PART III

STOCK AND DISTRIBUTION OF HUMAN CAPITAL

Chapter V

STOCK OF HUMAN CAPITAL : (EDUCATIONAL CAPITAL)

Introduction

In this chapter we present in detail estimates of the stock of human capital formed through the investment in education. We have estimated the stock of human capital formed through the expenditure on health in the next chapter. So the stock of human capital estimated can be conveniently be classified into (i) stock of educational capital and (ii) stock of health capital.

This chapter is divided into the following sections. Section I is devoted to the procedure followed in estimating the stock of educational capital and its typology. Section II is concerned with the actual estimates of the nominal stock of educational capital - both adjusted and unadjusted - embodied in population and labour force. Section III examines the adjusted and unadjusted real stock of human capital embodied in population and labour force. In the Section IV, main trends in human capital/output and physical capital/output ratios are compared. Also trends in per capita human capital and per capita physical capital are examined. In the last section i.e. Section V, important findings are given.

I

Stock of Human Capital (Educational Capital)

The procedure followed in estimating the stock of human (educational) capital is explained below. Firstly, we have calculated the average annual factor cost of education by level of education for the years, 1950-51, 1960-61, 1970-71 and 1979-80. Secondly, to work out the factor cost of education for the completed level of schooling (i.e. actual educational attainment of population and labour force), the average annual factor cost of education is multiplied by the number of years of schooling completed e.g., at the elementary level of education, the corresponding annual cost is multiplied by eight which is equivalent to eight years of schooling acquired. Similarly, at the secondary level of education a person who has completed secondary education, possesses overall eleven years of schooling - extra three years of schooling. So the average annual factor cost at the secondary level is multiplied by three which corresponds to three additional years of schooling. In the same way, at the University/ College level, the duration which is normally four years, the average annual factor cost of higher education is multiplied by the figure of four which amounts to four extra years of schooling attained by the persons in the labour force and population.

Thus, a person with eight years of schooling has invested in education the amount equivalent to 8 years of factor cost of elementary education; a person with eleven years of schooling, in addition to the investment equivalent to 8 years of factor cost of elementary education has invested the amount required for the completion of 3 years of secondary education and a person with 15 year of schooling in addition to total investment both at the elementary and secondary levels of education has invested amount needed for the completion of four years of college education.

Thirdly, the factor cost of education per person for each completed level of schooling so estimated, then, is multiplied by the number of persons in population and labour force with elementary, secondary and higher levels of education for the selected bench mark years to derive the stock of educational capital.

The stock of educational capital estimated in this manner is crude one, i.e. without making allowance for (a) Wastage and Stagnation. (b) Unemployment of educated persons (c) Brain drain - the migration of highly qualified manpower - which tentamounts to the reverse transfer of technology.

The crude stock is adjusted for each one of the factors mentioned above to arrive at the adjusted stock figures.

4 A significant part of the increase in nominal value of the stock of educational capital is fictious because of price rise. So, the stock is expressed in real terms also (at 1960-61 prices).

The sex-wise, caste-wise and region-wise educational capital stock is similarly estimated for the analysis of the distribution of this stock apart from its growth.

Typology of the Stock of Human Capital

We make an attempt to estimate the different types of stock of human capital in this chapter.

(1) Unadjusted nominal stock of human capital.

(2) Adjusted nominal stock of human capital (both (1) and (2) embodied in population and labour force by their actual educational attainment.

(3) Unadjusted real stock of human capital (1960-61=100) constant prices.

(4) Adjusted real stock of human capital.
Again both (3) and (4) embodied in population and labour force by their actual educational attainment.

(5) Unadjusted nominal and real stock of human capital (per capita) by sex, region and caste.

(6) Per capita, nominal and real stock of human capital.

II

Unadjusted Stock of Human Capital (Educational Capital)

Stock of human capital is predominently the stock formed through investment in education. So our measurement of the stock may be called human capital stock or the stock of educational capital. We have estimated seperately the stock for population as well as for the labour force by their educational attainment for four bench mark years - 1950-51, 1960-61, 1970-71 and 1979-80. (Table 5.I)

The unadjusted stock of human capital embodied in population gives a phenomenal rise in money terms. It went up from Rs. 5324 crores in 1950-51 to Rs. 12484 crores in 1960-61 giving an increase of around 14 per cent per annum. As against this during 1960s and 1970s it increased from Rs. 50862 crores to Rs.212844 crores giving a much higher annual rate of growth of 30.4 per cent and 35 per cent respectively.

