.66	1228.45	948.68	715.00	1127.81	1655.33
40 - 44	1638.28	1200.51	1005.71	1308.78	1551.85	1124.06	1450.00	1351.19	2106.92
45 - 49	1637.37	1175.97	1297.50	1278.78	1964.03	1285.31	--	1677.33	2062.50
50 - 54	1660.00	1637.71	600.00	1621.67	1752.86	1698.57	1300.00	1721.00	1910.00
55 - 59	1351.67	1810.55	1170.00	1674.80	1828.33	1540.00	280.00	1615.86	--
60 & above	1406.67	1148.89	--	1213.33	1785.00	1625.00	--	1705.00	--
All ages	893.64	809.86	787.75	840.30	1024.29	912.46	956.67	990.30	1684.04
N	956	1609	40	2607	1668	729	6	2405	47

TABLE 2.10

AGE, EDUCATION, DIVISION AND MEAN EARNINGS (Rs.)

F E M A L E S

Age in Years	M.Sc. (Science)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Below 20	545.00	570.00	--	557.50
20 - 24	405.45	412.38	243.33	398.04
25 - 29	463.71	452.09	440.00	455.62
30 - 34	577.00	428.33	400.00	464.47
35 - 39	590.00	545.00	496.67	546.52
40 - 44	751.11	617.50	410.00	658.95
45 - 49	--	622.50	--	622.50
50 - 54	--	950.00	--	950.00
55 - 59	--	--	--	--
60 & above	--	--	--	--
All ages	501.59	475.14	397.33	479.29
N	82	144	15	241

TABLE 2.10 (Contd.)

AGE, EDUCATION, DIVISION AND MEAN EARNINGS (Rs.)

F E M A L E S

Age in years	M.B.,B.S.			M.S. & M.D.		
	Hons. & I Divn.	II Divn.	All Divns.	Hons. & I Divn.	II Divn.	All Divns.
Below 20	--	--	--	500.00	970.00	735.00
20 - 24	590.00	530.00	538.00	--	--	--
25 - 29	570.00	594.40	592.61	686.00	702.00	694.00
30 - 34	605.00	629.12	628.46	825.00	778.33	794.80
35 - 39	1110.00	701.00	763.57	861.67	865.71	864.50
40 - 44	1350.00	730.00	936.67	1316.67	1103.75	1161.82
45 - 49	500.00	550.00	533.33	--	1096.67	1096.67
50 - 54	--	1450-00	1450.00	--	1175.00	1175.00
55 - 59	800.00	1250.00	1025.00	--	--	--
60 & above	400.00	650.00	566.67	--	--	--
All ages	640.00	680.79	630.06	988.70	894.34	916.50
N	18	140	169	23	53	80

(d) <u>Division and Earnings</u>:- If earnings are considered
in the context of division obtained, for any educational
qualification, those with first division have more earnings
than the second divisioners who in turn earn more than the
third divisioners, for both the sexes. While the difference
in mean earnings of the males securing first division and
other divisions is strikingly large, that between the second
divisioners and the third divisioners is not altogether
significant particularly for M.Sc.(Science and Agriculture),
M.V.Sc. and B.E.; M.E. degree holders being an exception
where the third divisioners earn more than the second divi-
sioners.* Also for the females in the medicine category
alone there occurs a large difference in mean earnings
between the second and the third divisioners both in the
M.B.B.S. as well as M.S. and M.D. degrees.*

(e) <u>Age and Earnings</u>:- Irrespective of division
obtained it is found that mean earnings increases with age
for both the sexes and all educational qualifications.

The age - earnings relation is best seen in the
'age - income profiles' presented for the seven educational
qualifications in the following pages:

The profiles confirm to all the anticipated characte-
ristics of 'well-behaved' (Blaug, <u>et al</u> 1969:70) age -
earnings profiles:

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* The number of observations are very small (compared to
  other divisions) in these educational qualifications.

AGE-EARNINGS PROFILE

Figure - 1
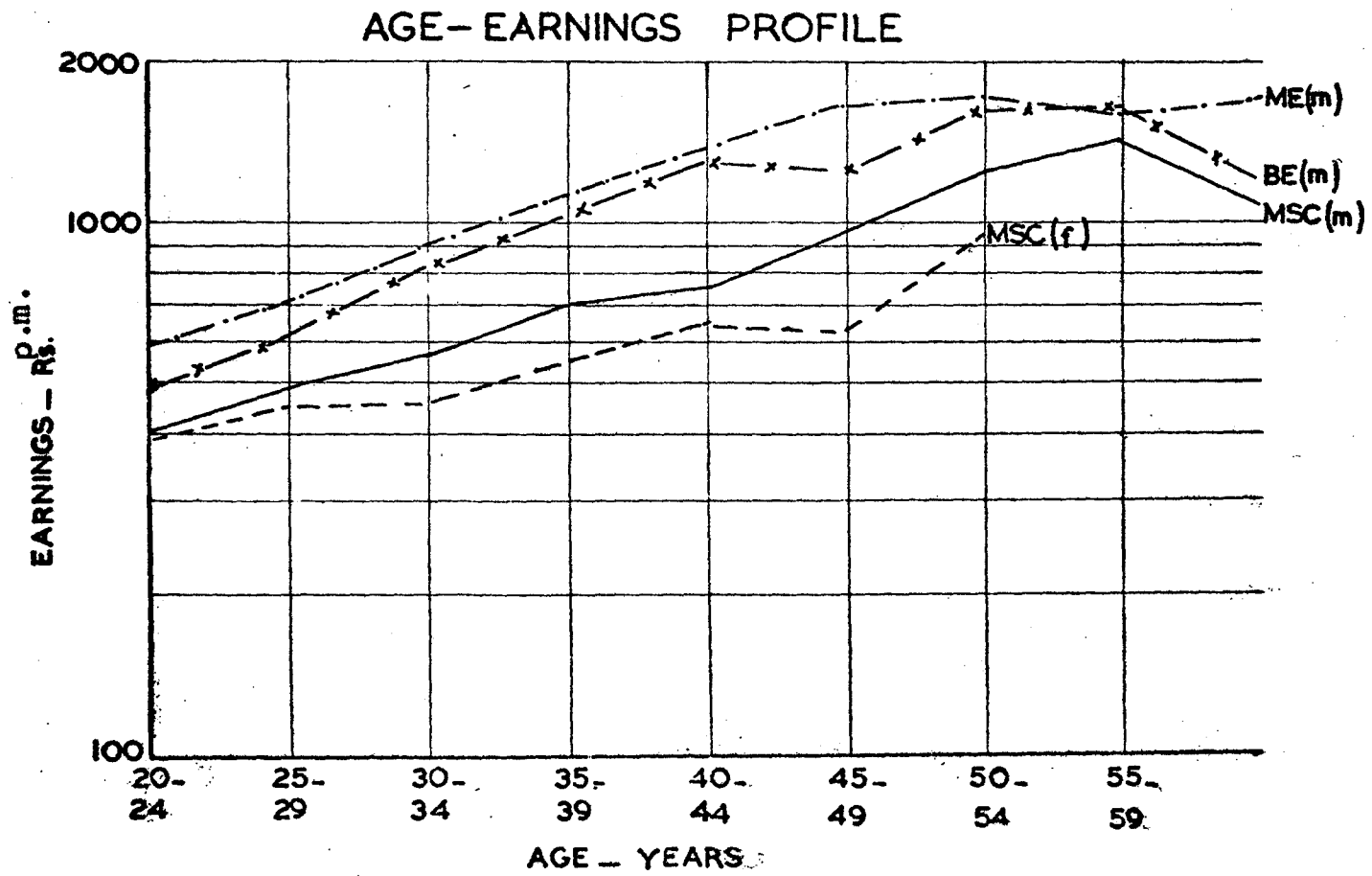
AGE – EARNINGS PROFILE
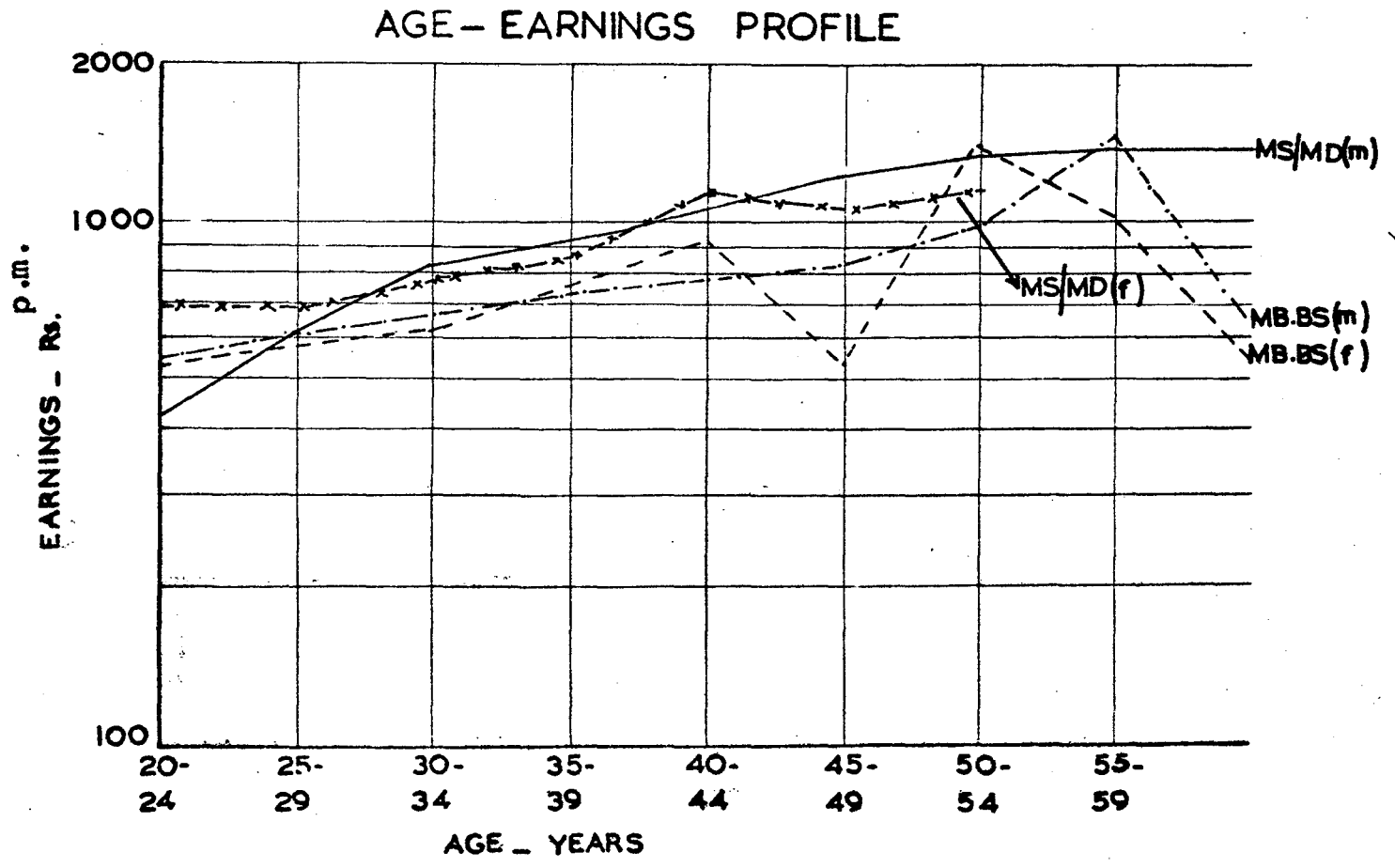
Figure – 2

