

# **A Cross- Sectional analysis on Returns to Education in India using PLFS 2017-18:**

**A term paper done in partial fulfillment of the course ECONOMETRICS by Sudhanshu Ranjan (GE/2023-25/027)**

## **INTRODUCTION:**

In this cross-sectional study, we thoroughly examine the relationship between education levels and income in India, focusing on data collected from the nationwide Periodic Labour Force Survey for 2017-18. By employing Ordinary Least Squares (OLS) estimates derived from the classical Mincerian equation, we aim to discern the returns on investment in education. Our analysis distinguishes between general education and technical education, utilizing separate regression equations for each. It's important to note that we exclusively consider individuals earning regular/salaried wages, excluding casual and self-employed workers from our investigation. The central aim of our research is to quantify the economic benefits associated with pursuing general and technical education, while also providing a rationale for our findings. Alongside education levels, our models incorporate variables such as age, gender, social demographics, household size, years of schooling, and sector of employment to ensure robust estimates.

Key inquiries addressed in our paper include:

- Impact of advanced education levels on wages
- Specific technical fields yielding the highest returns
- Variations in returns across different social groups
- Wage disparities between rural and urban areas
- Gender-based differences in wages

Through our analysis, we seek to elucidate how educational attainment influences income levels and to offer insights into the socio-economic dynamics shaping wage differentials in India.

## **METHODOLOGY**

We start by estimating the standard returns to general and technical education using two multiple linear regression models as follows: -

$$Y = \alpha + x_1GEL + x_2age + x_3age\_square + x_4YFE + x_5HH\_size + x_6Gender \\ + x_7Marital\_status + x_8Sector + x_9Social\_group + \varepsilon$$

$$Y = \omega + \beta_1TEL + \beta_2age + \beta_3age\_square + \beta_4YFE + \beta_5HH\_size + \beta_6Gender \\ + \beta_7Marital\_status + \beta_8Sector + \beta_9Social\_group + \mu$$

where Y is the natural logarithm of monthly wages, which remains so in all specifications, this means that we estimate a log-linear model and, therefore, the coefficients can be interpreted as semi- elasticities i.e. they measure the percentage change in wages for each unit increase in the regressor. In this model GEL is a categorical variable representing different educational qualifications in India ranging from not literate to obtaining post graduate and higher qualifications similarly, TEL is another categorical variable which represents the different technical educational qualifications in India. and are the random error terms, the remaining independent variables are the control variables which include age, age-squared, years of formal education, household size, gender, marital status, whether the individual belongs to rural or urban sector. We have used a large sample unit/individual level dataset on the relevant variables in India from the PLFS dataset for 2017-18. Further, we have restricted the sample for our analysis to only those individuals who are getting Regular/salaried wages.

## **Results:**

In assessing general education levels, our model categorizes education into six tiers: below primary schooling, primary schooling, middle schooling, diploma or certificate courses, graduate, and postgraduate. We note substantial differences in return on education (keeping the lack of formal education as the base variable) across these tiers: secondary schooling 16%, higher secondary 28%, diploma/certificate courses 46%, and graduate/postgraduate education 51% and 66%, respectively. This suggests a notable trend: as education advances to more specialized tiers, the returns experienced increase significantly. The progression from schooling to college education marks a substantial leap in returns, underscoring the potential importance of specialized education at higher levels. This trend highlights a clear link between the level of education attained and the economic returns it generates.

## **Control variables:**

In terms of control variables, the model considers factors such as sex (male or female), age, marital status (married or unmarried), household size, geographical location (urban or rural), and social group affiliation (Scheduled Tribes, Scheduled Castes, and other castes).

### **1. Gender:**

When educational levels are held constant, females, on average, receive wages 48.9% lower than males. This disparity can be attributed to various reasons:

1. Traditional gender roles and societal expectations often lead women to prioritize family duties over career advancement. This can result in career interruptions, part-time work, or limited mobility in the job market, ultimately affecting their earning potential.
2. Women are often underrepresented in leadership positions and decision-making roles within organizations. This lack of representation not only perpetuates gender biases but also limits women's opportunities for career growth and higher pay.
3. Persistent gender biases and discrimination in the workplace contribute to unequal pay for equal work. Women may encounter barriers to promotion, start with lower salaries, and face resistance when negotiating for higher wages.

