



Estimating the value of educational capital formation in India

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Human Capital

- “the knowledge, skills, competences and other attributes embodied in individuals that are relevant to economic activity” OECD (1998, page 9).
- One of the most important assets of a country
- Key determinant of a nation’s economic performance.
- National accounts confined to physical capital and fail to reflect the impact of human capital.
- Treatment in national accounts - controversial
- E.g. Expenditure on primary education generates streams of future income, but this expense is regarded as consumption rather than investment.
- Necessary to make appropriate adjustments in the framework and underlying concepts of national accounting.
- Frequently discussed but difficult to measure

Human Capital

- Seminal contributions by Becker (1966), Mincer (1974), and Schultz (1961)
- Work on human capital centered on estimating returns to education.
- Investment in education - only one of the many forms of investment in human capital.
- Education an important component of economic activity
- Because investment in human beings, like tangible investments generates a stream of future benefits.
- Educational expenditure in India averages around 4.2% of the gross domestic product;
- Estimating the returns to investment in education is useful for forming comparisons with other forms of investment.



Objective

- Provide empirical estimates of the educational capital formation in different Indian states.
- Comparison with national accounting indicators

Measurement of Human Capital

- Value of human beings - Three Methods
- **Cost-based approach' (cost-of-production approach)**
- Income-based approach' (capitalized earnings procedure)
- Educational stock-based approach

Cost-based approach

- — Origins to cost of production method of Engel (1883)
- - Involves estimating the total cost of producing a human being.
- Retrospective approach - focusing mainly on historical costs of production.
- Human capital - estimated using the depreciated value of the dollar amount spent on an individual.

Income-based approach

- measures the total human capital by the total discounted values of his expected future stream of earnings in his lifetime.
- Forward-looking (prospective) because it focuses on expected returns to investment.
- Jorgenson and Fraumeni (1989, 1992) – the most comprehensive study to date
- They define the “*investment in human capital in any year as the sum of lifetime incomes for all individuals born in that year and all immigrants plus the imputed labor compensation for formal schooling for all individuals enrolled in the school*”.

Educational stock-based approach

- Most commonly used measures
 - Education-augmented labour input,
 - Adult literacy rates
 - School enrollment ratios
 - Average years of schooling of the working-age population.
- Popularised by Barro and Lee (measured by ‘years of schooling’).
- Activities like formal education; on-the-job training, specific training and other recognized investments in human capital have an influence on earnings.
- The total amount invested in human capital and rate of return on this investment can be estimated from using the information on observed earnings.
- (Pioneering work by Mincer (1958,1974))

Framework for accounting for Human capital Formation in India

- ❖ **First step - Developing physical accounts for identified human capital.**
- ❖ **Accounts developed for age cohorts 15-60**
- ❖ Following educational groups considered:
 - ❖ 1) Illiterate ; 2) Non formal education; 3) Below primary; 4) Primary; 5) Middle; 6) Secondary; 7) Higher secondary; 8) Technical/Diploma; 8) Graduate and above (in Agriculture, Engineering, Medicine, Other subjects).
- ❖ Limitations of expressing human capital in physical terms
- ❖ Cannot be compared with other market activities.
- ❖ Important to place a value on human capital so as to convert it into monetary terms.
- ❖ **Second step - placing a value on human capital stock.**
- ❖ **Third step – Monetary accounts**

Framework for Physical Accounting

Opening stock	Stock of population, categorized by age cohorts and educational qualification, present at the beginning of the period 1993.
Additions to the stock	New enrollments or new workers entering the labor force or changes in inventories
Depreciation	Retirement of population above age 60
Other changes in inventory	(age group 0-14 treated as inventories) Due to migration, emigration, death etc.
Closing stock	Stock of population in different age cohorts by educational qualifications present at the end of the accounting period i.e. 2003.

Valuation

- Average wage cannot be used
- Factors like skills, parental background, and quality of schooling etc. cannot be observed using wages
- Following approach adopted
- **Step 1:**
- we used the Mincerian earning function approach.
- The wage of an individual is assumed to depend on level of schooling, skills possessed, technical qualifications, on-job training (job experience is used as a proxy) and other socioeconomic characteristics that represent the innate abilities of the individual.
- **Step 2:** From this earning function we estimated the marginal rate of return for different levels of schooling and obtained the predicted wages for different age cohorts by educational levels.