AGE— EARNINGS PROFILE
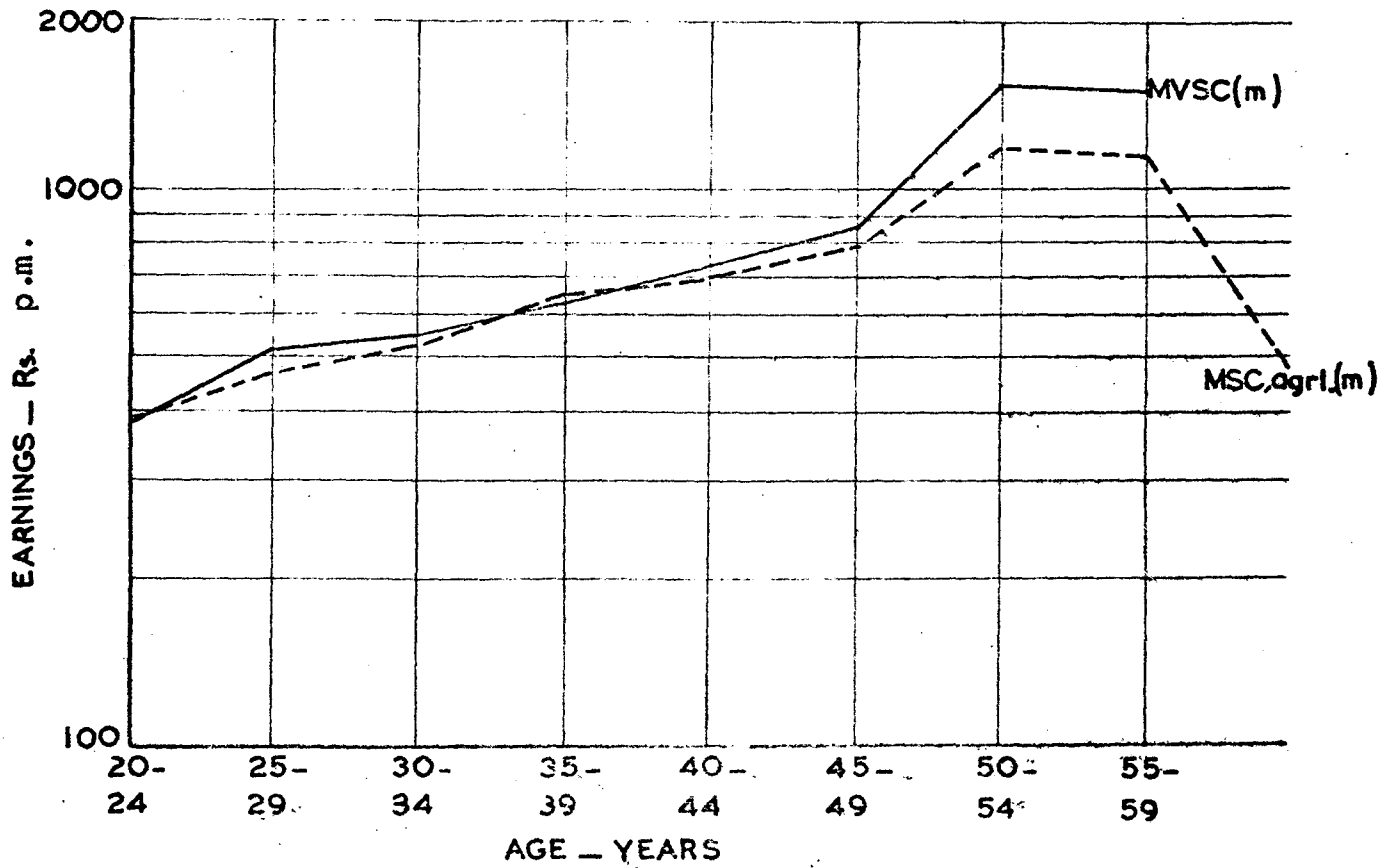
Figure - 3

TABLE 2.11

COMPARISON OF GROWTH OF EARNINGS WITH AGE

M A L E S

Education	Age & st. income		Age at which st. income doubles	Age & peak income		Peak income / St. income
M.Sc.(Sc.)	20 - 24	410.60	45 - 49	55 - 59	1422.90	3.46
M.Sc.(Agrl.)	-do-	390.49	40 - 44	50 - 54	1203.60	3.08
M.S./M.D.	-do-	422.50	35 - 39	55 - 59	1400.80	3.32
M.V.Sc.	-do-	377.00	45 - 49	50 - 54	1636.40	4.34
B.E.	-do-	488.20	35 - 39	55 - 59	1674.80	3.43
M.B.	-do-	599.10	35 - 39	50 - 54	1721.00	2.86

(i) All profiles increase with age upto a peak point, after which they either level off or decline.

(ii) Higher the level of education, more rapid the rise. For instance taking the B.E. and M.E. profiles for men and M.B.B.S. and M.S./M.D. for females this is largely observable.

(iii) Greater the amount of education received later the occurrence of the peak and larger the earnings found with the years of retirement.

Table 2.11 presents a comparison of the growth of earnings with age for the different educational qualifications. The following features are noteworthy:

(i) Earnings reach peak around the 50 - 54 years age for M.Sc.(Agriculture), M.V.Sc. and M.E. degree holders; for persons with other qualifications, namely M.Sc.(Science), M.S./M.D. and B.E. peak earnings are observed in the 55 - 59 years age-group.

(ii) The age at which starting income doubles varies for the different educational categories. For M.S./M.D., B.E. and M.E. degree holders starting income doubles when they are 35 - 39 years age; for those with M.Sc.(Agriculture) degree starting income is found to double at 40 - 44 years age; and starting income doubles at 45 - 49 years age for M.Sc.(Science) and M.V.Sc.

(iii) The ratio of peak income with starting income

varies from 2.8 (M.E.) to 4.3 (M.V.Sc.); for other categories it is a little above 3 (M.Sc.(Science), M.Sc.(Agriculture), M.S./M.D. and B.E.).

4. EXPERIENCE - EARNINGS RELATIONSHIP

Table 2.12 and 2.13 furnish information about experience - earnings profiles foe different educational categories classified by sex. Some of the general trends noticeable are:

(i) Larger the experience in the labour market, higher the earnings for both the sexes and for all educational categories.

As found in the age - earnings profiles, experience - income profile is highest among the males for M.E. degree holders and lowest for those with M.Sc.(Agriculture) degree. Engineers with Master's degree are closely followed by doctors with Master's degree.

For females experience - earnings profile is highest for doctors with Master's degree and lowest for those with M.Sc.(Science) degree.

(ii) Experience - earnings profiles are generally lower for females than for males whatever be the level of education and division obtained. The difference between male experience - earnings profiles and females experience - earnings profiles widens with years of experience.

TABLE 2.12

EXPERIENCE AND MEAN EARNINGS (Rs.)

M A L E S

Expereince in years	M.Sc. (Science				M.Sc. (Agriculture)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Up to 2	471.68	439.36	402.69	446.56	469.07	454.90	312.50	461.07
3 - 4	520.00	473.15	367.62	476.89	498.99	437.98	900.00	475.61
5 - 6	603.65	500.00	446.32	525.75	534.43	514.16	--	523.86
7 - 8	642.14	535.87	457.14	551.14	540.24	507.61	500.00	525.03
9 - 10	659.27	598.60	488.42	600.86	590.00	537.93	426.00	561.08
11 - 12	707.94	684.49	525.39	673.53	596.09	574.70	1320.00	595.63
13 - 14	983.63	654.60	701.25	749.75	602.90	592.39	425.00	509.32
15 - 19	871.35	740.92	780.77	777.33	875.61	650.38	592.22	742.90
20 - 24	971.33	774.19	662.22	803.28	814.00	838.75	492.00	813.82
25 - 29	1475.83	1038.52	900.00	1159.76	1041.07	882.50	--	993.50
30 & above	1950.77	942.86	1778.33	1491.82	1230.00	1152.86	--	1196.25
All years	697.97	581.20	568.94	612.39	601.58	555.07	534.83	578.93
N	438	965	170	1573	759	677	29	1467

TABLE 2.12 (Contd.)

EXPERIENCE AND MEAN EARNINGS (Rs.)

M A L E S

Experience in years	M.B.,B.S.				M.S. & M.D.			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Dvins.
Up to 2	568.95	631.04	682.50	626.29	942.67	897.59	626.67	906.29
3 - 4	681.67	615.78	490.00	622.71	863.57	719.57	--	774.05
5- 6	--	684.79	670.00	684.49	1041.77	745.36	340.00	846.09
7 - 8	1080.00	651.89	1000.00	682.00	820.00	777.24	800.00	792.77
9 - 10	670.00	798.57	--	782.50	1000.56	792.00	--	870.21
11 - 12	845.00	717.33	--	732.35	1086.43	941.15	--	992.00
13 - 14	1053.33	761.11	485.00	784.29	950.83	828.33	--	889.58
15 - 19	663.33	934.76	--	900.83	1209.17	1054.22	1710.00	1102.43
20 - 24	970.00	941.54	--	946.88	1476.67	1164.78	--	1271.71
25 - 29	1290.00	1110.00	180.00	1092.50	1418.33	1411.82	--	1414.12
30 & above	1240.00	1388.33	--	1314.17	2456.00	1043.75	--	1586.92
All years	798.42	690.72	616.67	701.08	1091.43	917.69	696.00	979.86
N	57	442	6	509	168	264	5	439

TABLE 2.12 (Contd.)

EXPERIENCE AND MEAN EARNINGS (Rs.)

M A L E S

Experience in years	M.V.Sc.				Ph.D.
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	
Up to 2	520.48	490.00	430.00	510.71	900.00
3 - 4	514.29	530.00	430.00	513-16	--
5 - 6	498.13	570.83	--	529.29	--
7 - 8	592.50	538.13	525.00	566.05	--
9 - 10	541-15	537.90	580.00	540.65	--
11 - 12 .	598.06	630.00	533.33	604.90	--
13 - 14	681.74	588.57	610.00	664.62	950.00
15 - 19	688.15	632.94	697.14	670.98	1423.33
20 - 24	2021.11	770.00	740.00	1331.50	1100.00
25 - 29	1298.33	800.00	--	1132.22	--
30 & above	1175.00	626.67	640.00	811.62	--
All years	682.82	598.60	625.00	648.21	1423.33
N	195	121	14	335	3

TABLE 2.12 (Contd.)

EXPERIENCE AND MEAN EARNINGS (Rs.)

M A L E S

Exp. in years 6	B.E.				M.E.				Ph.D.
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	
Up to 2	553.69	502.53	428.33	524.96	716.06	643.61	--	699.60	600.00
3 - 4	721.32	571.10	622.00	635.47	858.92	706.23	910.00	818.29	5300.00
5 - 6	752.65	260.87	608.00	695.58	848.24	717.65	--	816.97	1402.50
7 - 8	885.71	744.57	570.00	789.63	873.03	735.90	--	843.05	695.00
9 - 10	1149.14	832.40	740.00	931.17	1012.42	811.61	--	947.47	1110.00
11 - 12	1135.27	883.19	665.00	952.05	1100.27	855.41	625.00	1007.66	1365.00
13 - 14	1212.77	972.63	687.50	1032.66	1299.18	1036.81	680.00	1192.57	2006.67
15 - 19	1480.00	1216.07	1098.33	1285.71	1379.75	1128.45	800.00	1275.61	1426.67
20 - 24	1790.39	1221.25	1800.00	1376.57	1767.43	1219.45	2100.00	1538.15	1910.00
25 - 29	1924.29	1669.36	800.00	1728.04	2166.39	1795.33	1300.00	2042.69	1685.00
30 &above	1332.73	1756.92	1170.00	1618.68	1305.00	1660.00	280.00	1419.15	--
All yrs.	893.64	809.86	761.58	840.30	1024.29	912.46	625.00	990.03	1707.61
N	956	1609	38	2607	1608	729	2	2405	46

TABLE 2.13

EXPERIENCE AND MEAN EARNINGS (Rs.)

F E M A L E S

Exp. in years	M.Sc. (Science)			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Up to 2	443.26	414.05	347.50	423.86
3 - 4	444.62	449.36	120.00	440.67
5 - 6	500.83	415.00	346.67	443.45
7 - 8	556.00	477.78	535.00	498.00
9 - 10	603.33	578.33	320.00	552.35
11 - 12	505.00	472.22	330.00	465.83
13 - 14	715.00	545.71	840.00	609.00
15 - 19	753.33	720.00	530.00	720.77
20 - 24	695.00	486.67	--	570.00
25 - 29	--	950.00	--	950.00
30 & above	--	--	--	--
All years	501.59	475.14	376.86	479.29
N	82	144	11	241

TABLE 2.13 (Contd.)

EXPERIENCE AND MEAN EARNINGS (Rs.)