The break-up of the stock of human capital by the educational attainment of persons presents an interesting reading. The proportion of human capital embodied in persons with elementary level of education has steadily declined over time, from 61 per cent in 1950-51 to 45 per cent in 1979-80. At the high/higher secondary level of education the corresponding proportion has gone up consistently from 13 per cent in 1950-51 to 20 per cent

Table : 5.I

Unadjusted Nominal Stock of Human Capital

By Level of Education
(Population)

Year	Elementary (8 years of education)			Secondary (11+ years of education)+			Higher (15+ years of education			Total stock
	Population (Million)	Average Factor Cost (Rs.)	Stock Rs. crores (2x3)	Population (Million)	Average Factor Cost (Rs.)	Stock Rs. crores (5x6)	Population (Million)	Average Factor Cost (Rs.)	Stock Rs. crores (8x9)	Rs. crores 4+7+10
1	2	3	4	5	6	7	8	9	10	11
1950-51	18.12	1782	3229 (60.6)	2.15	3162	680 (12.8)	1.64	8580	1407 (26.4)	5324 (100.0)
1960-61	30.84	2257	6961 (55.7)	5.73	4395	2518 (20.2)	2.5	11924	2981 (23.8)	12488 (100.0)
1970-71	86.74	3389	29396 (57.8)	18.6	8208	15267 (30.0)	3.3	18636	6150 (12.1)	50862 (100.0)
1979-80	118.32	8138	96289 (45.2)	39.4	19515	76889 (36.1)	9.5	41648	39566 (18.6)	212844 (100.0)

Note : Total Stock of Human capital does not add up to 100.0 as it also includes the implicit cost (i.e., interest and depriciation) of educational buildings. However, it has hardly accounted for even half a per cent of the total stock.

\+ This includes persons who have completed 12 or 13 years of education, i.e., two years of college education also.

(Figures in paranthesis are percentages.)

in 1960-61 and further to 30 per cent and 36 per cent respectively in 1970-71 and 1979-80. At the higher level (University/College) of education we do not get such a consistent trend in the share of human capital. During the decade of 1950's the proportion came down to 24 per cent in 1960-61 from 26 per cent in 1950-51. It further reduced to 12 per cent in 1970-71 but went up again to around 19 per cent in 1979-80. From this trend it can be observed that the proportion of population embodying the stock of human capital on average with higher levels of education has increased, whereas that of elementary level of education has fallen. This is a qualitative change in the stock of human capital built up during the plan period. The skill level of population has certainly improved during the planning in India.

This can be accounted for by the two major changes :

(i) The proportion of population with secondary and higher education has gone up during the plan period; whereas the proportion with elementary schooling has declined.

(ii) The cost structure of education has also undergone a change - the two higher levels of education have turned out to be more costly. Taking cost of elementary education as base, in 1950-51, the cost ratios were 1:1.8 and 1:4.8 for Secondary and higher levels of education respectively. In 1979-80, on the

other hand, the said ratios were 1:2.4 and 1:5.1 respectively.

Estimates of the unadjusted Stock of Human Capital Embodied in The Labour Force

As is the case with total stock of human capital embodied in population, in case of the stock of active human capital embodied in the labour force also the share of persons with elementary education has declined, whereas, that of persons with secondary/higher secondary education has increased, giving a more consistent trend. In 1950-51, the said share was 18 per cent. It has stepped up to 28 per cent in 1960-61, which has further slowly risen to 31 and 37 per cent respectively in 1970-71 and 1979-80. As against this, the proportion of active stock of human capital of 24 per cent shared by persons with higher education in 1979-80 was higher than that of the previous two decades (i.e. 1960's and 1970's). The combined share in the stock of active human capital possessed by workers with secondary and higher education of 44 per cent in 1950-51 was as high as 61 per cent in 1979-80. (See Table 5.II).