### **2. Age and Years of formal education:**

Moving to age as a control variable, its influence is twofold due to its time-bound nature, inherently reflecting both age and years of formal education. For every additional year of age and formal education, wages increase by an average of 7.4% and 4.1%, respectively, all other factors being constant. However, the variable `age_sq` shows a negative coefficient, indicating that wages initially rise, reach a saturation point, and then gradually decline as individuals age beyond that point.

### **3. Household Size:**

The Household size speaks about the quantity of labor supplied. When the household size increases by one unit, wages tend to decrease by 2% for individuals at a given education level, while holding other factors constant. This decline in wages could be attributed to a potential reduction in effort towards economic activities due to increased engagement in non-market work within larger households. In developing economies like India, where there is a surplus of labor, open unemployment rates remain low as individuals are eager to secure any form of employment to sustain themselves and their families. The absence of passive income support systems for the unemployed further emphasizes the necessity for individuals to seek employment actively. This situation often leads to a depression of wages as individuals are willing to accept low-paying jobs rather than remain unemployed. With an increase in household size, more members may enter the labor market seeking casual wage employment. However, this influx of labor often results in each worker having to work for fewer hours, leading to a significant portion of the workforce being underemployed and engaged in low-productivity work. Consequently, the earnings from such activities tend to be considerably low on average, underscoring the prevalence of a situation where many workers find themselves trapped in low-paying occupations.

### **4. Marital Status:**

Following that we used Marital status as the next control variable. Married men in India tend to earn 8% more than their unmarried counterparts due to a combination of factors. Marriage often brings added responsibilities and motivations to provide for a family, leading to increased commitment and effort in the workplace. Social expectations of men as primary providers further reinforce this drive for financial success. Additionally, marriage expands social networks, providing access to job opportunities and career support. The division of labor within traditional family structures allows married men to focus more on their careers, enhancing their earning potential. Employers may also offer incentives for stability, such as benefits for spouses, contributing to higher overall compensation for married men. These factors collectively contribute to the observed trend of married men earning more in India.

### **5. Geographic Demarcation:**

At a given educational attainment level and while holding other factors constant, individuals in rural sectors tend to earn 24.1% less than their urban counterparts. Several factors contribute to this disparity:

1. **Limited Employment Opportunities:** Rural areas typically offer fewer job opportunities, especially in industries that offer higher wages such as manufacturing and technology. The predominance of agrarian economies in rural regions results in a scarcity of non-agricultural employment prospects, ultimately leading to depressed wage levels.

2. Lower Levels of Education and Skills: Rural populations often have lower educational attainment levels and reduced access to skill development opportunities compared to urban areas. This educational deficit limits their access to higher-paying jobs that necessitate specialized skills or credentials, thereby constraining their earning potential.

3. Lack of Infrastructure and Services: Rural regions frequently lack critical infrastructure such as robust transportation networks, reliable electricity, accessible healthcare facilities, and quality educational institutions. The absence of these essential amenities impedes economic growth and restricts employment opportunities, ultimately contributing to lower wages for rural inhabitants.

## **6. Social Groups:**

The returns to education for individuals belonging to Scheduled Tribes (ST) and Scheduled Castes (SC) in India are observed to be notably higher at 37% and 2.3%, respectively, compared to other social groups. This phenomenon can be largely attributed to the reservation policies implemented in India.

Reservation policies in India aim to address historical injustices and social inequalities by providing preferential treatment, including reserved seats in educational institutions and government jobs, for marginalized communities such as ST and SC. As a result, individuals from these communities often have enhanced access to educational opportunities and employment avenues, which in turn leads to higher returns on their educational investments.

Additionally, individuals from ST and SC communities often face socio-economic disadvantages and systemic barriers that hinder their educational and economic advancement. Reservation policies help mitigate these barriers by providing affirmative action measures that empower individuals from marginalized backgrounds to access education and secure better-paying jobs, thus yielding higher returns on their educational investments compared to other social groups.

## **Technical education:**

The College level of education which was discussed before tends to cover the part of technical education. Here, technical education is categorized into four different categories which include technical education in agriculture, technical education in engineering, technical education in medicine and other disciplines. It is observed from the regression analysis that the returns on education for a technical degree in agriculture yields 55.6% and thus outstrips those of other technical fields due to several factors intrinsic to the country's agricultural landscape. Firstly, India's agricultural sector is undergoing rapid modernization and technological advancement to address challenges such as food security, sustainable farming practices, and rural development. As a result, there is a growing demand for skilled professionals with expertise in agricultural science, technology, and management.