Estimation of the Mincerian model

- $$\ln twrec = \alpha + \beta_1 sex_1 + \beta_2 sec_1 + \beta_3 soc_grp_1 + \beta_4 hhpro_1 + \beta_5 hhpro_2 + \beta_6 hhpro_3 + \beta_7 hhdtype_4 + \beta_8 geduc_2 + \beta_9 geduc_3 + \beta_{10} geduc_4 + \beta_{11} geduc_5 + \beta_{12} geduc_6 + \beta_{13} geduc_7 + \beta_{14} geduc_8 + \beta_{15} skill + \beta_{16} exp + \beta_{17} exp^2 + \beta_{18} mpce + \varepsilon$$
- Equation estimated using the Heckmann Maximum Likelihood Estimation
- First stage - a probit estimation is used to estimate the probability of being employed (the dependent variable takes a value 1 if employed 0 otherwise)
- In the second stage the actual wages are used in the regression equation.
- STATA version 8.0 used for the estimation.
- Using the regression equation, we predict the wages for different age cohorts by educational level.

Results of Mincerian specification

- Education - plays a very important role in determining wages.
- For all the age cohorts the returns to education are positive as one moves to a higher educational level.
- Investment in education gives positive returns.
- Similarly experience has a positive impact on earnings
- Experience has diminishing returns
- Skill has a positive impact upon earnings
- Returns to skill are higher at younger age cohort
- Returns to education are positively influenced by on-the-job investment in the form of training (captured by experience)
- but negatively affected by depreciation (the wearing of human capital because of ageing).
- The net effects mixed depending on the profession/education.
- Individuals in rural areas earn less than the one in urban area
- Profession and Gender significantly affects the wages.

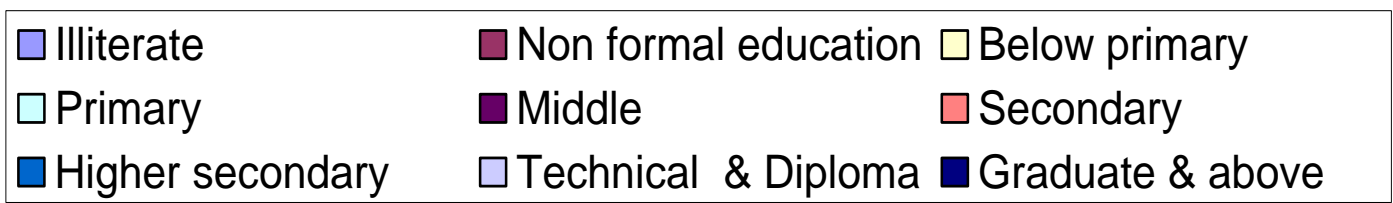
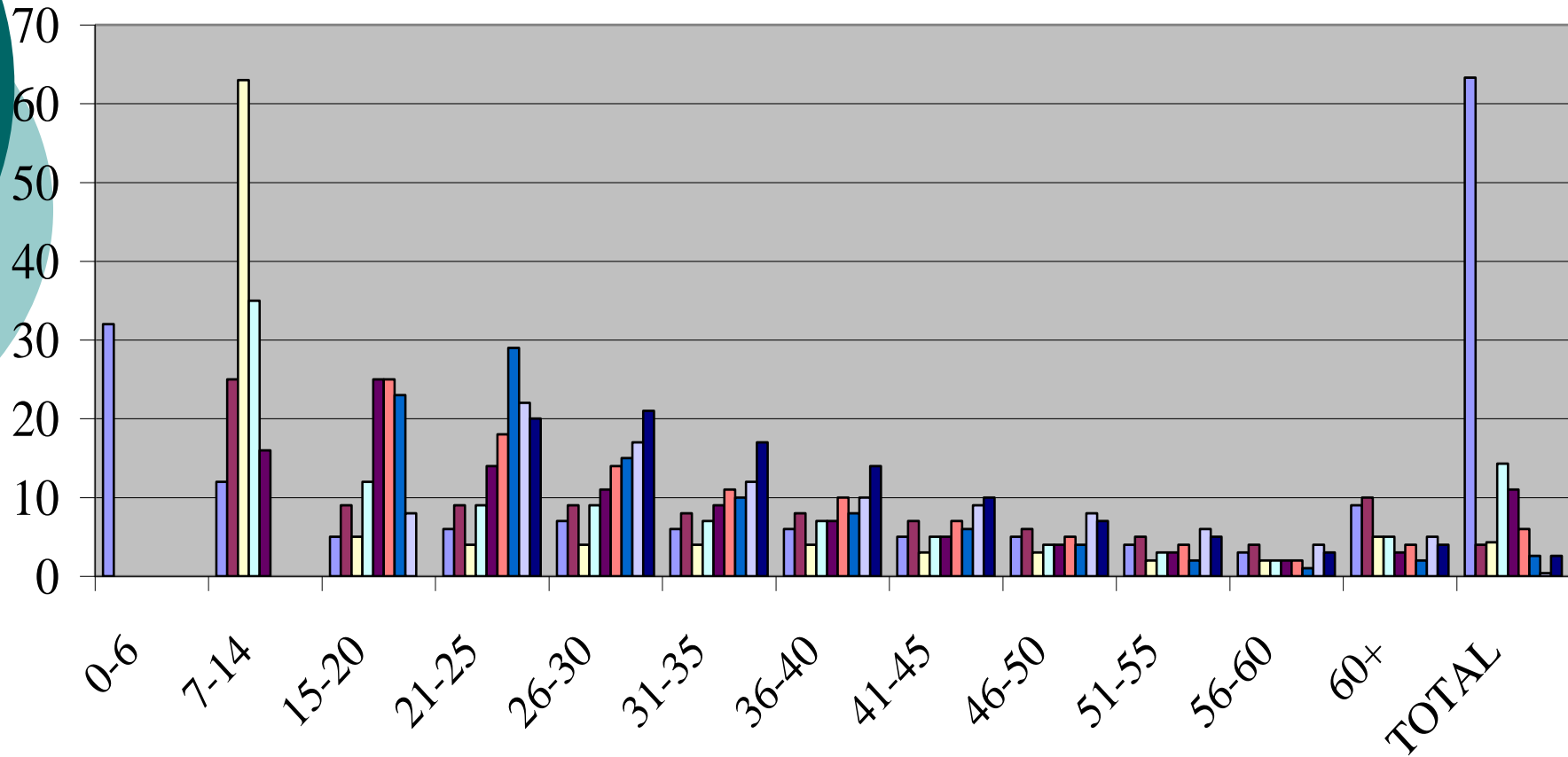
Value of total stock of human capital