It is the active stock of human capital which is more relevant since it contributes to the growth of the economy. This can be reflected in labour force participation rates. Labour force participation rates of educated persons are given in Table 5.III. Participation rate of educated labour

Table : 5.II

Unadjusted Nominal Stock of Human Capital by Level of Education

(Labour Force)

(Rs. in crores)

Year	Elementary (8 years of education)			Secondary (11+ years of education)			Higher (15+ years of education)			Total stock Rs. crores (4+7+10)
	Labour Force (Million)	Average Factor Cost (Rs.)	Stock Rs. crores (2x3)	Labour Force (Million)	Average Factor Cost	Stock Rs. crores (5x6)	Labour Force (Million)	Average Factor Cost (Rs.)	Stock Rs. crores (8x9)	
1	2	3	4	5	6	7	8	9	10	11
1950-51	8.08	1782	1440 (56.4)	1.48	3162	468 (18.35)	0.74	8580	635 (24.89)	2551 (100.0)
1960-61	13.75	2257	3103 (50.0)	3.94	4395	1732 (28.0)	1.13	11924	1347 (21.7)	6206 (100.0)
1970-71	37.08	3389	12566 (49.0)	9.81	8208	8052 (31.42)	2.66	18636	4957 (19.34)	25264 (100.0)
1979-80	50.6	8138	41178 (38.4)	20.51	19515	40026 (37.4)	6.2	41648	25822 (24.0)	107126 (100.0)

+ For the year 1950-51 the break up of Labour force with level of education is not available. So we have assumed that the same proportion of educated labour force to educated population is also in 1950-51 as it is for the year 1960-61.

Figures in paranthesis are per centages.

force is higher than that of all workers. In 1960-61 it was 13 per cent higher whereas in 1970-71 and 1979-80 the former was higher by one third. This is understandable in view of the investment that has gone into their schooling.

The participation rates vary by level of schooling. At both the higher levels of schooling it is much above the rate at the elementary level. It is highest at the University/College level. The labour force participation rate of 65.2 per cent in 1979-80 for the graduates and above compares favourably with that of 69 per cent in 1977-78 based on NSS data.[1] The corresponding proportion for 1980-81 estimated by CSIR is 88 per cent.[2] Labour force participation rate of matriculates of 52 per cent in 1981 census corresponds to 51 per cent rate based on NSS data for the year 1977-78. The non-participation rate of around 1/3rd needs some explanation. This includes students, trainees and apprentices. In all probability these together accounted for more than 50 per cent of the non-participants. (Of the 12 per cent non-participatns nearly 7 per cent are students, trainees and apprentices).[3] In any case though they are at present non-participants, once their education and training is over they will participate in economic activity. So one need not wory about their non-participation, what wories us is the large proportion of the educated unemployed. Unemployment among graduates accounts for nearly 30 per cent of the educated labour force. Of this nearly

Table : 5.III

Participation Rate of Educated Persons & Labour Force

Year	Elementary	Secondary	Higher	All levels	All India
1	2	3	4	5	6
1950-51	44.5	68.8	45.1	47.0	39.1
1960-61	44.6	68.76	45.2	48.5	43.1
1970-71	42.74	52.74	81.8	45.6	34.2
1980-81	42.76	52.0	65.2	46.2	33.4

Note : Participation rate is derived by dividing total number of educated labourers with total numbers of educated persons with a given level of education.

Source : Col. No. 6 : Work participation rates 1901-1981 Registrar General of India, Government of India Census, New Delhi.

8 per cent are not trying for jobs at all. The remaining 22 per cent are trying for jobs. It is this large unemployed proportion of/educated degree holders is a cause for concern. If the incidence of unemployment has increased then to that extent the wastage of resources invested in education has also increased. It is this wastage on account of unemployment amounts to the non-utilization of a portion of the active human capital stock. This is at a time when the overall educational level is low. We cannot afford such a large proportion of wastage. Its importance can be seen in the context of human capital in eradicating poverty and in promotion of the formation of human capital.

Adjusted Stock of Human Capital : Population & Labour Force

The stock of human capital presented in the previous section was unadjusted i.e., no allowance is made while estimating the stock for such factors as:

(i) Wastage and stagnation

(ii) Unemployment among educated persons and

(iii) Brain-drain

Wastage and stagnation connote a special meaning in the literature, Wastage technically implies no return from such investment in human capital. In a country like India where a large proportion of children drop-out within a year or two after joining primary school, naturally they fail

to attain the status of a 'literate' person even when they grow in age. The amount spent on them can be taken as wastage of resources.

Stagnation, on the other hand, means the number of times a student repeats the same class. Such a student takes a longer time than the normal time to complete the minimum prescribed years of schooling. Normally wastage and stagnation are estimated taking number of students in class I as a cohort. How many of those enroled in standard I reach Standard II, III and so on upto Standard VII? This, in turn, results in higher expenditure on education than normally required to complete the given years of schooling. It pushes up the costs of education and reduces the effectiveness of such investment.