F E M A L E S

Experience in years	M.B.,B.S.				M.S. & M.D.			
	Hons. & I Divn.	II Divn.	III Divn.	All Divns.	Hons. & I Divn.	II Divn.	III Divn.	All Divns.
Up to 2	510.00	579.70	605.00	573.12	806.67	797.78	--	802.22
3 - 4	635.00	619.02	680.00	624.05	800.00	940.00	--	905.00
5 - 6	705.00	670.00	--	675.00	687.50	770.00	--	737.00
7 - 8	600.00	609.09	--	608.33	800.00	795.00	--	796.67
9 - 10	670.00	622.50	--	632.00	1100.00	931.11	1910.00	944.55
11 - 12	1110.00	685.00	730.00	841.67	880.00	854.29	--	862.00
13 - 14	--	720.00	--	720.00	--	812.50	--	812.50
15 - 19	925.00	850.00	--	880.00	1550.00	1017.14	--	1135.56
20 - 24	--	1250.00	--	1250.00	--	1128.00	--	1128.00
25 - 29	--	600.00	--	600.00	1995.00	--	--	1995.00
30 & above	600.00	772.86	--	734.44	--	1000.00	--	1000.00
All years	665.00	618.92	671.67	626.53	970.00	892.04	--	915.44
N	20	139	6	167	22	54	--	79

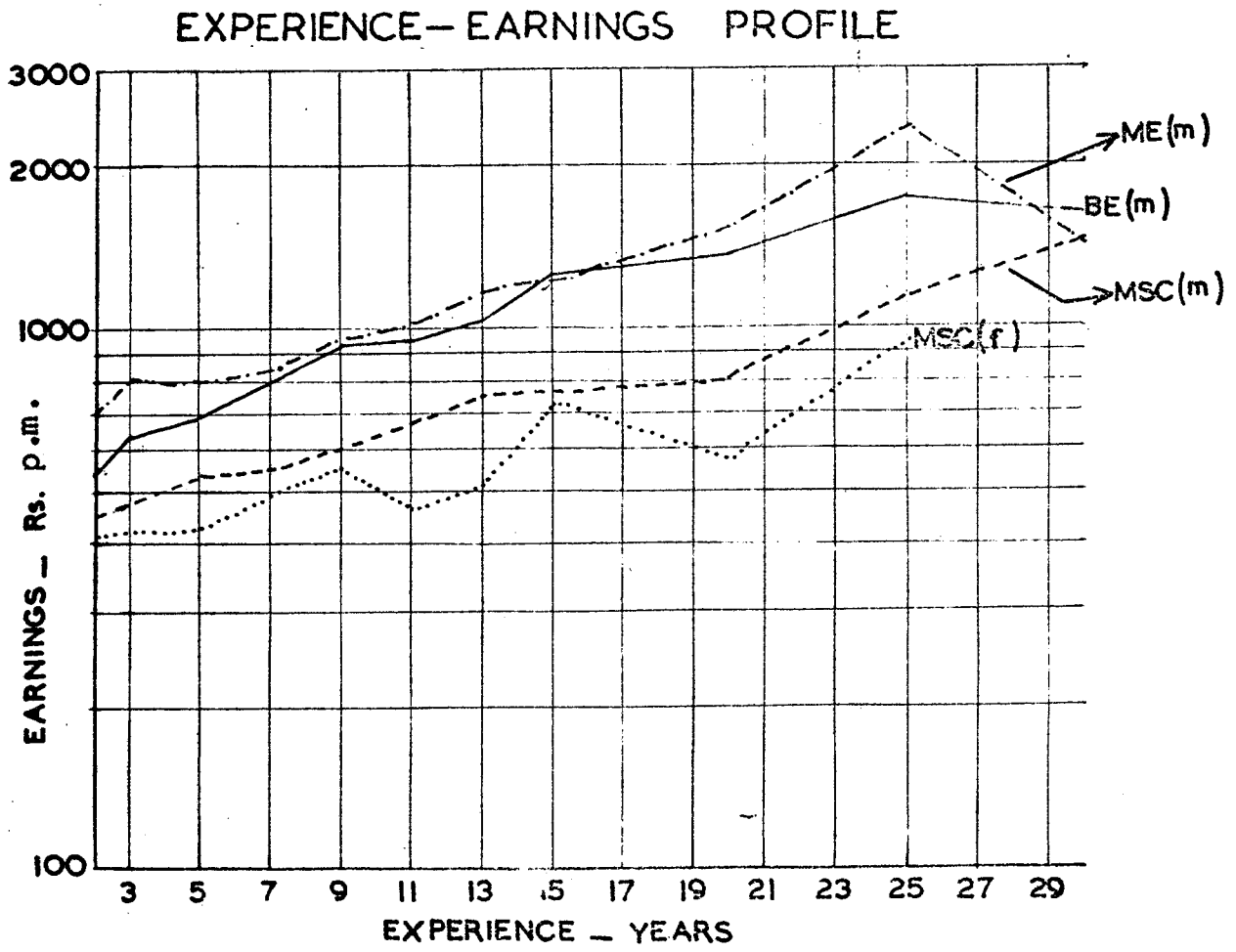EXPERIENCE—EARNINGS PROFILE
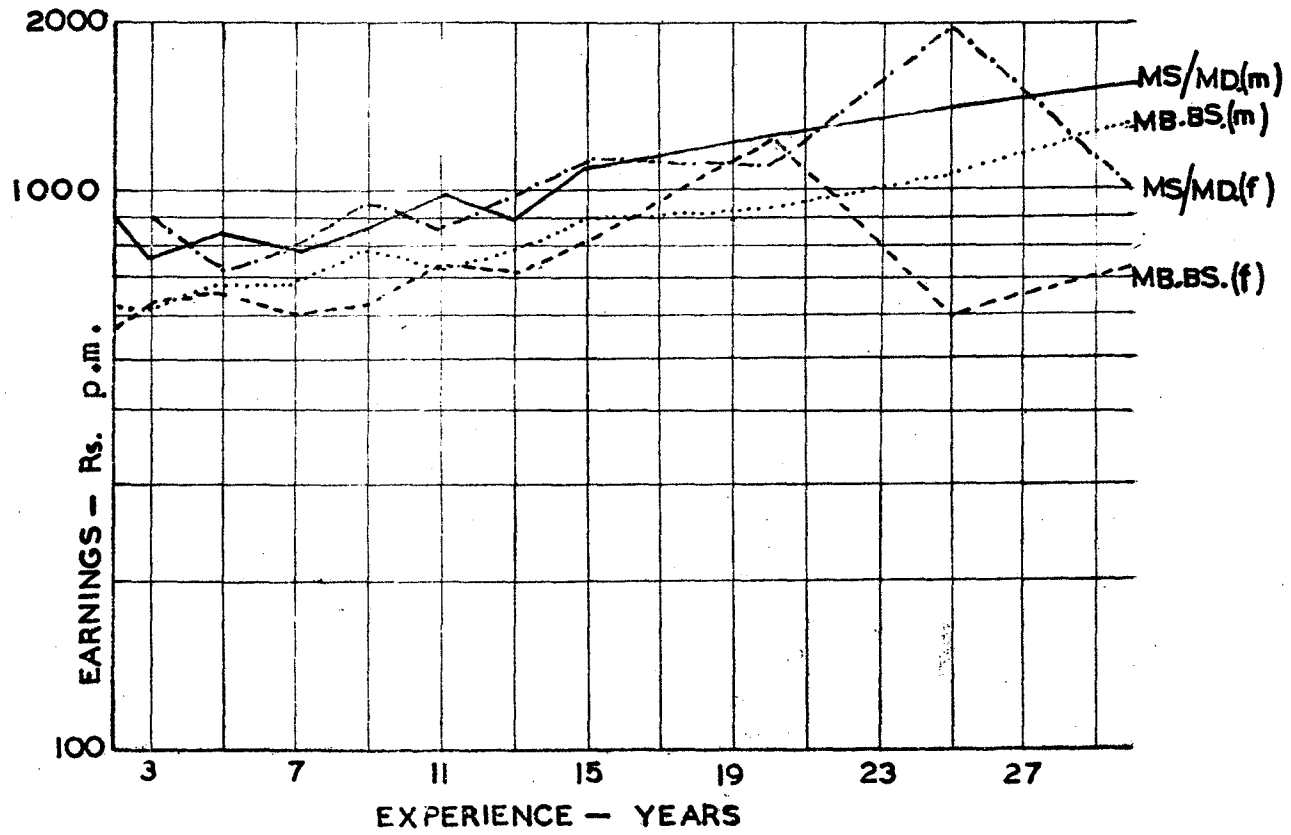
Figure — 4

EXPERIENCE— EARNINGS   PROFILE
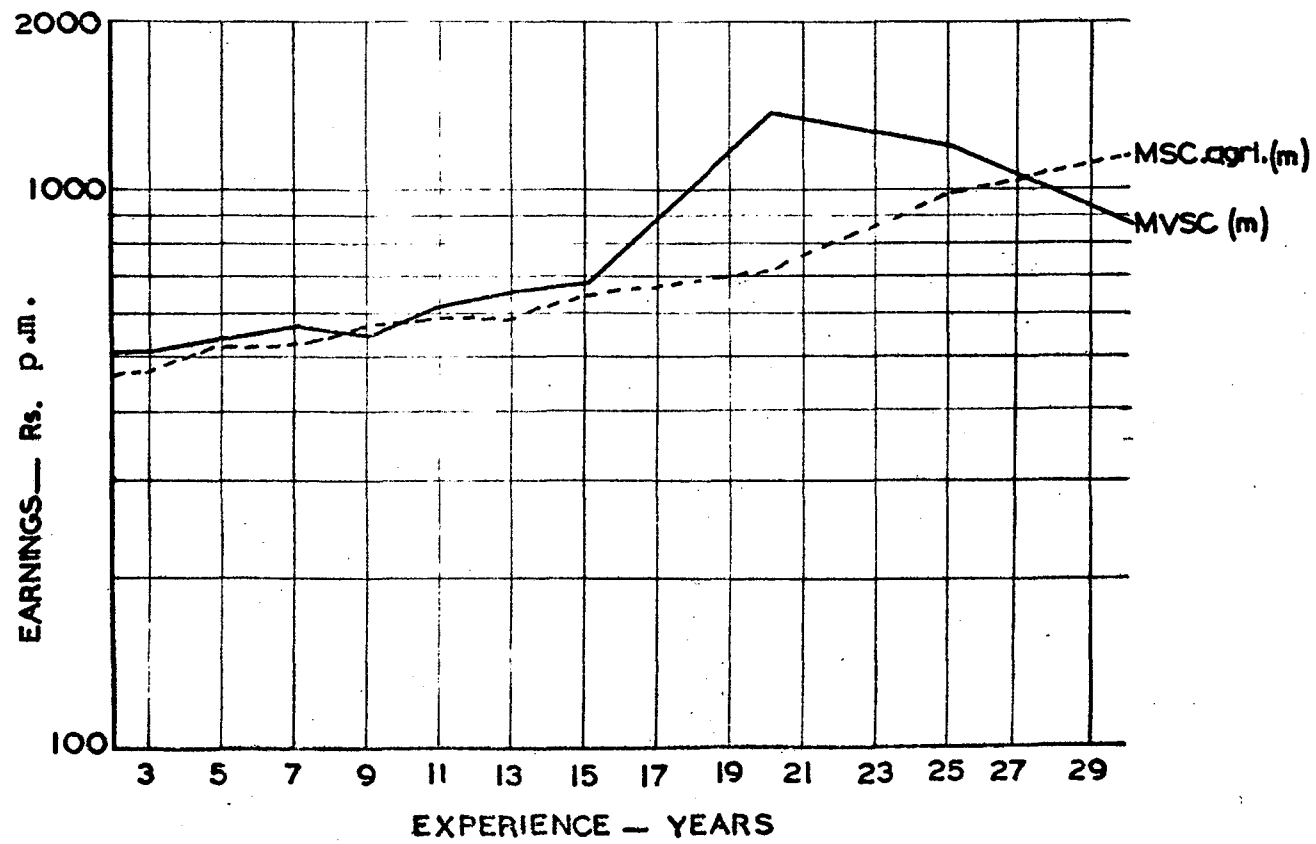
Figure – 5

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EXPERIENCE— EARNINGS PROFILE

Figure - 6

(iii) Regarding the influence of division on experience - earnings profiles, first divisioners earn more at "all years" experience than the second divisioners whose earnings are higher than the third divisioners. The difference in earnings between the divisions increases with years of experience. The characteristics of experience - earnings profiles are very similar to age - earnings profiles.

* * * * * * * *

CHAPTER III

EDUCATION AND UNEMPLOYMENT

In the previous chapter, incidence and duration of unemploy-
ment were presented in tabulated forms classifying the sample
by educational qualifications, division obtained, age.and sex.
In this chapter duration of unemployment is taken up for
further analysis by means of multiple regressions. This
regression analysis will be of use in finding out the signi-
ficant variable effecting the duration of unemployment. It
has also some policy implications, though it is difficult to
make any policy suggestions from the present sample, because
it contains only highly educated professional labour force.
If the sample includes matriculates and other degree and
diploma holders, such analysis might be used in recommending
the type of studies preferred from the point of view of
unemployment.