- **Step 3:**
- From the predicted wages present value of lifetime labor income for different educational levels
- Used a modified formula outlined by Jorgenson and Fraumeni (1989, 1992) and Wei (2001).
- The present value of the lifetime labour income of an individual is the discounted value of future income weighted by probability of survival and discount rate
- For this considered two stages:
 - Work and study stage (age groups 15-25)
 - Work only stage (25-60)

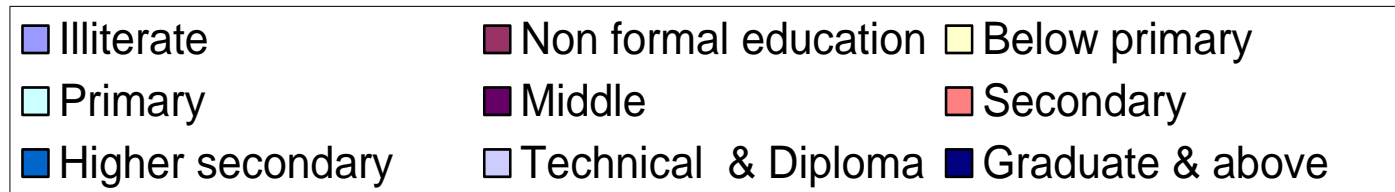
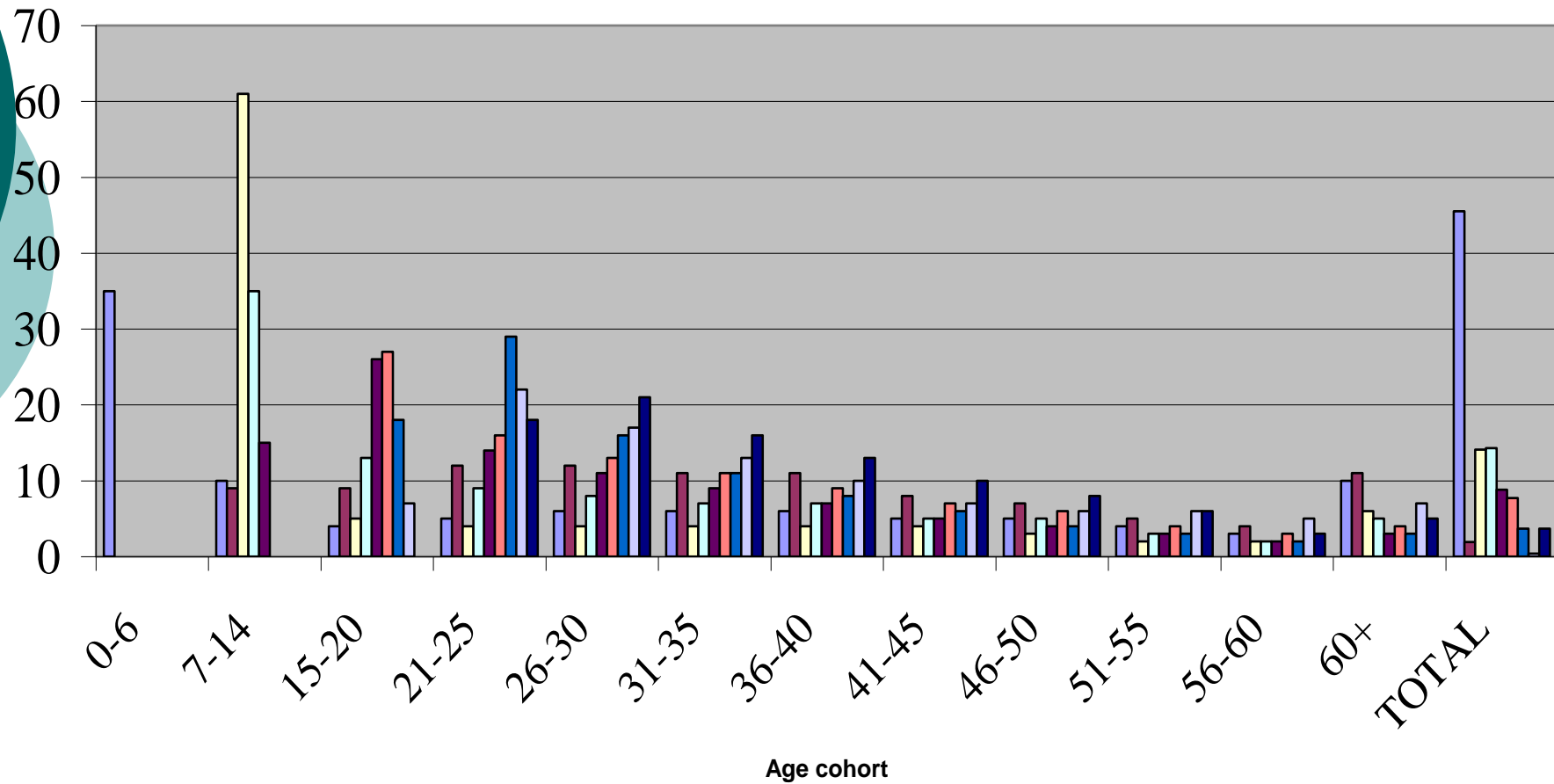
Monetary accounts