We have followed a slightly different procedure to account for the factor'wastage and stagnation'. As is known, there is a large gap between the number enroled and the number appeared in the examination. We do not observe such a large gap between the number appeared and number passed. This is valid for all levels of education. During 1950-51 to 1979-80, of the number ~~of~~ enrolled at the elementary level of education, the number appeared on average accounted for hardly 1/6th, whereas the pass per centage formed more than 4/5th of the total number of students appeared : At the secondary level of education,

on the other hand, the proportion of students appeared was around 1/4th of enrolment, whereas the proportion of pass students was around 2/3rd of the number appeared. At the higher level of education, the proportion of those appeared on average works our to 68 per cent of the total enrolment, whereas the proportion of pass out to number appeared comes to 55 per cent.+ Since we are estimating the stock of human capital embodied in population and workers who have successfully completed their schooling, it is better to estimate the adjusted stock of human capital by taking the number of students appeared and passed. We are more interested in working out the cost of education per person who has completed the relevant level of schooling, obviously, the number appeared in the examination is less than the number enrolled. So when the total expenditure on education is divided by the number appeared or passed, the average cost of education is bound to be higher than the one estimated on the basis of enrolment. Those reasearchers who have followed other than this method of adjustment for the factor wastage and stagnation have also obtained higher cost of education on average.

+ Note : Level of Education

	1950-51			1979-80 (Millions)		
	Enrol-ment	Appea red	Pass	Enrol ment	Appea red	Pass
Elementary	20424	3222	2582	77527	10761	8755
Secondary	4751	639	328	25559	6481	4013
Higher	403	306	146	4907	2874	1892

Source : Education in India, Vol 2.

.2 Unemployment Among Educated persons

During planning in India, unemployment among educated persons has increased both in terms of the proportion of the labour force and in terms of incidence i.e., waiting period prior to getting a first job. Educated unemployment amounts to wastage of resources in the sense that during their unemployment period they do not contribute to output. From the individual point of view educated unemployment may be viewed as an opportunity cost of wage. In the absence of unemployment, a person pursuing higher education of four years duration forgoes the earnings of matriculate for four years. Since unemployment among educated persons is wide spread, from the total earnings foregone we have taken out the amount of earnings corresponding to their period of unemployment taking the proportion of unemployed and the average waiting period. In 1979-80, the average annual earnings foregone by a graduate was Rs. 8142 for a year. If there was no unemployment, earnings foregone would come to Rs.32,568 (8142 x 4). The total earnings foregone would come to Rs. 2,01,922 million (Rs. 32,568 x 6.2 million graduates). From this amount we have to subtract the amount of earnings lost by the unemployed graduates. 0.98 million unemployed graduates on average waited for 1.17 years in 1979-80. The loss of earnings by them amounted to Rs. 9335.48 million in 1979-80. Thus, the net total earnings foregone comes to

13 Rs. 1,92,587 million. So the actual earnings foregone on average per year per person now works out to Rs.7766 instead of Rs. 8142.

Brain Drain

It is widely known that India has emerged as a leading skilled country in the world after independence. In terms of science and technical personnel India ranks third in the world. This is but natural, as India has embarked on rapid industrialization programme. The demand for science and technical personnel (highly qualified man power) is bound to increase as the process of industrialization gathers momentum. Enrolment in vocational courses at the higher level of education was 54 thousand in 1950-51. It went upto 830 thousand in 1979-80, giving a simple average annual growth rate of around 48 per cent.[4] Science and technical personnel accounted for roughly 40 per cent of all graduates in 1980-81.[5] In 1985 also the strength of the science and technical personnel crossed the 2.7 million mark.[6]

However, as it has happened with many third world countries a good proportion of this stock has migrated to the developed countries particularly to the United States of America. According to one study, of the total number of migrants to America in 1969, 33.3 per cent were skilled personnel.[7] From India also quite a good number of skilled

14 personnel migrated to America. In 1970-74, 57,542 science and technical persons fled to America and in 1975-80 the number was 64408.[8] Even in 1985 the proportion of migration of scientific and technical personnel to other countries was around 20 per cent.

We take the view that the migration of science and technical personnel amounts to what is known as brain drain, or the reverse transfer of technology.