This chapter is divided into two parts: the first one
discusses the different hypotheses about educated unemployment
while the second deals with the regression analysis for the
duration of unemployment.

Before discussing the different hypotheses about
unemployment, a comment might be made about one category of

persons in the sample, namely those who are unemployed and
not seeking job. It is unthinkable to have such category
among males with sound health. This category among males
forms only 0.5% whereas among females it forms 5.7% (chapter II,
tables 2.3 and 2.4). It may mean that they are not actively
seeking a job if and when offered, or they were frustrated
with the efforts to secure a job and have given up the effort
to get one. That is, they might be discouraged labour. Since
there is no way of checking this aspect from the data, no firm
statement could be made about the reasons for their not seeking
job.

Review of Hypotheses on Unemployment

The problem of educated unemployment has been of great
concern to government and planners. In spite of efforts made
by the government, the problem is becoming more serious as the
magnitude increases.

Various committees and individual researches have
investigated this problem from time to time. It is impossible
to review these studies. What is attempted here is to give
a brief critical review of two schools of thought which are
clearly distinguishable. One school of thought considers
the educational system as the villain whereas the other school
considers the economic system as the prime cause of the pheno-
mena. Though the schools of thought are clearly distinguishable,

it does not mean that they have no common aspects. The distinction is based on prime emphasis given to the primary cause. For want of better expression they are named as "education hypothesis" and "economic hypothesis".

Education Hypothesis

Those who are advancing the education hypothesis argue in the following manner.[1] Education as it is managed and imparted in India, is irrelevant and unrealistic. It is bookish, examination-oriented and students are interested only in getting the credentials. It develops no skills that could be used either in agriculture or in industry and as a result, the educated persons are, to a greater extent, unemployable. Thus educated unemployment problem is essentially one of mismatch between job expectations generated by the educational system and the job opportunities provided by the labour market.

The policy implication is that education should be vocational. This aspect of vocationalizing education was analysed by Foster with respect to Ghana.[2] He denied that

1 Gunnar Myrdal (1968). Asian Drama. An Inquiry into the Poverty of Nations, Vol.II and III.

2 Philip J. Foster (1966), "The Vocational School Fallacy in Development Planning", in Mark Blaug (ed.)(1968). Economics of Education 1, pp. 396 - 425.

vocational training provided within formal educational institutions could solve the problem. In India the available evidence though inadequate, indicate that vocational education will lead to more unemployment; for instance, many of the Industrial Training Institute trainees face the same problem of unemployment and even amongst the employed Industrial Training Institute trainees, many of them are in jobs which do not require skills what they acquired. Since data on all sorts of qualifications are not included in this study, it is not possible to state categorically whether vocational training is significant or not.

Economic Hypothesis

The other school of thought puts the blame on the labour market functioning. Labour market is full of imperfections and it does not dynamically react to the supply and demand conditions. When the labour market is imperfect, the market is not cleared within short time. In India some evidence are gathered by Blaug, Layard and Woodhall to support the view that labour market does respond to supply-demand conditions but the response is slow.[3] According to this school the students/parents are aware of the job opportunities and earning prospects.

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3 Mark Blaug, Richard Layard and Maureen Woodhall (1969). The Causes of Graduate Unemployment in India.

Since data are not available on the expectations of students and their understanding of the labour market conditions, it is not possible to test whether their expectations are realistic or unrealistic (over ambition). Only in an indirect way, it can be tested by analysing the behaviour of students.

When finding a job is very difficult and also when this difficulty is increasing, why do more students demand higher education? It is natural to assume that they are completely ignorant of the job opportunities. When one compares the costs students incur to get degree from the university, and the resulting additional earnings when he finds a job, one finds the reutrn to college education is profitable even after adjusting for the period of unemployment. This might be the reason for the increasing demand for higher education.

The return to higher education is due to salary differentials by education category. The imperfect market does not react to adjust to over supply and so salaries are sticky.

The policy implication is that the attack should be diverted to labour market, the wide gap in earnings should be narrowed and the cost of acquiring higher education might be increased with liberal scholarships.

It should be mentioned that everybody who tried to investigate the problem agree that the problem is complex and requires a set of reforms. The International Labour Organization Mission report on Kenya says:

"The root of the problem lies in the interaction

of the conventional educational system and the
wage and salary structure through the allocation
of jobs and wages by reference primarily to
educational qualifications".4

Regression Analysis for the Duration of Unemployment

The determinants of the duration of unemployment are
examined by means of an unemployment function using multiple
regression analysis in which the duration of unemployment is
the dependent variable and the explanatory variables are the
various characteristics of the unemployed persons such as
education, sex and division obtained.

Symbolically, the function is as follows:

$$D = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + b \, sex + c \, div. + e$$

where D is the duration of unemployment in months.

In the above regression, the duration of unemployment
at the time of the survey (March 1971) is related to a set
of explanatory variables which take the value of either 1
(where observed) or 0 (where not observed). By breaking up
the indipendent variables into discrete categories, for instance,
nine educational categories, allowance has been made for non-
linear effects. There exists also an error term 'e' that
reflects measurement errors and the effect of all other variables
that affect the duration of unemployment but one not included
in the model.

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4 International Labour Organization (1972). Employment,
  Incomes and Equality. A strategy for Increasing Productive
  Employment in Kenya, pp. 10 - 11.

Education refers to the highest education qualification reported. There are ten educational qualifications included here and they are: (1) Ph.D.(Sc.), (2) M.Sc.(Sc.), (3)M.Sc.(Agrl.) (4) M.B.B.S., (5) M.S./M.D., (6) M.V.Sc., (7) Ph.D. (Vet.), (8) B.E., (9) M.E. and (10) Ph.D.(Engg.). The educational qualification, Ph.D.(Engg.) has been dropped to avoid over-estimation. In the available literature, education is usually measured by the number of years of schooling completed and as such it is a continuous variable. In this study it is measured as dummies, because, the sample contains categories of education with very little variation in years of schooling; and the dummies help understand the effect of different kinds of education on the duration of unemployment.

Sex refers to male or female. The category 'female' has been dropped.

Div. refers to division obtained in the highest educational qualification. For measurement the sample has been split into two groups: (i) I Division, (ii) II Division and others.

Table 3.1 presents the regression results for the duration of unemployment. For instance, the duration of unemployment 'D', for an M.Sc., male with first division is calculated as:

$$D_{M.Sc.\ (male)} = \underset{(a_0)}{20.349} + \underset{(Ed_i)}{1.635} - \underset{(sex)}{5.44}$$

$$= 16.53 \text{ months.}$$

TABLE 3.1

REGRESSION COEFFICIENTS AND T-RATIOS : DURATION OF UNEMPLOYMENT

Durn. of unemp.	Constant Term	Ph.D. (Sc.)	M.Sc. (Sc.)	M.Sc. (Agrl.)	M.B.B.S.	M.S./M.D.
D	20.35	0.45	1.64	-2.31	-5.84	-6.18
		(0.15)	(0.87)	(1.08)	(2.97)	(2.45)

M.V.Sc.	Ph.D. (Vet.)	B.E.	M.E.	Sex	Div.	R^2/S E E
-12.93	0.0	-2.24	-5.21	-5.44	0.32	0.05524/ 14.23
(1.52)	(0.0)	(1.22)	(2.58)	(4.01)	(0.48)	(n = 1175)

TABLE 3.2

AVERAGE ESTIMATED DURATION OF UNEMPLOYMENT FOR DIFFERENT EDUCATIONAL CATEGORIES (MONTHS)

	M.S./M.D.	M.B.B.S.	B.E.	M.Sc. (Agrl.)	M.Sc. (Sc.)	M.V.Sc.	M.E.	Ph.D. (Engg.)	Ph.D. (Vet.)	Ph.D. (Sc.)
I Div.										
Male	8.73	9.07	12.47	12.60	16.54	1.98	9.70	13.91	14.91	15.36
Female	14.17	14.51	17.91	18.04	21.98	7.42	15.14	20.35	20.35	20.80
Other Div.										
Male	9.05	9.37	12.79	12.92	16.86	2.30	8.02			
Female	14.49	14.83	18.23	18.36	22.30	7.74	15.46			

And for a female with the same educational qualification and division:

$$D_{M.Sc.}(female) = 20.349 + 1.635$$

$$= 21.98 \text{ months, and so on.}$$

Table 3.2 presents the expected duration of unemployment (in months) for both sexes according to different educational qualifications and division obtained as calculated from the regression coefficients presented in table 3.1.

The number of observations in the degrees M.S./M.D., M.V.Sc., M.E. and Ph.D.(Sc., Vet.Sc. and Engg.), reported as 'unemployed seeking job' are very small as noted in the previous chapter. Hence to study the estimated duration of unemployment, only the degrees M.B.B.S., B.E., M.Sc.(Agrl.) and M.Sc.(Sc) are considered here as these present more observations compared to the earlier mentioned degrees.

Education and Unemployment

For both sexes, duration of unemployment is lowest among doctors with M.B.B.S. (9.07 months) and highest for persons with M.Sc. (Sc.) (16.54 months). In consequence M.B.B.S. can be considered as more popular educational qualification and M.Sc.(Sc.) less popular.

The table 3.2 as a whole shows that the expected duration of unemployment is the shortest for the M.V.Sc. degree holders and longest for those with Ph.D.(Sc.).

Division and Unemployment

Among both sexes, the duration of unemployment appears to be lower with first divisioners compared to those degree holders with second or other divisions for all education.

Sex and Unemployment

For any particular educational qualification and division obtained, it is seen that the duration of unemployment is higher among the females than the males.

* * * * * * * * * *

CHAPTER IV

EDUCATION AND EARNINGS

The previous chapter was devoted to a short review of competing hypotheses about unemployment, particularly educated unemployment of the professional manpower in terms of personal characteristics; it was done by means of multiple regression analysis. In this chapter, the focus is turned towards those who are employed.

The labour market behaviour of the employed manpower could be analyzed from different angles such as geographical mobility, occupational mobility, job-switching, longitudinal change in labour market experience and earnings. This chapter is confined to analysing the relation between education and earnings; however, this does not mean that the other aspects of the labour market behaviour of the manpower are less important. This limited scope is imposed by the resource constraints of the author.

This chapter is divided into two parts, one dealing with different hypotheses (or interpretations) of the observed relation between education and earnings, while the other one the estimation of the association between education and earnings.

It is a statistical fact that "between any two groups
of individuals of the same age and sex, the one with more
education will have higher average earnings than the one
with less even when the two groups are employed in the same
occupational category in the same industry".[1] This positive
association between education and earnings is one of the
most striking findings and is observed in all the countries
where the data is available. Psacharopoulos reviewed all
the available studies on the correlation between education
and earnings and found no exception to this universal pheno-
mena.[2] His review of 53 studies refers to 32 countries
located in North and South Americas, Europe, Africa and Asia
including India. His generalization is accepted by all eco-
nomists who have worked on education and labour market.
However, when the question, "why educated individuals earn
more" is posed, there is no generally accepted answer and
different hypotheses are put forward as answers to this
question. These hypotheses may be grouped as Human Capital
hypothesis, Screening hypothesis and Labour market Seg-
mentation hypothesis. However, it must be mentioned that
within each group of economists adhering to each hypothesis
there exist some variations.

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1 Mark Blaug (1972). "The Correlation between Education
   and Earnings: What does it Signify", Higher Education,
   Vol.1, No.1, p.54.

2 George Psacharopoulos (1973). Returns to Education:
   An International Comparison.

(a) Human Capital Hypothesis

Of the three hypotheses (or explanations and models) the most clearly formulated and well-established is the human capital hypothesis. According to this model, the productivity - relevant differences between individuals can be attributed to the differences in the human capital possessed by the individuals.[3] Human capital is acquired by individuals through investing in education, health, nuttrition, labour market information, etc.

Individuals invest in human capital up to a point where the cost of acquiring a unit of human capital (income forgone plus the direct expenditure) equals the discounted value of the expected income increase resulting from that investment. Aggregation of the outcomes gives the supply of human capital. On the other side employers ascertain how much additional output can be produced by an individual with an extra unit of human capital. Competition in the labour market and employers' desire to maximize profit will drive them to hire workers up to a point where the wage paid equals the value of the additional output. Aggregation across employers' decision gives the demand for human capital.