- We multiplied the present value of annualized life income (for different educational qualifications for different age cohorts) with the physical accounts
- Additional term revaluation captures the effect of difference in wages
- **Step 5.**
- The difference in the value of human capital stock between the 1993 and 2001 gives the value of human capital formation.
- Compared with other national accounting indicators.
- Computed GSDP adjusted for Human Capital Formation (AHSDP)

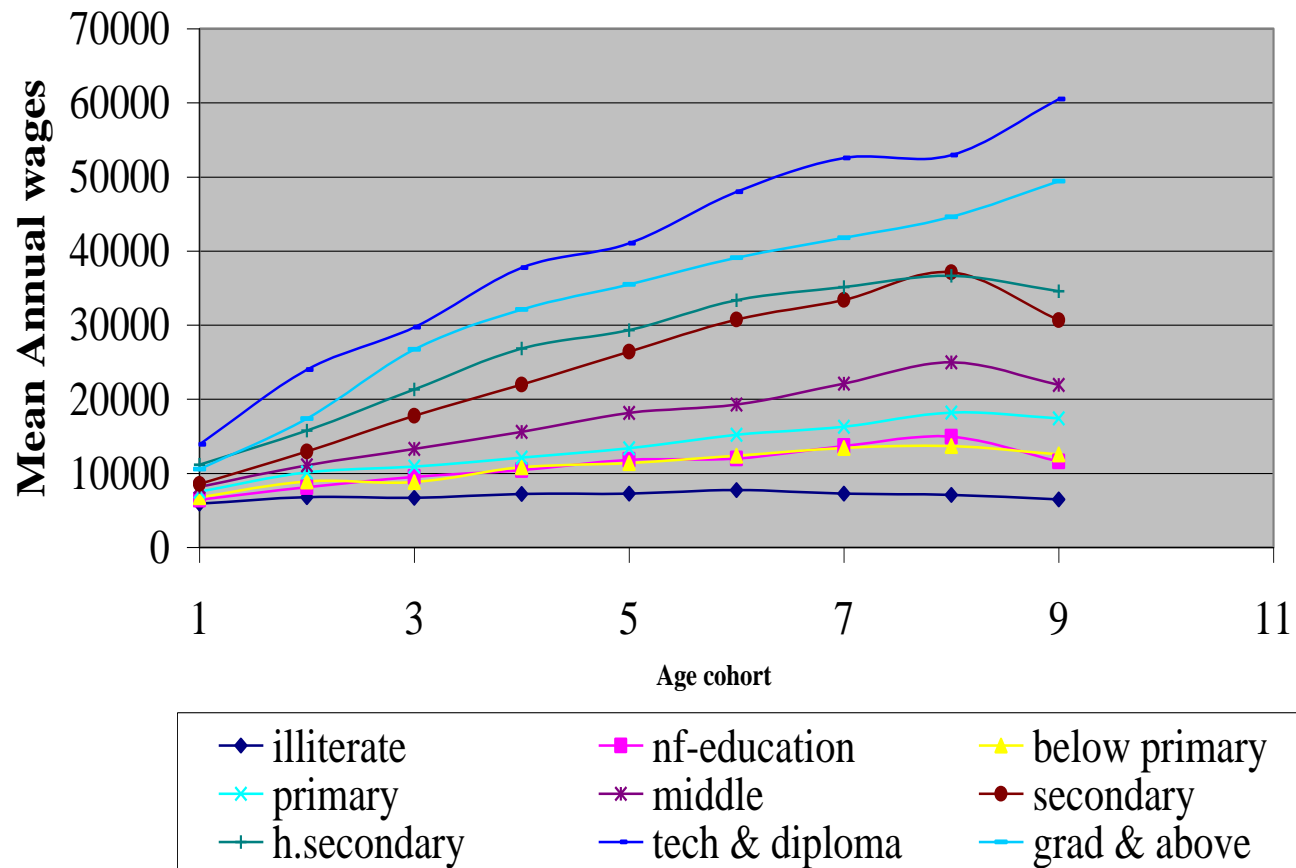
% distribution of population by education in 1993 (all India)