On the basis of cost benefit analysis of international migration conducted by Gurushriswamy, it is found that "larger the proportion of unskilled unemployed or under-employed persons in the migrat.labour force, the more likely it is that emigration results in positive benefits. since there is little loss of output or investment in human capital. However, with a few exceptions the share of the unskilled is not overwhelmingly large. Professional and technical immigration into the United States from developing countries shows that for many of them professional emmigration was significant. Social externalities and the higher (public) cost of higher education reduce the net benefits from migration. In addition many have argued that the possibility of migration creates the demonstration effect on salaries and prevents internal diffusion. The idea that professional emmigrants should, therefore, be taxed has explicitely been made, particularly since most long term emmigrants remain citizens and immigration quota

conferred on them a rent which should be appropriated by a sending country."[9] Thus, the migration of professional manpower does amount to the loss of investment in human capital. We have estimated the loss of investment in human capital by taking the average annual factor cost of vocational/professional personnel at the higher level of education and multiplied it by the number of such immigrants to the U.S.A. To the extent we have confined to the United States of America our calculation of the loss is slightly underestimate. We have deducted this loss of investment in human capital to arrive at the finally adjusted stock of human capital.

Adjusted nominal stock of human capital embodied both in population and labour force is around 7 to 8 times the unadjusted stock. The difference between the adjusted stock and the unadjusted stocks embodied in persons with elementary education is around eight to nine times. The corresponding difference in stocks embodied in persons with secondary education of 14 times in 1950-51 came down to 6 times in 1979-80. The difference remains unchanged at roughly 3 times in the case of persons with higher education (Tables 5.IV and 5.V).

It would be interesting to compare the relative share in the adjusted and unadjusted stocks of human capital possessed by persons with elementary, secondary and higher

Table : 5. IV

Adjusted Nominal Stock of Human Capital (Population)

Year	Elementary			Secondary		
	Population (Million)	Average Factor Cost (Rs.)	Stock Rs. crores (2x3)	Population (Million)	Average Factor Cost (Rs.)	Stock Rs. crores (5x6)
1	2	3	4	5	6	7
1950-51	18.12	14096	25542 (65.5)	2.15	44497	9567 (24.5)
1960-61	30.84	19005	58611 (72.0)	5.73	26651	15271 (18.8)
1970-71	86.94	34504	299288 (73.0)	18.6	48866	90891 (22.2)
1979-80	118.32	72098	853064 (61.0)	39.4	112050	441477 (31.6)

contd...

Table : 5.IV contd...

Year	Higher			Total Stock All levels (4+7+10)	Loss of Human capital due to migration (brain-drain) (11 — 12)	Total Stock Rs. (crores)
	Population (Million)	Average Factor Cost (Rs.)	Stock Rs. (crores) (8x9)			
1	8	9	10	11	12	13
	1.64	23562	3864 (9.9)	38981	3	38978 (100.0)
	2.5	29857	7464 (9.2)	81370	9	81361 (100.0)
	3.3	59384	19597 (4.8)	409825	353	409472 (100.0)
	9.5	109760	104272 (7.5)	1398913	979	1397934 (100.0)

* Total stock is inclusive of implicit cost of buildings (interest and depriciation)

\+ which was in : 1950-51 - Rs.8 crores
1960-61 - Rs.24 "
1970-71 - Rs.49 "
1979-80 - Rs.100 "

\+ Based on Professor V.N. Kothari's estimates given in an article "Factor Cost of Education in India" - Indian Economic Journal, 1966. pp. 641.

Table : 5.V

Adjusted Nominal Stock of Human Capital (Labour Force)

Year	Elementary			Secondary		
	Labour Force (million)	Average Cost Rs.	Stock Rs. crores (2x3)	Labour Force (million)	Average Cost Rs.	Stock Rs. crores (5x6)
1	2	3	4	5	6	7
1950-51	8.08	14096	11390 (57.8)	1.48	44497	6586 (33.4)
1960-61	13.75	19005	26132 (65.3)	3.94	26651	10500 (26.3)
1970-71	37.08	39504	127941 (66.8)	9.81	48866	47938 (25.0)
1979-80	50.6	72098	364816 (55.1)	20.51	112050	229815 (34.7)

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Table : 5.V contd....

Higher			Stock Total (4+7+10)	Loss of Human Capital (Rs. in crores (Migration brain-drain)	Total Stock (11-12) Rs. crores
Labour Force (million)	Average Cost (Rs.)	Stock Rs. crores (8x9)			
1	8	9	10	11	12	13
0.74	23652	1744 (8.8)	19728	3	19725 (100.0)
1.13	29857	3374 (8.4)	40030	9	40021 (100.0)
2.66	59384	15796 (8.2)	191724	353	191371 (100.0)
6.2	109760	68051 (10.3)	662782	979	661803 (100.0)

* Total stock is inclusive of implicit cost of building (interest and depriciation)

Figures in paranthesis are percentages.

education. The share of persons in the adjusted stock with elementary education has been higher than that in the unadjusted stock. In 1979-80 the difference between the two came to as high as 15 to 16 per centage points. Unlike this, the shares of persons in the adjusted stock with secondary and higher education have been lower than those of the unadjusted stock.