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3 Gary S. Becker (1964). Human Capital: A Theoretical Analysis with Special Reference to Education; Jacob Mincer (1974). Schooling, Experience and Earnings; and Sherwin Rosen (1972). "Learning and Experience in the Labour Market", Journal of Human Resources, Vol.7, No.3, pp. 326 - 342.

Most of those who subscribe to human capital hypothesis believe that the cognitive abilities* and technical skills are the major components of productivity. Schooling and training impart cognitive abilities, abilities to learn and use technical skills. Thus education enhances productivity and consequently educated workers earn more.

At least two economists have challenged this view that cognitive skills are the major components of productivity. Edwards compared the relative importance of cognitive skills and affective personality traits* in explaining worker performance in a variety of jobs and found that a set of personality traits such as discipline, docility, reliability, internalization of firm's goals, etc. are more important than cognitive skills.[4] Gintis suggested that schooling serves the major function of socializing the individual with a certain set of attitudes which are necessary for success in labour market. In his view the influence of schooling on earnings is independent of its influence on cognitive achievment. Rather it operates through the inculcation of attitudes desirable to different jobs and they are rewarded

* By cognitive abilities are meant individual capacities to logically combine, analyze, interpret and apply informational symbols.

* By affective traits are meant personalities, codified on the individual's personality structure to respond in stable, emotional and motivational patters, to demands made upon him in concrete social situations.

4 R.Edwards (1972). "Alienation and Inequality. Capitalistic Relations of Production in Bureaucratic Enterprises", Unpublished Ph.D. dissertation, Harvard University, as quoted by Pak Wai Liu (1975). Education and Socio-Economic Status in Labour Market Segmentation: Case Study in Singapore (mimeo)

with high earnings.[5] Different levels of schooling socialize
students with different sets of values and attitudes.

A remark is in order at this point. The latter me-
chanism - scholarship and training inculcates certain set
of values and attitudes which are rewarded in modern societies -
is considered as a sociological explanation[6] of the positive
association between education and earnings. Generally it is
considered as non-human capital interpretation. Whether
education increases the cognitive abilities and technical
skills which are valued in the market, or it inculcates a
set of values and attitudes which are rewarded in the market,
education enhances the value of human time in the labour
market; in this sense both the mechanisms should be consi-
dered as belonging to human capital hypothesis.

(b) Screening Hypothesis

Different words are used to denote this hypothesis
such as "signalling", "filter" and "sorting". Though there
are certain differences, they all refer to the same central
concept that hiring is an investment in uncertainity.
Employers are interested in productivity, but they do not
know how much productivity a candidate has and what producti-
vity-relevant traits a candidate has; or perhaps they do not
know what combination of traits is most productive in particular

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5   Herbert Gintis (1971). "Education, Technology and the
    Charasteristics of Worker's Productivity", American Eco-
    nomic Review, Vol.61, No.2, pp. 266 - 280.

6   Mark Blaug (1972). op. cit., pp. 68 - 70.

job situations. Only by observing the workers' performance for some period, employers are able to gauge more or less accurately the worker's productivity. This time lag involved in knowing an individual's productive capabilities makes the hiring decision subject to risk.

However, at the time of recruitment, the employer is able to observe a variety of personal data such as age, education, sex, experience, etc. Those traits which cannot be altered are termed "indices" and those which are alterable are "signals".[7] Based on previous experience with different combinations of indices and signals, the employer forms conditional assessment of any individuals productive capacity. It is this subjective assessment of productivity which determines the wage offered. Given the offered wage schedule for different levels of a signal, a worker will acquire the amount of the signal which maximizes the difference between offered wage and cost of acquisition of the signal. Equilibrium is attained when the employers' expectation about productivity of individuals with given signal levels are confirmed by the actual performances. Education is used as a signal.

Thurow and Lucas have presented the job-competition model of the education-income relationship. In their model labour supply plays little role in wage determination.

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7 Michael Spence (1974). _Market Signalling: Informational Transfer in Hiring and Related Process_.

Workers' signal and indices are unimportant in determing
their potential productivity; on the job, only their
"trainability" matters.[8] This is because productivity is
an attribute of jobs and not people. Jobs in which the
worker works with a number of modern equipments are highly
productive. Workers queue up for such jobs. The necessary
skill to raise the worker-productivity up to the producti-
vity of the job are learned through on-the-job training -
formal and informal. "Trainability" is the chief criteria
for employment.

The workers who possess background characteristics
which employers feel reduce training costs go to the head
of the queue and gain entry to the best jobs. Those who are
not possessing the traits are pushed to low paying job or
they are pushed to the end of the queue. What factors
determine the position of the worker in queue for best job?
Thurow and Lucas list the following: education, sex, psycho-
logical tests, previous experience, race, etc.' Education
is used as an index of trainability because it gives the
"sense of justice among workers and employers".

In signalling model education is a proxy for labour
productivity and in the Thurow-Lucas model it is a proxy
for trainability. The first is based on labour market

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8   L.C. Thurow and R.E.B. Lucas (1972). The American Distri-
    bution of Income: A Structural Problem.

experience and the latter on the sense of justice. The extreme version assumes that education does not increase productivity; it is used only to identify productive labour.

(c) Labour Market Segmentation Hypothesis

There are a number of variants of segmentation hypothesis. All of these hypotheses try to establish that there are several types of jobs in the labour market each with distinct criteria for hiring and advancement, supervisory procedures, working conditions, wage levels, etc. The distinct segments as observable in the labour market have been referred to as "primary" and "secondary" labour markets. Doeringer and Piore posit that there is no mobility between them. They define:

> "Jobs in the primary market possess several of
> the following characteristics: high wages,
> good working conditions, employment stability,
> chances of advancement, equity, and due process
> in the administration of work rules. Jobs in
> the secondary market, in contrast, tend to have
> low wages and fringe benefits, poor working
> conditions, high labor turnover, little chance
> of advancement, and often arbitrary and capricious
> supervision".[9]

Carter and Carnoy further classify the primary into primary routinized and primary independent (or creative).[10] The former requires conformity to externally imposed norms, whereas the latter requires creative and self-initiating actions on the part of the workers.

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9   Peter B.Doeringer and Michael J.Piore (1971). _Internal Labour Market and Manpower Analysis_, p.165.

10 M.A.Carter and Martin Carnoy (1974). _Theories of Labour Market and Worker Productivity_. (mimeo)

Although many scholars have conceptualized the difference between primary and secondary jobs, none has developed an operational definition so that specific jobs might be classified. Doeringer et. al concluded after extended discussion that:

> "to begin with, some reliable indices of primary and secondary jobs are needed in order to identify jobs suitable for referral".11

Two different explanations have been suggested in the literature: one the "technological" and the other "social control". However, they accept interactions and reciprocal feedbacks between technology, organization of production and workers traits. Piore summarizes technological explanation as follows:

> "The roles of institutional forces and labour force characteristics in determining market structure are played out within a set of technological forces which constrain and channel their impact .... there is probably an elementary technological core to the economy which is impervious to assault by alien institutions and workers and will mould the latter to its own image before it gives away".12

That is, technological requirements shape the nature of jobs and the requirements of jobs shape worker characteristics.

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11 Peter B.Doeringer, et al. "Low Income Labour Markets and Urban Manpower Programmes (Washington: National Technical Information Service, U.S. Department of Commerce, P.B. 192484, March 1969) p.115 as quoted by Paul J. Andrisani (1973). An Empirical Analysis of Dual Labour Market Theory, (mimeo), p.35.

12 Michael J.Piore (1973). On the Technological Foundations of Economic Dualism, (mimeo), p. 4.

Reich, Gordon and Edwards, reject the technological[7]
hypothesis and provide an alternative hypothesis which states
that productivity is rooted in social relations; the deve-
lopment of technology itself is constrained by the needs to
reproduce the existing social relations of production; those
whose income and status depend on maintaining their control
over the production process are interested only in technolo-
gical changes which will tighten their control over pro-
duction.[13]

I B. Empirical Evidence

Although a wide range of studies exist on the schooling-
income relationship, few empirical attempts have been directed
towards the generating mechanism. Much of the work has been
concerned with assessing the bias in schooling's private
return, which results from ignoring measures of ability.
The results have consistently found a minimal reduction in
schooling's incremental effect on earnings.[14] However, it
would be erroneous to conclude from this that schooling
directly produce human capital rather than serving an identi-
fication function. The reason is that screening arises

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13 Michael Reich, David Gordon and Richard Edwards (1973).
    "A Theory of Labour Market Segmentation", American Eco-
    nomic Review, Vol.63, No.2, pp. 359 - 366.

14 Herbert Gintis (1971). op. cit. pp. 266 - 268, and
    Zvi Griliches and William Mason (1972). "Education,
    Income and Ability", Journal of Political Economy,
    Vol.80, No.3 Part II, pp. S74 - S103.

solely as a consequence of imperfect information. Schooling

is simply a proxy for earning-producing skills.

There are only two empirical studies which have

attempted to isolate the effect of education on earnings.

According to Taubman and Wales,

> "screening is said to occur when individuals,
> due to their lack of education, are restricted
> from entering occupations in which their
> marginal products are greatest".[15]

The authors estimated the expected distribution of workers

under free entry and compared it with actual distribution

of workers accross occupations. They came to the conclusion

that the screening hypothesis, in its extreme form is not

supported though some element of screening is there. Wolpin

compared the earnings regression results of self-employed

and came to the conclusion that screening hypothesis is not

fully substantiated.[16] This conclusion is based on the

findings that education is significant in explaining the

income variance both among employees and self-employed and

the coefficient of education, for the two groups are very

nearly equal. On this basis, he says:

> "........ with respect to their schooling
> decision and lifecycle effect of schooling
> on earnings yielded results which are not
> consistent with the existence of a substantial
> identification on screening function".[17]

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15 Paul Taubman and Terrance Wales (1973). "Higher Edu-
cation, Mental Ability and Screening", Journal of Poli-
tical Economy, Vol.81, No.1, pp. 28 - 56.

16 Kenneth Wolpin (1975). Education and Screening (mimeo).

17 Ibid., p. 29.

Regarding the segmentation theories, there are about six studies in which empirical evidences have been collected to substantiate the hypothesis. All these studies, after collecting information about age, sex, race, earnings, occupation, sector, locality, etc., classified the sample into primary and secondary labour markets. The criteria used for such classification varies from author to author. Some use earnings,[18] others use occupations and subjective evaluation of jobs.[19] Those workers whose earnings fall below the mean of the total sample are grouped into secondary and others, into primary. Occupations which have mean earnings less than the grand mean earnings of the whole sample are classified as secondary jobs and others as primary jobs. After classification, earnings functions are fitted separately for each segments. They found education to be more significant in explaining earnings on primary labour market than in secondary. They also tested the mobility of workers from secondary to primary labour market and found considerable mobility, though mobility rate varied by sex and race. All these studies do not support the extreme version of segmentation hypothesis, though one may interpret the evidence as giving some support for it. The same evidence might be

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18 Paul J.Andrisani (1973). op. cit.

19 Osterman, as cited in G.G.Cain (1975). The Challenge of Dual and Radical Theories of the Labour Market to Orthodox Theory (mimeo).

interpreted by the human capital theorists as market imper-
fections. It should be mentioned that when the income -
the dependent variable - is truncated, the estimated coeffi-
cients will be biased towards zero. This is a limitation
of the statistical procedure used by segmentation hypothesis.

II Earnings Function

In the second part of this chapter, the relation
between education and earnings is analysed by means of regre-
ssions. No attempt is made here to verify any of the hypo-
theses reviewed above. The statistical analysis attempted
here will be of interest because there is no such a study
in India and further, this analysis may be useful for planning
education. The regression analysis will also enable one to
know the significance of each variable in explaining earnings
variance.

The analysis is carried through in three stages:
(a) Schooling Model, (b) Human Capital Model, and (c) Expanded
Human Capital Model.

Before presenting the results of the regression analysis,
some comments upon the variables used in the analysis and the
specific form of the equation used should be made.

Earnings is the subject of analysis, i.e., it is the
dependent variable. Earnings in the survey questionnaire
refers to monthly earnings: the respondents were requested
to report the total monthly emoluments. How the respondents

interpreted "total emoluments" is not known from the data. Whether they reported their total salary (including allowances) or whether they reported total earnings (i.e., total salary plus additional earnings, if any) or whether they included over-time payments and other fringe benefits if any, are not detectable from the data. It is hunch that most of the respondents reported total salary only.