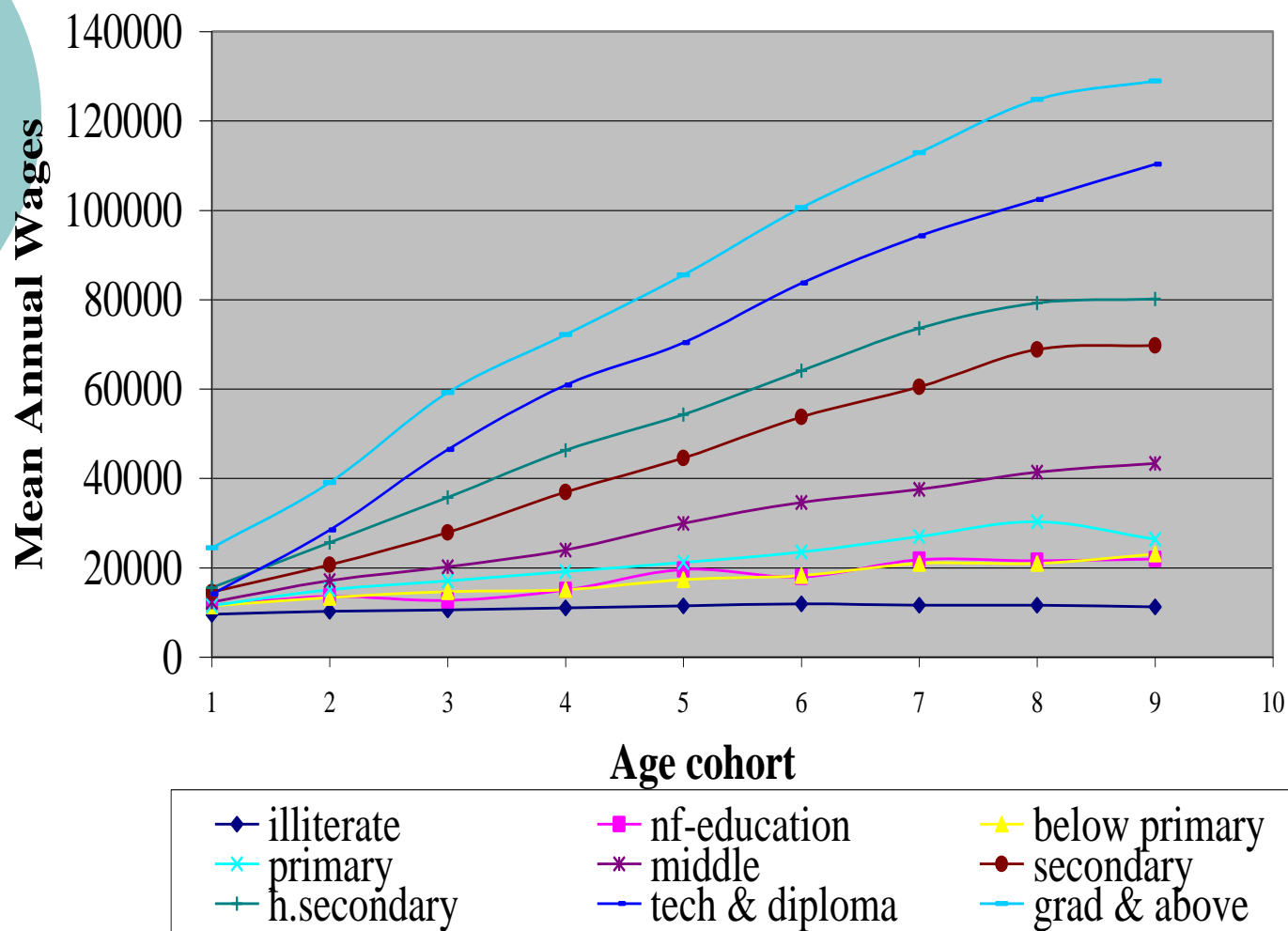
% distribution of population by education in 2001 (all India)



