DSAI Working Paper 2014/003

What Explains the Gender Discrimination in Employment and Earnings of Engineering Graduates in India?

Pradeep Kumar Choudhury

Institute for Studies in Industrial Development (ISID),
4, Institutional Area, Vasant Kunj, New Delhi - 110070, India
E-mail: pradeep.hcu@gmail.com

Published: 24 November, 2014
Development Studies Association of Ireland

Abstract

The paper analyzes the factors that are responsible for gender discrimination in the employment and earnings of engineering graduates in India. It has used the data collected in 2009-10 through a survey among the fourth year students in Delhi who have gone through the placement exercise. The author finds, among other things, that a smaller percentage of women engineering graduates than men have got job offer and it varies widely across socio-economic settings. Also, it is found that the offered earnings of women are about 54 per cent less than that of men. The results provide strong and consistent evidence that institutional factors account for a sizable portion of the employment and earnings gap between male and female graduates, with type of institution (government/private) contributing a large part of it. There is no significant difference in the employment of students by their branch of study (traditional/IT-related) but it has a role to play in the offered earnings of the graduates. The study suggests in minimising the gender discrimination in terms of employment and earnings of engineering graduates that may increase the access of females to this discipline.

Keywords: Engineering Education; Gender Discrimination; Employment; Earnings; India

JEL Classification Code: I21, J21, J31, J71

1. Introduction

In many developing countries, including India, the gender differences in employment and earnings are a common phenomenon and also seen as a serious policy issue. The employers positive discrimination towards male candidates, keeps many talented and highly qualified females out of the workforce. In India, the female labour force participation (FLFP) has remained lower than male participation and in the recent years it has fell down further. According to the International Labour Organization's (ILO's) Global Employment Trends 2013 report, India's FLFP rate fell from 37.3 per cent in 2004-05 to 29 per cent in 2009-10. Out of 131 countries, India ranks 11th from the bottom in female labour force participation. The most recent figure of World Bank shows a FLFP rate of 28.7 in India, as compared to the world average of 50.4 (World Bank Indicators for Social Development, 2012). Further, in the economics of education literature, labour market discrimination against women is one of the most cited explanations of the gender gap in education (Kingdon, 1998). Some of the potential causes of the discrimination against women in the Indian labour market lie with the established argument that employers expect, on an average, better performance from men compared to women. They might feel that male employees tend to work for longer hours, while there may be interruption of the work by women because of uneven pressure of family responsibilities. Also, it is relatively easy to transfer male employees from one establishment of the company to the other as compared to female employees. Examining the reasons for the stagnant FLFP in India, Klasen and Pieters (2012) have found that the rising male education and income induces women to drop out of the labour force. Moreover, the issue of gender discrimination in the job market is more clearly visible in the engineering sector, where male candidates are strongly preferred than females. It is often argued that engineering and technical education is a masculine domain and hence, out of reach for women. Those who advocate this line of argument point to the persistence of certain social myths such as 'women are emotional while technology is strictly logical and hence both do not go together [Rao, 2007, pp. 187]. Considering these popular observations, one can expect that, other things being equal, companies coming for on-campus recruitment prefer to hire male graduates compared to females.

What are the factors that determine the gender discrimination in employment and earnings among engineering graduates? Economist Paula Stephan (1996) has observed that the extent science and engineering jobs value measurable skills and knowledge over less tangible traits

such as personality or appearance (which are more important in some non-science and engineering jobs such as management, sales and service), then a small set of human capital variables might be expected to capture a large portion of the gender variation in employment opportunities and offered earnings. A similar argument is also given by Kingdon (1998) for India. However, by contrast, sociologist Laurie Morgan (1998) offers an alternative view and argues that since science and engineering jobs have been traditionally male-dominated, women find themselves at a disadvantage in terms entry, pay and promotions. This view suggests that factors other than human capital are likely to account for much of the gender variations in the employment and earnings. Combining these two alternative views, one can suggest that both human capital and socio-economic factors are likely to account for much of the gender differential in getting a job and also in earnings. Thus, in this paper both human capital and other socio-economic factors are included in the analysis to understand the gender discrimination in employment and offered earnings of engineering graduates in India.