The big push in the adjusted stock observed above may be attributed largely to the rapid hike in the factor cost of elementary education adjusted for the factor 'wastage and stagnation.' The difference between adjusted and unadjusted average factor cost of elementary education is 9 times. As against this, at the secondary level of education, the variation in adjusted and unadjusted average factor cost is around 6 times and at higher level of education it is approximately 3 times.* This can be taken as higher degree of relative wastage taking place at the elementary level of schooling. In this way, the cost effectiveness seems to be very low at the very base of the education system in India. The moot question, therefore, is not only regarding less resources which are allocated to elementary education, but also the less effective use of those resources.

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* We give below the adjusted and unadjusted average social cost per pupil by level of education in Andhra Pradesh (1970-71) estimated by J.B.G. Tilak in his book 'The Economics of Inequality in Education".

Level of Education	Unadjusted Cost (Rs.)	Adjusted Cost (Rs.)
Primary	497.70	1516
Secondary	1636.45	4728
Higher	4572.97	27754

*Adjusted cost figures are inclusive of all adjusted factors.

Table : 5.VI

Nominal and Real Stock of Human Capital
(Adjusted/Unadjusted) Population and Labour Force

(Rs. crores)

Year	Unadjusted Nominal Stock		Adjusted Nominal Stock		Wholesale+ Price index 1961-62 = 100	Unadjusted Real Stock		Adjusted Real Stock	
	Population	Labour Force	Population	Labour Force		Population	Labour Force	Population	Labour Force
1	2	3	4	5	6	7	8	8	10
1950-51	5324	2551	38978	19725	86.1	6184	2962	45271	22909
1960-61	12484	6206	81361	40021	99.8	12509	6218	81524	40101
1970-71	50862	25264	409472	191371	181.1	28085	14149	226103	105671
1979-80	212844	107126	1397934	661803	394.1	54008	27182	354716	167928

Source : + Whole sale prices in India, Monthly Bulletin, March - 1986.

III

Real Stock of Human Capital : Adjusted-Unadjusted

Both the stocks of human capital adjusted as well as unadjusted are expressed in 1961-62 prices (wholesale price index). The purpose of this exercise is to find out to what extent the growth of human capital stock is simply due to price rise. As can be seen from table 5.VI, the adjusted real human capital stock was 16 per cent higher than that of the adjusted nominal stock in 1950-51. In 1970-71, on the other hand, the adjusted real stock of human capital was just 56 per cent (a little more than half) of the adjusted nominal stock. Similarly, in 1979-80 the adjusted real stock was just 25 per cent of the adjusted nominal stock. Thus, in 1970-71 less than 50 per cent of the increase in real stock of human capital and in 1979-80 75 per cent of the increase in stock were due to the phenomenon called price inflation. The simple average annual rate of growth of adjusted real stock during 1950s was 8 per cent, during 1960s around 18 per cent and it was just 6 per cent during 1970s. The corresponding decenial growth rate of adjusted nominal stock were 10.9 per cent, 40.3 per cent and 26.8 per cent respectively.

Real Stocks of Physical Capital : Human Capital and Real National Income

Of the two real stocks—human capital and physical capital—which have grown faster? How do their growth rates

Table : 5.VII

Real Adjusted Stock of Human Capital, Physical Capital and GDP

(Rs. crores)

Year	1950-51	1960-61	1970-71	1979-80	Growth Rate per annum
Stock					
1	2	3	4	5	6
Stock of Capital					
Human Capital+ (Population)	45271	81524	226103	354716	22.8
Human Capital+ (Labour Force)	22909	41105	105671	167928	21.0
Physical Capital*	24071	42198	76136	124718	13.9
National Income*	9191	14071	20244	25872	6.5
GDP*					

\+ 1961-62 = 100 Source : Derived from the Text

* 1960-61 = 100 " India's National Income - 1950-1980
V.K.R.V. Rao, Sage Publications, New Delhi, 1983.