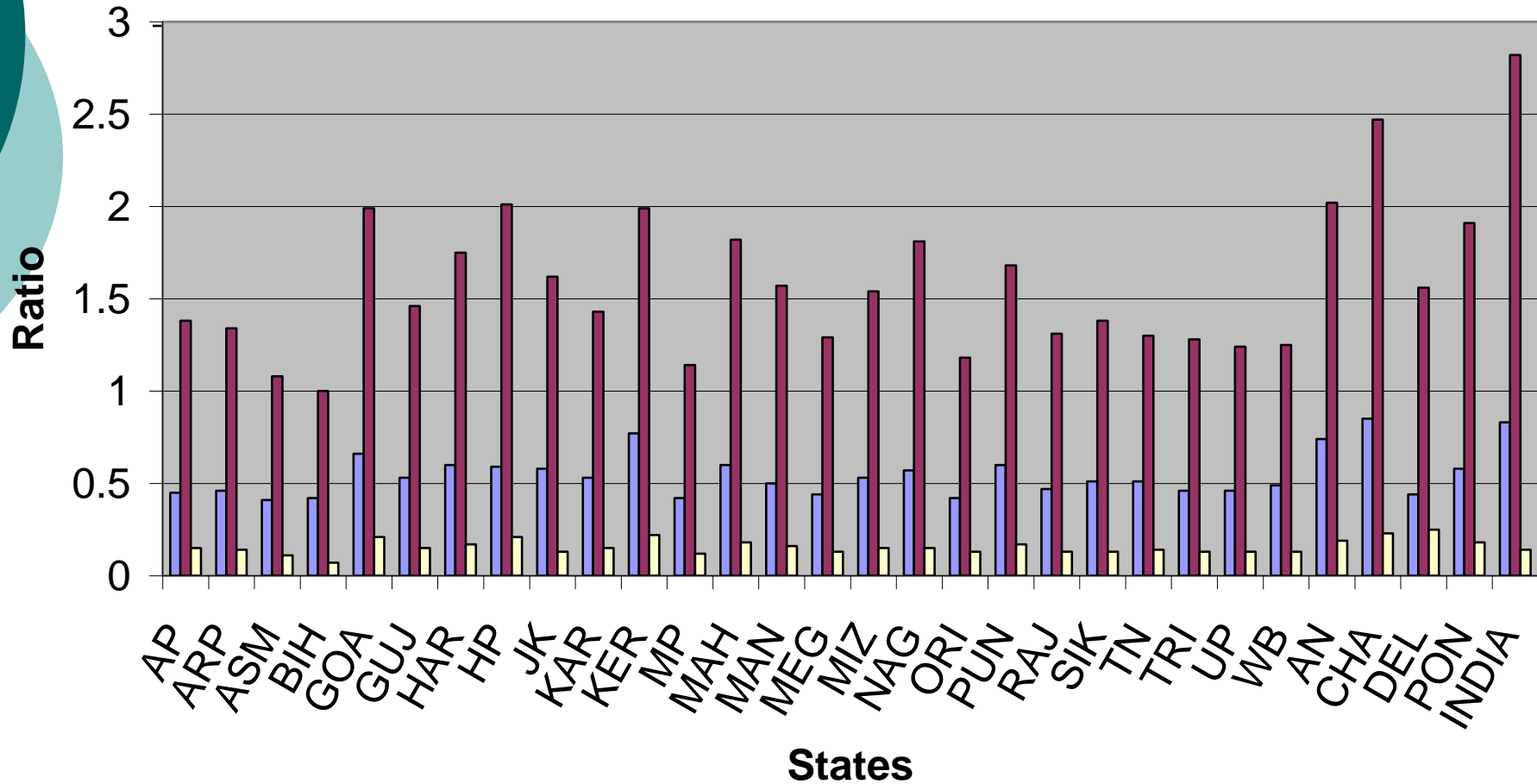
Mean annual income of persons for different educational level by age cohort for the year 1993



Mean Annual income of persons for different educational level by age cohort for the year 1998