In the available literature on earnings function, earnings (dependent variable) is used either in log or non-log form. Most of the studies before Mincer's work used non-log form. After his work many studies used log form. Mincer has argued that earnings should be in log form.[20] Heckman and Pollacheck did not a priori assume any form: they asked the data through transformation function to decide the best form of the dependent variable.[21] They concluded that log earnings is the best form. In this analysis both log and non-log form of earnings are used.

The independent variable used by different authors to explain earnings are numerous. They may be grouped as follows: (a) those not subjected to choice of individuals - sex, age, race, genetic ability, family background and risk attitude, (b) those subjected to choice - occupation, marital status, number of children, weeks worked and human capital (years of

20 Jacob Mincer (1974). op. cit.
21 J.Heckman and Solomon Pollacheck (1974). "Empirical Evidence on the Functional Form of the Earnings-Schooling Relationship", Journal of American Statistical Association, Vol.69, No.2, pp. 350 - 354.

schooling, achievement, experience, migration and health;
(c) environmental factors such as geographical locality,
economic sector, unionization, monopoly and discrimination,
and (d) chance.

In this study only a limited number of variables
are used because of data limitations and other constraints
of the author. These variables are: education, occupation,
sector, experience and sex.

The variable education is defined in the previous
chapter and the same applies here also.

Occupation is an important variable, particularly
in sociological studies. Though Becker has argued that
occupation should not be included in the earnings function
(when one calcuates rates of return to education) many eco-
nomists including those who share Becker's 'human capital'
concept, continue to use occupation as one of the explana-
tory variables. This inclusion of occupation seems to be
relevant when the goal is distribution analysis.

The classification of occupation as given in the
Survey Card is different from the standard single digit
occupational classification in India. The occupations listed
in the survey card are: Teaching and/or Research, Design and
Development, Construction, Production, Administration, Cle-
rical, Sales, Professional and others. Since the occupation
is a qualitative variable and since we do not have ranking
ofthese occupations, they are measured as dummies.

Sector is another important variable in explaining the income variance. This sector is different from economic sectors (such as agriculture, industry, trade, etc.). Here it refers to who controls the economic activity, i.e., public sector and private sector. In this case also, it is measured by zero or one dummy as in the previous case.

Another important variable is age or experience. In the literature, one finds both; some have used age and others have used experience; even when direct information on experience was not available, experience was calculated. Many U.S. studies have calculated experience as age minus number of years of schooling minus five. This implicitly assumes that the group of persons with the given level of education complete that level of education at the same age and enter job without any waiting or unemployment period. This assumption may be approximately correct in the U.S. In India, where stagnation at schools and colleges is widespread and unemployment is serious, it will be unrealistic to calculate experience as in the case of U.S. studies. Fortunately there is no need to do like that. The information available in the survey card enables us to calculate the years of experience directly, which is done as follows: 1971 minus the year of entering the first job. However, it should be pointed out that this calculation assumes that the persons have been in the service throughout this period; there is no break in the labour market experience. This seems to be unrealistic; but there is no other alternative.

This is a continuous variable and is measured in years.

Except earnings and experience all other variables are measured as dummies. In order to avoid the problem of over-estimation, one category in each of the qualitative variables is dropped.

The variables used are:

Income	:	y or ln y
Education	:	Ed_i ; where i refers to the educational category like M.Sc.(Sc.), M.Sc.(Agrl.), etc. Dropped out category is Ph.D..(Engg.)
Occupation	:	Occ_i ; where i refers to occupational category such as construction, production, etc.
Sector	:	Sec.; Public or Private. Dropped out category is private.
Experience	:	Exp. ; measured in years.
Sex	:	Male or Female. Dropped out category is female.

The earnings function are fitted in the following forms:

(a) Schooling Model

$$y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + e \qquad (1)$$

$$\ln y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + e \qquad (2)$$

(b) Human Capital Model

$$y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + c \, exp. + d \, (exp)^2 + e \qquad (3)$$

$$\ln y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + c \, exp. + d \, (exp)^2 + e \qquad (4)$$

(c) Expanded Human Capital Model

$$y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + b \text{ sex} + c \text{ exp.} +$$
$$d(exp)^2 + \sum_{i=1}^{s} k \, occ_i + e \qquad (5)$$

$$\ln y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + b \text{ sex} + c \text{ exp.} +$$
$$d(exp)^2 + \sum_{i=1}^{s} k \, occ_i + e \qquad (6)$$

$$y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + b \text{ sex} + c \text{ exp.} +$$
$$d(exp)^2 + j \text{ sec.} + \sum_{i=1}^{s} k \, occ_i + e \qquad (7)$$

$$\ln y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + b \text{ sex} + c \text{ exp.} +$$
$$d(exp)^2 + j \text{ sec.} + \sum_{i=1}^{s} k \, occ_i + e \qquad (8)$$

Regression Results

Twenty regression models (ten in the log form and ten in the non-log form) were run in an attempt to explain the variations in earnings amongst individuals. The following discussion is based on the equations as mentioned above. In general it has been found that the log form fits better compared to the non-log form of the equation, if R^2 is used as the criteria. Though this is being criticized, it is used by many as a criteria to find best fit.

(a) Schooling Model

This model is the initial and crude version of human capital model of earnings function. In this model, the formal schooling done is treated as human capital formation and on that assumption the earnings function is specified.[22]

22 J. Mincer (1974). op.cit.

Mincer and Becker arrived at the following specification

of earnings function:

$$\ln y = a + bS$$

where y is earnings and S is the number of years of schooling.

In this formulation, earnings are proportional to schooling,

the proportionality being the coefficient of schooling. It

is here implied that there is a linear relationship between

schooling and earnings. This need not necessarily be correct.

Mincer used 'schooling square' also and estimated the rate of

return to schooling at different levels. In the present

study schooling is used in the dummy form represented by the

type of degree. This method will enable one to find out the

non-linear effect of education.

Table 4.1 presents the results of the regression

analysis both in the log and non-log forms for the schooling

model.

The coefficient of determination is low in both log

and non-log form; it is 6% in log form and 7% in non-log

form. This poor fit was expected because it (schooling model)

is not correct specification of human capital; post-school

human capital formation is neglected.

Table 4.2 presents the estimated monthly earnings of

persons with different qualification. This is done as follows:

Earnings of a Ph.D.(Sc.) is

$$Y = a_0 + \sum_{i=1}^{q} a_i \, Ed_i + e$$

$$= 696 + \quad 159.16$$

$$= Rs.855.16$$

TABLE 4.1

REGRESSION COEFFICIENTS AND T-RATIOS: SCHOOLING MODEL

Income	Constant Term	Ph.D. (Sc.)	M.Sc. (Sc.)	M.Sc. (Agrl.)	M.B.,B.S.	M.S./M.D.
(1) Y	696.00	159.16	-269.46	-248.33	-399.28	0.78
		(7.473)	(16.336)	(13.699)	(27.24)	(0.55)
(2) lnY	4.6895	0.8521	-0.278	0.0614	-1.8979	0.0023
		(8.663)	(3.6349)	(0.7301)	(27.9311)	(0.0346)

M.V.Sc.	Ph.D. (Vent.)	B.E.	M.E.	R^2/S E E	N
-118.37	154.96	-103.38	-169.81	0.0721/ 652.2	25190
(3.783)	(2.078)	(7.253)	(11.886)		
60.8792	1.1041	-0.1512	0.7018	0.0612/ 3.024	25190
(6.0612)	(3.4549)	(2.2885)	(10.5955)		

TABLE 4.2

AVERAGE ESTIMATED MONTHLY EARNINGS (Rs.) ACCORDING TO EDUCATIONAL QUALIFICATIONS: SCHOOLING MODEL.

Income	M.B., B.S.	M.Sc. (Sc.)	M.Sc. (Agrl.)	M.V.Sc.	B.E.	M.S./ M.D.	Ph.D. (Engg.)	Ph.D. (Vet.)	Ph.D. (Sc.)	M.E.
(1) Y	296.72	426.54	447.68	577.63	592.63	695.22	696.00	850.95	855.60	865.81
(2) lnY	2.7916	4.4115	4.7509	5.5687	4.5383	4.6918	4.6895	5.8836	5.5416	5.3913

From the table 4.2, it seems that the schooling leading to bachelor's degree in medicine has the least return whereas the schooling leading to master's degree in engineering has the highest return. Education leading to master's degree in medicine has more or less the same return as Ph.D. in engineering, the estimated monthly earnings being Rs.695 and Rs.696 respectively. The t-ratio (table 4.1) for M.S./M.D. is 0.55.

Within the same subject category, earnings increase with education level, the exception being Ph.D. in engineering. Normally one should expect that Ph.D.'s in engineering should earn more than master's degree holders in engineering. This exception may pehaps be due to small number of observations; and perhaps they are concentrated in teaching and research.

(b) Human Capital Model

Previous studies, when schooling model was fitted, performed poorly. The poor performance lead some scholars like Jenks to look for some other explanation of income variation.[23] They put their faith in chance or luck. Becker, Mincer and others who believed in human capital, started refining the schooling model and arrived at the human capital model. Human capital model differs from schooling model in one important respect: schooling model assumes that investment in human capital stops the moment the individual leaves

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23 Christopher Jenks (1972). Inequality: A reassessment of the Effect of the Family and Schooling in America.

schooling whereas human capital model assumes that investment continues even after the schooling is over; investment in human capital takes place till late in working life.

Researches are being carried about the lifetime pattern of human capital investment: how much investment is made immediately after schooling, how this amount changes when the individual gets older, and when investment stops. Differences of opinion exist regarding the life-cycle pattern of investment in human capital. However, all agree that investment will be heavier at younger ages and smaller and smaller when individuals become older. This is due to: (1) "with finite working lifetime, later investments cannot produce returns for as long as earlier ones and therefore, usually have smaller total benefits; (2) later investments are less profitable than earlier ones because the present value of net benefits (or profits) is reduced merely by postponing them";[24] and (3) human capital enters as an input along with time (of an investor) in the production of additional capital; with accumulated human capital, the value of time increases and thus the investment costs increase with age. This reduces the present value of later benefits.[25]

There is no data on post-school investment in human capital. What is available is age, reported earnings and

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24 Gary S. Becker (1974). Human Capital, Second Edition, pp. 99 - 100.

25 Ibid.

TABLE 4.3

REGRESSION COEFFICIENTS AND T-RATIOS: HUMAN CAPITAL MODEL

Income	Constant Term	Ph.D. (Sc.)	M.Sc. (Sc.)	M.Sc. (Agrl.)	M.B.,B.S.	M.S./M.D.
(3) Y	480.17	51.77	-208.96	-219.11	-116.55	34.69
		(2.8034)	(14.5424)	(13.8951)	(8.9125)	(2.8422)
(4) lnY	5.4912	0.2547	0.3274	-0.1901	-0.4347	0.0088
		(3.6878)	(6.0924)	(3.2235)	(8.8879)	(0.1934)

M.V.Sc.	Ph.D. (Vet.)	B.E.	M.E.	Exp.	$(Exp.)^2$	R^2/S E E	N
-236.39	23.06	-28.24	153.65	43.27	-0.6781	0.30481/ 564.6	25188
(8.7174)	(0.3568)	(2.2721)	(12.3525)	(53-2373)	(64.8471)		
0.0686	0.5313	-0.0534	0.2416	0.0731	0.0020	0.54215/ 2.112	25118
(0.6765)	(2.2006)	(1.1483)	(5.1931)	(24.1957)	(50.3925)		

TABLE 4.4

AVERAGE ESTIMATED MONTHLY EARNINGS (Rs.) ACCORDING TO EDUCATIONAL QUALIFICATIONS: HUMAN CAPITAL MODEL

Income	M.V.Sc.	M.Sc. (Agrl.)	M.Sc. (Sc.)	M.B., B.S.	B.E.	Ph.D. (Engg.)	Ph.D. (Vet.)	M.S./ M.D.	Ph.D. (Sc.	M.E.
(3) $\underline{Y}$	286.37	303.95	313.60	406.21	494.52	522.76	545.79	557.45	574.53	676.41

education. The age-earnings profiles are concave from below
(age side) and the slope is steeper at young age than at old
age. Assuming that individuals try to maximize the present
value of lifetime earnings, Becker and Mincer have formulated
human capital model and the model is econometrically specified
as:

$$\ln y = a_0 + a_1 S + a_2 \text{Exp.} + a_3(\text{Exp.})^2$$

where y = earnings, S = schooling and Exp. = experience. This
is the same as equation (4) mentioned earlier in this chapter.