This study on gender discrimination in the engineering job market assumes greater significance because of two potential reasons; first, gender differences in the choice of institutions – the participation of women students in the private institutions are relatively higher than that of government institutions in India, and therefore, it is expected that the scope of getting a job in the labour market among women students is less. It is because of the fact that the large scale expansion in private engineering education has come at the cost of quality of the educational offerings due to outdated curricula, inadequate infrastructure, shortage of qualified teachers and, poor teaching/learning process and hence, the employability in the job market. Second, gender differences in the choice of courses - a wide range of literature show the differences in the employment avenues of engineering graduates by their fields of specialisation. Further it is noticed that the choice of subjects within engineering is influenced by the gender. More clearly, the women are more likely to opt for IT-related courses like computer science, electronics and communication engineering, information technology etc. whereas majority of men go for traditional courses such as electrical, mechanical and civil engineering. Thus, one needs to examine the impact of gender differences in the choice of fields of specialisation on their employment and offered earnings. The importance of carrying out this study also lies with the widely argued fact that certain personal factors like choice of the location of the job, rigid job preferences (for example, preference for the public sector jobs over private jobs) etc. may

influence the gender differences in employment and earnings of the engineering graduates, which perhaps not many studies have highlighted in their analysis. Given the lack of evidence and the voiced concern of policy makers and other stakeholders about the gender inequality in the engineering labour market in India, based upon survey data, this study examines factors determining the gender differences in employment and offered earnings of engineering graduates in Delhi, by considering a fairly large set of demand side factors.

The rest of the paper is organised as follows: section 2 presents data and method used for the analysis. This is followed by the description of results on the determinants of gender discrimination in employment. The next section examines the factors that are responsible for the gender differences in earnings among the graduates. Section 5 points to the study's conclusion.

2. Data and Method

Issues raised in the paper are examined using the primary survey data from 2009-10.[1] The survey collected information, on the status of engineering education in four states of India, namely Delhi, Maharashtra, Karnataka, and Tamil Nadu. The present study is based on data collected from Delhi and the survey respondents include fourth year students of selected departments in eleven engineering institutions.[2] These include five government institutions (including Indian Institute of Technology, Delhi) and six private institutions. The selection of fourth year students was done due to the fact that the information related to labour market aspects can be answered by these graduates, as in majority of the colleges the campus recruitment among students take place when they are in the fourth year of their course. Also, the fourth year students are assumed to be mature enough to maintain consistency in answering questions. The total number of students surveyed was 1178 out of which 41 per cent were from government institutions, and 59 per cent from private institutions. [3][4] Distribution of engineering

[1] The survey was conducted by the National University of Educational Planning and Administration (NUEPA) as part of a research project titled 'Potential Economic and Social Impact of Rapid Expansion of Higher Education in the World's Largest Developing Economies.' This international comparative study was conducted in collaboration with Stanford University covering India, Brazil, Russia and China. Hereafter, it will be referred as 'NUEPA Survey.'

[2] The survey targeted to include all the then existing 15 graduation level engineering institutions in Delhi; however, data was collected from 11 because two institutions did not permit to conduct the survey and the other two had no traditional and/or IT-related departments of study, as these institutions were offering courses only in power engineering and tool engineering.

students according to their branch of study shows that three-fourth were from IT-related departments and the rest one-fourth were from traditional departments of study. Traditional branches include mechanical engineering, civil engineering, and electrical engineering which have been the standard departments in engineering institutions for a long period; and Information Technology (IT) related departments, also called modern departments, include computer science and engineering, electronics and communication engineering, and information technology. Of the total students covered in the study, 15 per cent were female (177 in numbers), their share being 10 per cent in government institutions and 21 per cent in private institutions.[5] Distribution of students by social category shows that 83 per cent were from general category followed by scheduled castes (9 per cent), other backward classes (5 per cent) and scheduled tribes (3 per cent). Further, the representation of scheduled caste and scheduled tribe students in private institutions was less than the government institutions.[6]