Percapital human capital and human capital accumulation

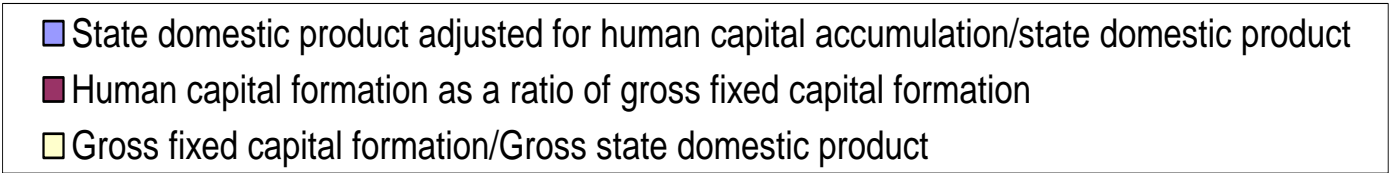
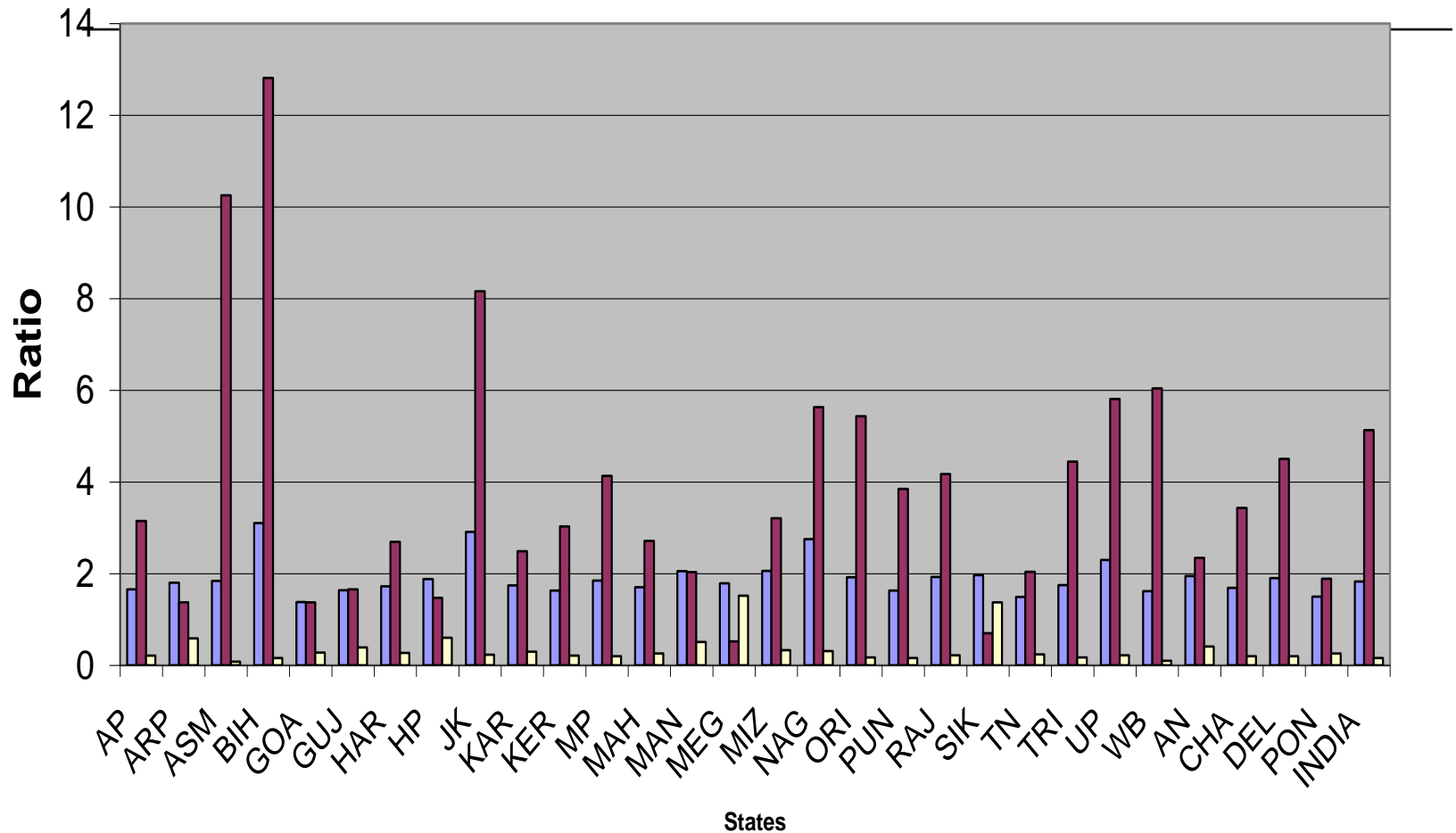