The results of the regression analysis using both 'y' and
'ln y' are presented in table 4.3.

The explanatory power of the model has increased as R^2
has increased to 30% in non-log form and 54% in log form.
In the schooling model R^2 was a little above 7%. The variables
experience and experience square are significant as evident
from the t-ratios and the signs of the coefficients are as
expected; experience has a positive sign and experience square
has a negative sign. That is, earnings increases with expe-
rience, but it does so with a decreasing rate/amount.

When experience enters into the equation, people with
M.S./M.D., M.V.Sc., B.E. earn not significantly different
from Ph.D.(Engg.). This is based on t-ratios of table 4.3.
In the non-log form Ph.D.(Vet.) earn more or less the same
as the Ph.D.(Engg.) as the t-ratio is insignificant.

Using the results of equation (3), the average monthly
earnings are estimated and given in table 4.4. Some of the

salient features are given below:

Education and Income

It can be seen from the table 4.4 that M.E.'s earn the highest as in the case of schooling model but M.V.Sc.'s appear to be earning the lowest income here. Persons with qualifications like Ph.D.(Vet.), M.S./M.D., Ph.D.(Science) and M.E. progressively earn more than those with Ph.D.(Engg.); persons with any other qualifications get lesser income.

Experience and Income

Years of experience add to the earnings of individuals, but this effect is found to decline as years of experience increase. Considering the table 4.3, abstracting from other variables, the relationship between earnings (y) and experience (x) is given as:

$$y = 43.27x - 0.68x^2$$

The maximum return to years of experience is obtained at 32 years.[26]

(c) Expanded Human Capital Model

In this model additional explanatory variables are introduced; these additional variables are occupation, sex and sector. In many of the existing studies family background,

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26 Thus y is a maximum at x = 32, as obtained by standard procedures:

$$\frac{dy}{dx} = 43.27 - 1.36x, \text{ when } \frac{dy}{dx} = 0 \text{ and } x = 31.81.$$

TABLE 4.5

REGRESSION COEFFICIENTS: EXPANDED HUMAN CAPITAL MODEL

Income		Constant Term	Ph.D. (Sc.)	M.Sc.	M.Sc. (Agrl.)	M.B.,B.S.
(5)	Y	-178.05	43.99	-203.91	-248.60	-56.14
			(2.5)	(14.93)	(16.68)	(4.59)
(6)	lnY	0.85065	-.0141	-.3451	-.2567	-.0287
			(.2612)	(8.21)	(5.5962)	(.7604)
(7)	Y	-180.65	58.5	-198.19	-224.41	-60.1
			(3.31)	(14.51)	(14.76)	(4.91)
(8)	lnY	0.86218	-.0784	-.3704	-.3638	-.0111
			(1.4416)	(8.8213)	(7.7834)	(0.2954)

(Figures in parenthesis show t-ratios)

TABLE 4.5 (Contd.)

	M.S./M.D.	M.V.Sc.	Ph.D. (Vet.)	B.E.	M.E.
(5)	47.04	-259.29	-25.98	-65.32	115.45
	(4.15)	(10.27)	(0.43)	(5.3)	(9.73)
(6)	-.0383	-.1761	-.0075	-.061	.1124
	(1.0959)	(2.2665)	(0.0409)	(1.6081)	(3.0766)
(7)	38.45	-267.78	-14.54	-48.85	129.13
	(3.38)	(10.61)	(.24)	(3.9)	(10.77)
(8)	-.0003	-.1385	-.0582	-.1339	.0518
	(.0072)	(1.7855)	(.3159)	(3.4868)	(1.4065)

TABLE 4.5 (Contd.)

REGRESSION COEFFICIENTS: EXPANDED HUMAN CAPITAL MODEL

	Sex	Experience	$(Exp.)^2$	Sector
(5)	47.74	40.21	-.53	
	(4.30)	(52.61)	(53.23)	
(6)	0.1607	.0642	-.0011	
	(4.7041)	(27.2795)	(35.7040)	
(7)	50.10	40.48	-.54	-66.996
	(4.5182)	(52.9767)	(53.6482)	(7.8074)
(8)	.1502	.0630	.0011	.2966
	(4.4065)	(26.8015)	(35.1060)	(11.2447)

TABLE 4.5 (Contd.)

REGRESSION COEFFICIENTS : EXPANDED HUMAN CAPITAL MODEL

	OCCUPATION				
	Teaching/ Research/ Teaching & Research	Design & Developt.	Constrn.	Prodn.	Admin.
(5)	637.87	801.00	596.86	930.45	953.48
	(49.25)	(26.85)	(27.64)	(43.20)	(51.07)
(6)	4.8647	5.0209	4.7926	5.1700	4.8988
	(123.1864)	(54.6738)	(72.1026)	(77.9774)	(85.2344)
(7)	664.95	834.15	638.69	942.38	981.20
	(49.27)	(27.71)	(28.74)	(43.70)	(51.69)
(8)	4.7182	4.8741	4.6074	5.1172	4.7760
	(113.721)	(52.6755)	(67.4385)	(77.1790)	(81.8352)

TABLE 4.5 (Contd.)

REGRESSION COEFFICIENTS: EXPANDED HUMAN CAPITAL MODEL

	OCCUPATION				R^2/S E E	N
	Clerical	Sales	Profl.	Others		
(5)	448.11	1025.59	662.82	701.91	0.40365/ 523	25186
	(7.41)	(26.91)	(51.33)	(14.35)		
(6)	4.075	4.9237	4.6751	4.4028	0.734/ 1.610	-do-
	(21.8843)	(41.9688)	(121.2696)	(29.2401)		
(7)	500.34	1026.16	662.41	729.33	.40509/ 522.4	-do-
	(8.23).	(26.97)	(51.92)	(14.89)		
(8)	3.8437	4.9212	4.5884	4.2814	.73533/ 1.606	-do-
	(20.5680)	(42.0518)	(116.9855)	(28.4313)		

race and geographical area have been introduced. This model is very popular among sociologists and many economists also use this model, though such a model has been criticized as "empirical ad hocism" by Mincer. One may see at least one advantage of using this model: controlling education, experience, etc. the influence of occupation on earnings could be estimated.

The results of regression equations (5) to (8) are given in table 4.5.

The coefficient of determination increases from 30% to 40% in non-log form and from 54% to 74% in log form. Addition of three more variables - occupation, sex and sector - has improved the fit by 10% to 20% depending upon the form of the equation. Judging the performance of the model by means of R^2, one may say that it is doing very well because none of the available studies have reported R^2 as high as the present study. Klevermarken has reported R^2 more than 90%; however, his model is quite different from this and is based on cohort data.[27]

It is tempting to calculate the individual contribution of the variables towards the explanation of earnings variance with the help of incremental R^2. However, this temptation is controlled, because increase in R^2 cannot be used to do

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27 Andres Klevermarken and John M. Quigley (1976). "Age, Experience, Earnings and Investment in Human Capital", Journal of Political Economy, Vol.84, No.1, pp. 47 - 72.

TABLE 4.6

AVERAGE ESTIMATED INCOME OF MALES IN THE PUBLIC SECTOR
FOR DIFFERENT OCCUPATION AND YEARS OF EXPERIENCE.

	Years of Exp.	OCCUPATION								
		Clerical	Constrn.	Teaching/ Research/ Teaching & Research	Profe- ssional	Design/ Develop- ment	Prodn.	Admin.	Sales	Others
M.B., B.S.	0	242.694	381.094	407.3040	404.764	576.504	684.734	723.554	768.514	471.684
	15	848.27	986.62	1012.88	1010.34	1182.08	1290.31	1329.13	1374.09	1077.26
	30	1453.85	1592.70	1618.46	1615.92	1787.66	1895.89	1934.71	1979.67	1682.84
M.Sc; (Sc.)	0	104.60	242.95	269.21	266.67	438.41	546.64	585.41	630.42	333.59
	15	710.18	848.53	874.79	872.25	1043.99	1152.22	1191.04	1236.00	939.17
	30	1315.76	1454.11	1480.37	1477.83	1649.57	1757.80	1796.62	1841.58	1544.75
M.Sc. (Agrl.)	0	78.39	216.74	243.00	240.46	412.20	520.43	595.25	604.21	307.38
	15	683.97	822.32	848.58	846.04	1017.78	1126.01	1164.83	1209.79	912.96
	30	1289.55	1427.90	1454.16	1451.62	1623.36	1731.59	1770.41	1815.37	1518.54

TABLE 4.6 (Contd.)

AVERAGE ESTIMATED INCOME OF MALES IN THE PUBLIC SECTOR
FOR DIFFERENT OCCUPATION AND YEARS OF EXPERIENCE

	Years of Exp.	OCCUPATION								
		Clerical	Constrn.	Teaching/ Research/ Teaching & Research	Profe- ssional	Design/ Develop- ment	Prodn.	Admin.	Sales	Others
M.V.Sc.	0	35.11	173.46	199.72	197.18	368.92	477.15	515.97	560.93	264.10
	15	640.69	779.04	805.30	802.76	974.50	1082.73	1121.55	1166.51	869.68
	30	1246.57	1384.62	1410.88	1408.34	1580.08	1688.31	1727.13	1772.89	1475.26
B.E.	0	253.94	392.29	418.55	416.01	587.75	695.98	734.80	779.76	482.93
	15	859.52	997.87	1024.13	1021.59	1193.33	1301.56	1340.38	1385.34	1088.51
	30	1465.10	1603.45	1629.71	1627.17	1798.91	1907.14	1945.96	1990.92	1694.09
M.S./M.D.	0	321.24	479.59	505.85	503.31	675.05	783.28	822.10	867.06	570.23
	15	926.82	1085.17	1111.43	1108.89	1280.63	1388.86	1427.68	1472.64	1175.81
	30	1532.40	1690.75	1717.01	1714.47	1886.21	1994.44	2033.26	2078.22	1781.39

TABLE 4.6 (Contd.)

AVERAGE ESTIMATED INCOME OF MALES IN THE PUBLIC SECTOR
FOR DIFFERENT OCCUPATION AND YEARS OF EXPERIENCE

	Years of Exp.	OCCUPATION								
		Clerical	Constrn.	Teaching/ Research/ Teaching & Research	Profe-ssional	Design/ Develop-ment	Prodn.	Admin.	Sales	Others
Ph.D.(Engg)	0	302.79	441.14	467.40	464.86	636.60	744.83	783.65	828.61	531.78
	15	908.37	1046.72	1072.98	1070.44	1242.18	1350.41	1389.23	1434.19	1137.36
	30	1513.95	1652.30	1678.56	1676.02	1847.76	1955.99	1994.81	2039.77	1742.44
Ph.D.(Vet)	0	288.25	426.60	452.86	450.32	622.06	730.29	769.11	814.07	517.24
	15	893.83	1032.18	1058.44	1055.90	1227.64	1335.87	1374.69	1419.65	1122.82
	30	1499.21	1637.76	1664.02	1661.48	1833.22	1941.45	1980.27	2025.23	1728.40
Ph.D.	0	361.29	499.64	525.90	523.36	695.10	803.33	842.15	887.11	590.28
	15	966.87	1105.22	1131.48	1128.94	1300.68	1408.91	1448.09	1492.69	1195.86
	30	1572.45	1710.80	1737.06	1734.52	1906.26	2014.49	2053.67	2098.27	1801.44
M.E.	0	431.92	570.27	596.53	593.994	765.73	873.96	912.78	957.74	660.91
	15	1036.80	1175.85	1202.11	1199.52	1371.31	1479.54	1518.36	1563.32	1266.49
	30	1642.38	1781.43	1807.69	1805.10	1976.89	2085.12	2123.94	21.6890	1872.07

TABLE 4.7

AVERAGE ESTIMATED LOG INCOME OF MALES IN THE
PUBLIC SECTOR FOR DIFFERENT OCCUPATION AND
YEARS OF EXPERIENCE

Education	Years of Exp.	OCCUPATION								
		Clerical	Constrn.	Teaching/ Research/ Teaching & Research	Profe- ssional	Design/ Develop- ment	Prodn.	Admin.	Sales	Others
M.B., B.S.	0	4.5484	5.3121	5.4229	5.2931	5.5788	5.8219	5.4807	5.6259	4.9928
	15	5.4604	6.2241	6.3349	6.2051	6.4908	6.7339	6.3927	6.5379	5.9048
	30	6.3724	7.1361	7.2469	7.1171	7.4028	7.6459	7.3047	7.4499	6.8168
M.Sc. (Sc.)	0	4.1891	4.9528	5.0636	4.9338	5.2195	5.4626	5.1214	5.2666	4.6268
	15	5.1011	5.8648	5.9756	5.8458	6.1315	6.3746	6.0334	6.1780	5.5388
	30	6.0131	6.7768	6.8876	6.7578	7.0435	7.2866	6.9454	7.090	6.4508
M.Sc. (Agrl.)	0	4.1957	4.9594	5.0702	4.9404	5.2261	5.4692	5.1280	5.2732	4.6334
	15	5.1077	5.8714	5.9822	5.8574	6.1381	6.3812	6.040	6.1852	5.5454
	30	6.0197	6.7834	6.8942	6.7644	7.0501	7.2932	6.952	7.0972	6.4574

TABLE 4.7 (Contd.