However, the supply of individuals with specialized agricultural education remains relatively limited. Despite agriculture being a significant contributor to India's economy and employment, the number of graduates with technical degrees in agriculture is often lower compared to other fields such as engineering or information technology. This imbalance between demand and supply leads to a scarcity of skilled agricultural professionals, thereby driving up the wages and career opportunities for those with agricultural qualifications.

Moreover, governmental policies and initiatives further bolster the attractiveness of agricultural careers in India. Various schemes and subsidies aim to promote agricultural education, research, and entrepreneurship, incentivizing individuals to pursue education and careers in agriculture. Additionally, the tax treatment of agricultural income in India is often favorable, with lower tax rates or exemptions provided to agricultural income earners, further enhancing the financial rewards associated with agricultural professions.

Furthermore, the cultural and societal significance of agriculture in India adds to the appeal of careers in this sector. Agriculture is deeply rooted in Indian traditions, culture, and livelihoods, and many individuals are drawn to the idea of contributing to the country's agrarian heritage and rural development efforts.

**Annexure:**

**Regression on General education in India (2017-18)**

|                   |              |
|-------------------|--------------|
|                   | (1)          |
| VARIABLES         | logwage      |
|                   |              |
| Secondary         | 0.164*       |
|                   | (0.0849)     |
| higher secondary  | 0.281***     |
|                   | (0.0990)     |
| diploma           | 0.469***     |
|                   | (0.113)      |
| graduate          | 0.512***     |
|                   | (0.122)      |
| postgraduate      | 0.667***     |
|                   | (0.139)      |
| Female            | -0.490***    |
|                   | (0.0166)     |
| age               | 0.0743***    |
|                   | (0.00413)    |
| age_sq            | -0.000680*** |
|                   | (4.94e-05)   |
| YFE               | 0.0416***    |
|                   | (0.00771)    |
| hh_size           | -0.0209***   |
|                   | (0.00316)    |
| Currently married | 0.0806***    |
|                   | (0.0206)     |
| Rural             | -0.242***    |
|                   | (0.0141)     |
| Schedule tribe    | 0.380***     |
|                   | (0.0215)     |
| Schedule caste    | 0.0230       |
|                   | (0.0197)     |
| Others            | 0.150***     |
|                   | (0.0153)     |
| Constant          | 6.884***     |
|                   | (0.0803)     |
|                   |              |
| Observations      | 42,925       |
| R-squared         | 0.153        |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*Table 1.*

### Regression on Technical education in India (2017-18)

|                                       |              |
|---------------------------------------|--------------|
|                                       | (1)          |
| VARIABLES                             | logwage      |
|                                       |              |
| Technical degree<br>in agriculture    | 0.555*       |
|                                       | (0.298)      |
| Technical degree<br>in engineering    | 0.338***     |
|                                       | (0.0473)     |
| Technical degree<br>in medicine       | 0.422***     |
|                                       | (0.0934)     |
| Technical degree<br>in other subjects | 0.148***     |
|                                       | (0.0508)     |
| Female                                | -0.476***    |
|                                       | (0.0170)     |
| age                                   | 0.0768***    |
|                                       | (0.00421)    |
| age_sq                                | -0.000705*** |
|                                       | (5.03e-05)   |
| YFE                                   | 0.0813***    |
|                                       | (0.00155)    |
| hh_size                               | -0.0196***   |
|                                       | (0.00324)    |
| Currently married                     | 0.0679***    |
|                                       | (0.0213)     |
| Rural                                 | -0.249***    |
|                                       | (0.0144)     |
| Schedule Tribe                        | 0.383***     |
|                                       | (0.0219)     |
| Schedule Caste                        | 0.0391*      |
|                                       | (0.0203)     |
| Others                                | 0.147***     |
|                                       | (0.0158)     |
| Constant                              | 6.644***     |
|                                       | (0.0779)     |
|                                       |              |
| Observations                          | 40,406       |
| R-squared                             | 0.148        |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 2.



**References:**

- **Chen, Jie & Bhaduri, Sanghamitra & Pastore, Francesco. (2022). Updates on Returns to Education in India: Analysis using PLFS 2018-19 Data. SSRN Electronic Journal. 10.2139/ssrn.4114527.**