■ Per capita Human capital 1993

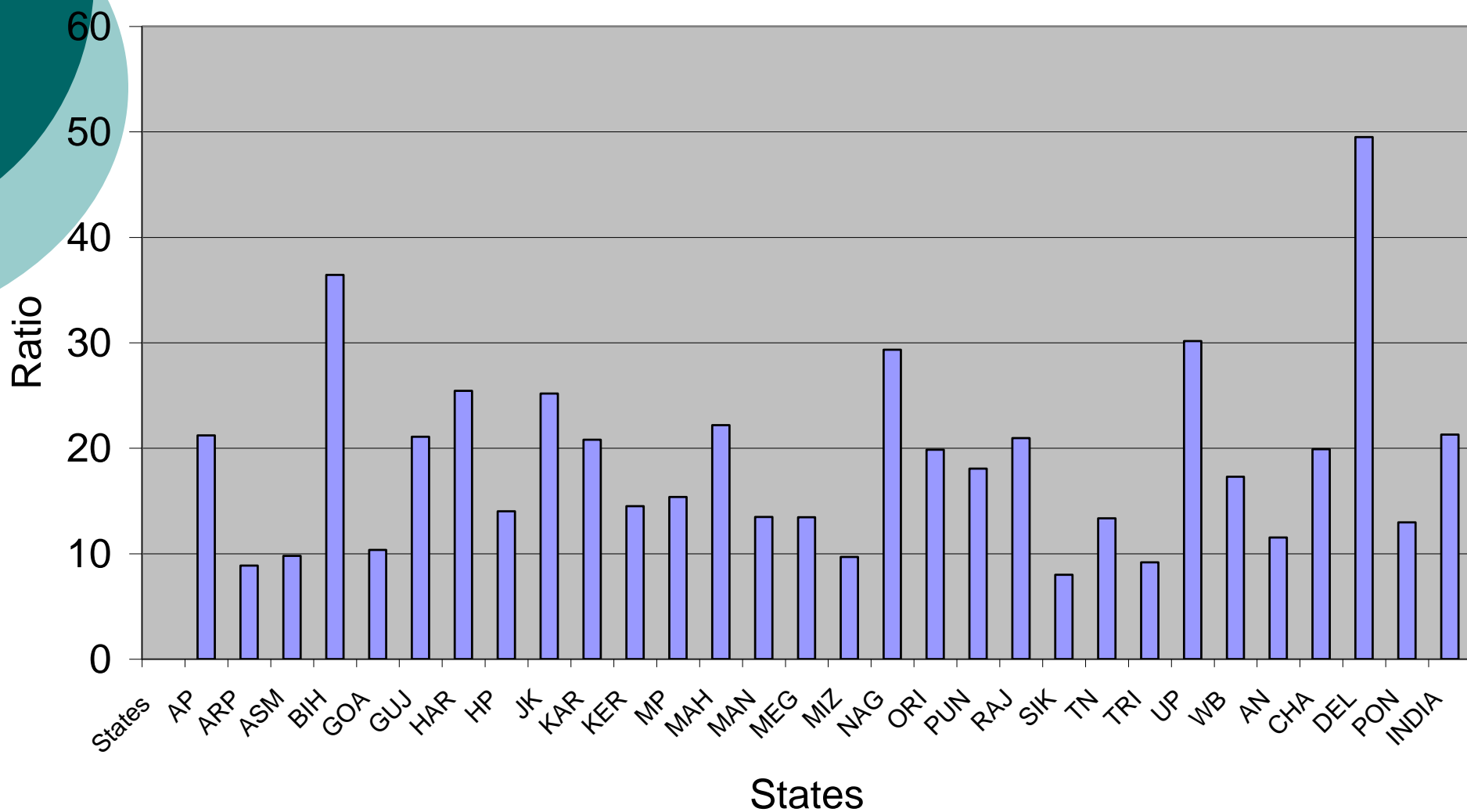
■ Per capita human capital 2001

■ Per capita human capital accumulation

Comparison with national accounting indicators (GSDP, HCF)



Gross human capital formation/Expenditure allocated on education



Conclusions

- Our results capture the value being generated through expansion in education (especially at the primary level).
- On a per capita basis, the value of human capital in India nearly doubled between 1993 and 2001 and
- the value of HCF was more than 5 times the GFCF.
- The highest values for HCF in 2001 were for UP, Maharashtra, AP, WB and Bihar.
- On a per capita basis, Delhi, Chandigarh, HP, Goa and Kerala topped the list in human capital accumulation.
- In gross terms, the largest beneficiaries of these human capital adjustments were Bihar, J&K, Nagaland, UP, Mizoram and Manipur (AHSDP/GSDP ranged from 2.05-3.1.)
- Investment in education in these states had the greatest impact.

Conclusions

- Biggest gains accrue to states that are considered the least developed – NE states like Nagaland, Mizoram, Manipur and populous ones like Bihar and U.P.)
- In contrast, the relatively educated states of Kerala and Goa see the least benefits
- city-states like Delhi and Chandigarh do somewhat better presumably because they are able to generate increasing returns to human capital clustering.
- This is to be expected since returns to spreading basic education should be higher in those areas where it is a scarce resource.