AVERAGE ESTIMATED LOG INCOME OF MALES IN THE
PUBLIC SECTOR FOR DIFFERENT OCCUPATION AND
YEARS OF EXPERIENCE

Education	Years of Exp.	OCCUPATION								
		Clerical	Constrn.	Teaching/ Research/ Teaching& Research	Profe- ssional	Design/ Develop- ment	Prodn.	Admin.	Sales	Others
M.V.Sc.	0	4.4210	5.1847	5.2955	5.1567	5.4514	5.6945	5.3533	5.4985	4.8587
	15	5.333	6.0967	6.2075	6.0777	6.3634	6.6065	5.2653	6.4105	5.7707
	30	6.245	7.0087	7.1195	6.9897	7.2754	7.5185	7.1773	7.3225	6.6827
B.E.	0	4.4256	5.1893	5.3001	5.1703	5.4560	5.6991	5.3579	5.5031	4.8633
	15	5.3376	6.1013	6.2121	6.0823	6.368	6.6111	6.2699	6.4151	5.7753
	30	6.2496	7.0133	7.1241	6.9943	7.280	7.5231	7.1819	7.3271	6.6873
M.S./M.D.	0	4.5592	5.3229	5.4337	5.3039	5.5896	5.8327	5.4915	5.6367	4.9969
	15	5.4712	6.241	6.3457	6.2159	6.5016	6.7447	6.4035	6.5487	5.9089
	30	6.3832	7.153	7.2577	7.1279	7.4136	7.6567	7.3155	7.4607	6.8209

	Years of Exp.	OCCUPATION								
		Clerical	Constrn.	Teaching/ Research Teaching & Research	Profe-ssional	Design/ Develop-ment	Prodn.	Admin.	Sales	Others
Ph.D. (Engg)	0	4.5595	5.3232	5.4340	5.3042	5.5899	5.8330	5.4918	5.6370	4.9972
	15	5.4715	6.2352	6.346	6.2162	6.5019	6.745	6.4038	6.549	5.9092
	30	6.3835	7.1472	7.258	7.1282	7.4139	7.657	7.3158	7.461	6.8212
Ph.D. (Vet)	0	4.5013	5.2650	5.3758	5.2460	5.5317	5.7748	5.4336	5.5788	4.9390
	15	5.4133	6.177	6.2878	6.158	6.4437	6.6868	6.3456	6.700	5.851
	30	6.3253	7.089	7.1998	7.070	7.3557	7.5988	7.2576	7.612	6.763
Ph.D. (Sc)	0	4.4811	5.2448	5.3556	5.2258	5.5115	5.7546	5.4134	5.5586	4.9188
	15	5.3931	6.1568	6.2676	6.1378	6.4235	6.6666	6.3254	6.498	5.83
	30	6.3051	7.0688	7.1796	7.0498	7.3355	7.5878	7.2374	7.4100	6.74
M.E.	0	4.6113	5.3750	5.4858	5.3560	5.6417	5.8848	5.5436	5.6888	5.0490
	15	5.5233	6.2870	6.3978	6.2680	6.5537	6.7968	6.4556	6.600	5.9610
	30	6.4353	7.199	7.3098	7.18	7.4657	7.7088	7.3676	7.512	6.8730

this exercise. Individual contribution to R^2 depends upon the order in which the variables are introduced.

Using the results of equations (7) and (8), the expected monthly earnings are estimated for individuals with given education, sex, experience, sector and occupation. They are presented in table 4.6 and 4.7.[28]

The table 4.6 is prepared as follows: for example, the estimated monthly income of those males with M.Sc.(Sc.) in clerical occupation and in public sector with no experience would be

$$y = -\ \underset{a_0}{180.65} + \underset{Ed_i}{(-198.19)} + \underset{sex}{50.10} +$$

$$\underset{occ.}{500.34} + \underset{pub;\ sec.}{(-66.96)}$$

$$= Rs.104.66$$

In the private sector the income would be

$$y = -\ 180.65 + (-198.19) + 50.10 + 500.34$$

$$= Rs.176.60$$

Education, Sector and Income

It can be noticed that for all educational qualification and occupations, public sector appears to be paying

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28 In the construction of the tables 4.6 to 4.8 there arises a limitation due to the fact that the regression coefficient for sex remains unchanged irrespective of educational qualifications, occupations and years of experience. In other words, the sex coefficient remains invariant over time. Such a limitation arises due to the regression equation employed here where all variables are introduced in the additive form. No attempt has been made to capture the possible interaction effects between the explanatory variables.

lower than the private sector.

Education, Occupation and Income

Given any particular educational qualification it is
found that design, production, administration and sales
occupations offer much higher pay compared to clerical,
construction, teaching and professional occupations. The
occupations have been arranged in two tables in the increa-
sing order of income received and hence the differences are
observable very clearly.

The table 4.6 reveals that the same individual with
any particular educational qualification, if enters different
occupations earns different income, the highest being in
'sales' and the least in 'clerical' occupation.

In any occupation, it is seen that M.E.'s, Ph.D.'s
(Science, Veterinary Science and Engineering) and M.S./M.D.'s
receive much higher income at the start as well as with more
experience compared to B.E.'s, M.V.Sc.'s, M.Sc.'s (Agricul-
ture and Science) and M.B.B.S.'s. While M.E.'s receive the
highest pay irrespective of occupation at entry, M.Sc. (Sc.),
M.Sc.(Agriculture), M.V.Sc.'s form the three lowest-paid
educational qualifications, particularly at entry to any
occupation, M.V.Sc.'s being paid the least.

Education, Occupation and Discrimination

In table 4.8, using the results of the non-log form
equation (5) of the expanded human capital model, the

TABLE 4.8

ESTIMATED MONTHLY INCOME FOR MALES AND FEMALES ACCORDING
TO EDUCATION, OCCUPATION AND FIVE YEARS EXPERIENCE

Education	OCCUPATION							
	Clerical		Constrn.		Teaching/ Research/ Teaching & Research		Professional	
	M	F	M	F	M	F	M	F
M.B.,B.S.	457.41	(-47.74)	608.16	(-47.74)	649.17	(-47.74)	654.12	(-47.74)
M.Sc.(Sc.)	311.64	-do-	460.39	-do-	501.35	-do-	506.35	-do-
M.Sc.(Agrl.)	266.95	-do-	415.70	-do-	456.71	-do-	461.66	-do-
M.V.Sc.	256.26	-do-	405.31	-do-	446.02	-do-	450.97	-do-
B.E.	450.23	-do-	598.98	-do-	639.99	-do-	644.94	-do-
M.S./M.D.	560.59	-do-	709.34	-do-	750.35	-do-	1099.76	-do-
Ph.D.(Engg.)	513.55	-do-	662.30	-do-	703.51	-do-	708.26	-do-
Ph.D.(Vet.)	487.54	-do-	636.32	-do-	677.33	-do-	682.28	-do-
Ph.D.(Sc.)	557.54	-do-	706.29	-do-	747.30	-do-	752.25	-do-
M.E.	629.27	-do-	**777.75**	-do-	818.76	-do-	823.71	-do-

TABLE 4.8 (Contd.)

ESTIMATED MONTHLY INCOME FOR MALES AND FEMALES ACCORDING TO EDUCATION, OCCUPATION AND FIVE YEARS EXPERIENCE

Education	OCCUPATION									
	Design/ Development		Prodn.		Admin.		Sales		Others	
	M	F	M	F	M	F	M	F	M	F
M.B.,B.S.	812.30	(-47.74)	962.35	(-47.74)	964.78	(-47.74)	1034.89	(-47.74)	711.21	(-47.74)
M.Sc.(Sc.)	673.53	-do-	793.98	-do-	817.01	-do-	887.12	-do-	563.44	-do-
M.Sc.(Agrl.)	619.84	-do-	749.29	-do-	772.32	-do-	842.43	-do-	518.75	-do-
M.V.Sc.	609.15	-do-	738.60	-do-	761.63	-do-	831.74	-do-	508.06	-do-
B.E.	803.12	-do-	932.57	-do-	955.60	-do-	1025.01	-do-	702.03	-do-
M.S./M.D.	913.48	-do-	1042.93	-do-	1065.96	-do-	1138.07	-do-	814.39	-do-
Ph.D.(Engg.)	866.44	-do-	995.89	-do-	1018.92	-do-	1091.03	-do-	167.35	-do-
Ph.D.(Vet.)	840.46	-do-	969.91	-do-	992.94	-do-	1065.05	-do-	141.37	-do-
Ph.D.(Sc.)	910.43	-do-	1039.88	-do-	1062.91	-do-	1135.02	-do-	811.34	-do-
M.E.	981.89	-do-	1111.34	-do-	1134.37	-do-	1206.48	-do-	882.80	-do-

TABLE 4.9
COEFFICIENTS OF DISCRIMINATION 'd' (delta) ACCORDING TO OCCUPATION, EDUCATIONAL QUALIFICATION AND FIVE YEARS EXPERIENCE (%)

Education	OCCUPATION								
	Clerical	Constrn.	Teaching/ Research/ Teaching& Research	Profe-ssional	Design/ Develop-ment	Prodn.	Admin.	Sales	Others
M.B.,B.S.	11.6	8.5	7.9	7.8	6.2	5.3	5.2	4.8	7.1
M.Sc.(Sc.)	18.0	11.5	10.5	10.4	7.6	6.3	6.2	5.6	9.2
M.Sc.(Agrl)	21.7	12.9	11.6	11.5	8.3	6.8	6.5	6.0	10.1
M.V.Sc:	22.8	13.3	11.9	11.8	8.5	7.4	6.6	6.0	10.3
B.E.	11.8	8.6	8.0	7.9	6.3	5.3	5.2	4.8	7.2
M.S./M.D.	9.3	7.2	6.7	4.5	5.5	4.7	4.6	4.3	6.2
Ph.D.(Engg.)	10.2	7.7	7.2	7.2	5.8	5.0	4.9	4.5	6.6
Ph.D.(Vet.)	10.8	8.1	7.5	7.5	6.0	5.1	5.0	2.4	6.8
Ph.D.(Sc.)	9.3	7.2	6.8	6.7	5.5	4.8	4.7	4.3	6.2
M.E.	8.2	6.5	6.1	6.1	5.1	4.4	4.3	4.1	5.7

estimated earnings for males and females are presented for
5 years experience according to different educational quali-
fications and occupations. Using the table 4.8 discrimination
coefficient (d) is calculated as:

$$d = \frac{\text{average male earnings} - \text{average female earnings}}{\text{average female earnings}}$$

and expressed in percentages.

For example, from table 4.9 it can be noted that an
M.Sc.(Science) male in clerical occupation, earns 18 per cent
more than a female with the same qualification and having the
same occupation; similarly a male M.B.B.S. in the teaching
profession earns 7.9% more than his female counterpart and
so on.

A few remarks can be made regarding sex discrimination,
on close observation of table 4.9; the sample contains consi-
derable female workers with M.Sc.(Sc.) and M.B.B.S., in other
education categories, female workers are very few.

On the whole irrespective of educational qualifications,
discrimination is less among design, production, administration
and sales-occupations compared to clerical, construction,
teaching and professional occupation, the only exception being
M.V.Sc. whose coefficient of discrimination remains uniformly
high in all occupations. One possible implication of this
would be that in veterinary science, the dominance of males
continues to exist or to put it in other words the entry here
for females is largely restricted compared to men.

Further, for all educational qualifications, the coeffi-
cient of discrimination is highest on the 'clerical' occupation

and the lowest among 'sales' occupation.

Lastly, it may be noted that the discrimination is strikingly high among those with M.Sc.(Science), M.Sc.(Agriculture) and M.V.Sc. qualifications irrespective of occupations they enter.

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