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compare with that of the National Income? The real stocks of human capital contained both in the population and the labour force give annual increase of 23 per cent and 21 per cent respectively which are far above that of 14 per cent for the stock of physical capital. During the first decade of planning (1950-51 - 1960-61) the real stock of human capital has increased annually by 8 per cent which is marginally above the rate of growth of 7.5 per cent of real stock of physical capital. During the following decade the picture has altered much in favour of human capital. Its growth rate works out to 16 to 18 per cent as against only 8 per cent increase in the real stock of physical capital. During the third decade of planning for the first time the 7 per cent annual increase in the real stock of physical capital is higher than that of roughly 6 per cent annual increase observed for real stock of human capital. The faster growth of real stocks of human capital during 1960 to 1980 relative to that of physical capital observed for India tallies with that of the movement of real stocks in the U.S.A. from 1927 to 1957. As against 2.01 per cent annual rate of growth of physical capital, the educational capital both in population and labour force give a higher growth rates of 3.57 per cent and 4.09 per cent respectively.[10] From the table it can also be observed that the real stocks of human capital and physical capital have grown at a much faster rate than that of the real national income.

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IV

Trends in Human Capital/Output Ratio and Physical Capital/Output Ratio

In Table 5.VIII we give the physical capital/output ratio and human capital/output ratio for the period - 1950-51 to 1979-80. It is observed that both these ratios have steadily increased from decade to decade. The ratios have doubled between this period i.e., 1950-51 to 1979-80. Physical capital/output ratio popularly known as capital/output ratio of 1:2.62 and 1:3 in 1950-51 and 1960-61 respectively were marginally higher than those of adjusted human capital/output ratios. In the following period the picture has altered. As against the capital/output ratio of 1:3.8 in 1970-71 and 1:4.82 in 1979-80, the adjusted human/capital output ratios were 1:5.22 and 1:6.5 respectively.

The main conclusion that can be drawn is that we need an increasing amount of both human capital and physical capital per unit of output produced. This probably explains the low total factor productivity in India in the international context. The comparison of the total factor productivity in 1975 (based on purchasing power parity) in India, U.K., and the U.S.A., reveals that productivity in India was 37 per cent of that in U.K. and 20 per cent of that in the U.S.A.[11]

Table : 5.VIII

Physical Capital/Output Ratio and

Human Capital/Output Ratio

Year	Physical Capital/ Output Ratio	Human Capital/ Output Ratio
1	2	3
1950-51	2.62:1	2.49:1
1960-61	3:1	2.92:1
1970-71	3.8:1	5.22 : 1
1979-80	4.82 :1	6.49 : 1

Source : Derived from the Table 5.VII

20 In the table 5.IX, we have given a comparative picture of adjusted real per capita and per worker human capital alongwith real per capita physical capital and per worker physical capital. Real human capital per worker as well as per person has grown more or less uniformally. Taking 1950-51 as base the index number of real human capital per capita and per worker in 1979-80 was 425 and 418 respectively. This shows that both have increased by more than three times. The index of real human capital per worker can be taken as an index of skill intensity. Similarly, real physical capital per worker can be taken as an index of capital intensity. The index of real physical capital per worker (capital intensity) taking 1950-51 as the base has moved up to 295 in 1979-80, giving roughly two times increase in capital intensity. Thus, skill intensity has increased at a faster rate than increase in capital intensity or in other words both types of intensities have increased during plan period in India. This shows that these two types of intensities are complementary. This observation is in conformity with theoretical premise that they are complementary in nature.[12]

These intensities are also differently defined. Skill intensity is defined as wage per employee and capital intensity is defined as non-value added per worker. our observation that these intensities are complementary in India holds good even if we follow these definitions. The

Table : 5.IX

Real Adjusted Stock of Human Capital and Physical Capital per Person in Population and Labour Force

Year	Real adjusted Human capital per person	Index	Real adjusted Human Capital per Worker	Index	Real Physical Capital per Person	Index	Real Physical Capital per worker	Index	Per Capita National Income	Index	Per Capita Net Domestic Product	Index
1	2		3		4		5		6		7	
1950-51	1254	100	1648	100	667	100	1731	100	255	100	253	100
1960-61	1857	148.09	2133	129.43	961	144.08	2245	129.69	320	125.49	304	120.16
1970-71	4126	320.03	4655	282.46	1389	208.25	3354	193.76	369	144.71	350	138.34
1979-80	5334	425.36	6882	417.60	1875	281.11	5111	295.26	389	152.55	393	155.34

Source : Derived from the table No.5.VI and 5.VII

21 index of skill intensity i.e., wage per employee (1960-61 = 100) was 379 in 1978-79 giving approximately three times increase in skill intensity.[13] At the same time the index of the capital intensity has also moved up from 100 in 1960-61 to 393 in 1978-79.giving approximately three times increase.[14] This also can be taken as an evidence to refute the argument that the improvement in labour productivity is solely due to more fixed capital per worker.

Change in skill level of the labour force must reflect improvement in the labour productivity (value added per worker). During 1960-61 to 1983-84 labour productivity has improved by about 4 per cent per annum. The real wage also have shown an annual increase of around 2 per cent.[15] So it can be inferred that the long run labour supply in India is mainly governed by investment motive.

V

Conclusions

(1) The unadjusted stock of human capital embodied in population gives a phenomenal rise in money terms. It went up from Rs.5,324 crores in 1950-51 to Rs.12,484 crores in 1960-61, giving an increase of around 14 per cent per annum. As against this, during 1960s and

22 1970s it gave a much higher annual rate of growth of 30.4 per cent and 35 per cent respectively.

(2) The allocation of the stock of educational capital embodied in population by the actual attainment of education reveals that the share of the stock of persons with eight years of schooling (elementary) has gone down from 61 per cent in 1950-51 to 45 per cent in 1979-80. On the other hand, the share of the stock of persons with high, higher secondary education (persons with 11 and upto 13 years of schooling) improved from 13 per cent in 1950-51 to 36 per cent in 1979-80, whereas the share of the stock of persons with university/college education (15 years and more) which was 26 per cent in 1950-51 came down to around 24 per cent in 1960-61 and further reduced to 12 per cent in 1970-71. However, in 1979-80 it accounted for 19 per cent of the total stock.

The combined share of persons with 11 and more years of education worked out to 55 per cent in 1979-80 which was 39 per cent in 1950-51. This is a qualitative change in the stock of human capital built up during the plan period. As the share of persons with more than 11 years of schooling in the total stock has gone up it can be inferred that the skill level of population has certainly improved.

23 (3) With reference to labour force also the combined share of workers with 11 and more years of schooling has gone up from 44 per cent in 1950-51 to 61 per cent in 1979-80. This further confirms the earlier observation regarding the improvement in the skill level during planning in India.

(4) This stock of educational capital embodied in the labour force is the active stock of human capital. It is this stock that contributes to the growth of the economy. One way of examining its contribution is to study the participation rate of educated labour force and that of all workers. It was observed that the participation rate of the educated labour force was 13 per cent more in 1960-61 and was also higher by more than 1/3rd both in 1970-71 and 1979-80, than the rate for all workers. It was also seen that the labour force participation rate improves with the improvement in the educational attainment of persons.

(5) The unadjusted human capital stock is adjusted by considering the three factors viz. (i) wastage and stagnation (ii) educated unemployment and (iii) Brain-drain. This exercise shows that the adjusted nominal stock of human capital embodied both in the population and labour force is approximately 7 to 8 times the unadjusted stock. The difference between the two

24 of around 8 to 9 times is the highest for persons with elementary education. For persons with secondary education and higher education the difference between the adjusted and un-adjusted stock is 6 and 3 times respectively. The wide margin observed between the adjusted and unadjusted stocks may be attributed largely to the rapid hike in the factor cost of education. At the elementary level of education it is the factor wastage and stagnation that is mainly responsible for the increase in the factor. Thus, the cost effectiveness seems to be low at the base of the education system in India. This amounts to the less efficient use of resources spent on elementary education.

(6) The adjusted nominal stock of human capital when expressed at (1961-62 = 100 whole sale price index) constant prices reveals that the increase in the nominal stock of human capital to the extent of 50 per cent to 75 per cent was on account of price rise. Thus, in real terms the value of human capital stock is much lower than that of the nominal stock.

(7) During the plan period the real stock of human capital has increased much faster than the increase in physical capital. Whereas both these stocks (human and physical capital) have increased at much

faster rate than that of the real national income. This implies that the human capital/output ratio and physical/output ratio over the plan period have increased. It is also observed that unlike 1950s and 1960s, during 1970s the human capital/output ratio was higher than the physical capital/output ratio. On the basis of these trends it can be inferred that we need an increasing amount of both human capital and physical capital per unit of output. This probably explains the low total factor productivity in India in the international context. The comparison of the total factor productivity in 1975 in India, U.K., and the U.S.A., reveals that productivity in India was 37 per cent of that in U.K., and 20 per cent of that in the U.S.A.

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