The student questionnaire was administered to collect information on labour market aspects, socio-economic profile of the students, academic background of the students, and students' current education detail that are used in the analysis. Generally, in India, on-campus recruitment of engineering graduates takes place when they are in the third/fourth year of their programme through placement cell of the institution. Different companies or organizations visit engineering institutions for on-campus recruitment and select graduates as per their requirements with the help of interviews or group discussions or any other selection criterion developed by the

[4] The survey had planned to cover all the fourth year students of selected traditional and IT-related departments of 11 institutions, but some students were absent at the time of data collection and some who were present did not wish to be included in the survey. The absentees and those who did not wish to participate in the survey together constitute 1 to 4 per cent of total enrolment in different engineering institutions. Institution-wise number of students surveyed is given in Table A1 in appendix.

[5] The representation of female students in this survey data is better than national average. In India, the share of females in the discipline of engineering education is only 11 per cent in 2011-12 and it was further less (7.7 per cent) in 2009-10, the year in which the primary survey was undertaken (Annual reports 2009-10 & 2011-12, University Grants Commission).

[6] In India for the purpose of affirmative action in education, students belonging to various castes and communities are broadly classified as Scheduled Caste (SC), Scheduled Tribe (ST), Other Backward Class (OBC) and general category. It is well recognised that the students from the SC, ST and OBC categories fare relatively poorly in several socio-economic indicators when compared with the general category students.

employers.[7] The data collected from the survey on 'whether engineering graduates have got job offer or not' is taken as indicator of their prospectus for getting employment. At the time of survey (in 2009-10), students were in fourth-year of their study and they will join in their offered job after completion of the course. They have not entered into the job market yet. Some engineering graduates have got job offer and some do not through the campus placement till the survey time. In the questionnaire, the students who have got job offer were asked to provide their job information on three important aspects: type of job (engineering/non-engineering), type of the company (domestic/foreign/joint venture), and annual salary offered for the job. The annual salary offered to the graduates who have got campus placement is taken as the earnings from their jobs.

To analyse the factors responsible for the gender variations in employment probabilities and expected earnings, the following two models are used:

i. *Logit Model:* This is used to find out the factors determining the gender discrimination in employment of engineering graduates.

ii. *Ordinary Least Square (OLS) Technique*: This is used in examining the determinants of the gender differences in the offered earnings of engineering graduates.

Keeping in view the possible determinants of gender differences in employment of engineering graduates in the labour market in India, the major hypothesis of the study is: the probability of getting employment in the labour market and their offered earnings differs significantly between male and female engineering students. The explanatory variables used in the regression are broadly categorised as individual characteristics, household factors, student's academic background, student's current education status, and job characteristics. The summary statistics of the explanatory variables used in the analysis is given in Table A2 in Appendix.

[7] Major companies visited different engineering institutions in Delhi for the campus placement in 2009-10 academic year as mentioned in the mandatory disclosure of different institutions include: Microsoft, Mckinsey, International Business Machines, Tata Consultancy Service, Computer Science Corporation, Maruti, Tata Motors, Samsung, Bharat Heavy Electrical Limited, National Thermal Power Corporation, and Defence Research and Development Organisation, Accenture, Birlasoft, Convergys, I-Flex, Hindustan Computer Limited, Infosys, Sapient, Syntel, Tata Tele Services etc.

3. Determinants of Gender Discrimination in Employment

In the recruitment process companies primarily look at the academic and current educational backgrounds, individual characteristics and household factors, besides some other specific information such as willingness to work in a particular place, expected salary etc. from the engineering graduates. Academic and current educational background here includes past academic information and present educational background of graduates. Information related to senior secondary level of education such as whether students were taught in English or not, and percentage of marks scored in the senior secondary examination are considered as academic background of graduates. Current educational background comprises the factors related to present programme of study such as type of institution and department of study the graduates are enrolled with, whether any formal mechanism is set up by the institution for graduates to keep in touch with their alumni, and whether they have availed educational loan or not from commercial banks. An attempt is made in this section to find out how the effect of these factors on employment of engineering graduates differ by gender, using binary logistic regression. Three separate logit equations (male, female and total) are estimated for this and take the following form:

$$Employment = \alpha + \beta_1 Gender + \beta_2 Mgtpvt + \beta_3 Deptit + \beta_4 Secmarks + \beta_5 Secmed + \beta_6 Eduloan + \beta_7 Alumni + \beta_8 SC + \beta_9 ST + \beta_{10} OBC + \beta_{11} Fathocpprf + \beta_{12} Fathocpbsn + \beta_{13} Fathsch + \beta_{14} Mothsch + \varepsilon \quad \textit{(Eqn. 1)}$$

Where,

Employment = whether graduates have employed or not, which is a dummy variable and defined as

1, if the graduates have employed and 0, otherwise, i.e., if the graduates have not employed

α = constant

βi = respective coefficient of the explanatory variables

ε = error term

Explanatory Variables

Gender[8]*:* Despite significant progress of the female participation in the workforce in recent decades, labour markets across the world (specifically in less developed and developing countries) remain divided along gender lines, and improvement toward gender equality seems to have stalled (Woytek et al., 2013). It is generally observed that, other things being equal, employers coming for the on-campus recruitment prefer male to female candidate. They might feel that male employees tend to work for longer hours, while females have family obligations. Also, recruiting a male candidate will help the companies to transfer employees to different place of their establishments. Moreover, the problem of gender discrimination in the job market is predominantly visible in the engineering sector, where male candidates are strongly preferred than females. Considering these popular observations, one can expect that, other things being equal, companies coming for on-campus recruitment prefer to hire male graduates compared to females.

Gender = 1, if the students are male

= 0, otherwise i.e. if the students are female

Type of Institution: Companies generally prefer employing graduates of government to private institutions. This may be due to the quality and brand name (if any) differences between these two type of institutions. Very often it is viewed that graduates of government institutions are better trained than the private institutions due to the availability of experienced faculty and other physical infrastructure. The competition level to enter into some of the public technical education institutions such as Indian Institutes of Technology (IITs), National Institutes of Technology (NITs) is very intense as graduates of these institutions command better job opportunities and higher incomes than average. In the global ranking of educational institutions, IITs and other public-funded educational institutions rank among the top most institutions that influence parental decision to enrol their children in these.[9] Therefore, it is interesting to analyse how the type of institution matter in gender differences in employment.

[8] GENDER is used as an explanatory variable only in the equation where male and female taken together.

[9] Four IITs (Delhi, Kanpur, Kharagpur, and Roorkee) have been placed within the top 400 institutions in the world university rankings 2013-14 done by the Times Higher Education, UK. Similarly, five IITs (Delhi, Bombay, Kharagpur, Kanpur and Madras) are among the top 20

Mgtpvt = 1, if the students have enrolled in private institutions

= 0, otherwise, i.e., i.e., if the students have enrolled in government institutions

Department of Study: Another important factor that may determine the employment of graduates is the choice of department of study. Due to a large scale expansion of IT sector in India in recent years, one can expect that the graduates from IT-related courses have higher probability to get employment than the students of traditional courses. However, the global economic downturn that started in the end of 2008 had a significant impact on the job market of India, particularly on the IT-related fields which might have an adverse impact on the graduates of these courses. Thus, in this juncture, it is important to analyse the influence of the choice of departments on employment. In addition to this, analysing the gender discrimination in employment of graduates by department of study is an important concern to examine. Men are much more likely than women to study traditional courses in engineering; a factor which greatly increases their chances of getting a job offer in the labour market. It is likely that the employers may prefer female graduates from IT-related courses and male graduates from traditional courses, mainly due to the nature of job they are expected to perform.

Deptit = 1, if the students have enrolled in IT-related departments

= 0, otherwise, i.e., if the students have enrolled in traditional departments

It is commonly felt that the academic background of the graduates has a significant effect on getting a job in the labour market due to the fact that they can perform well in the selection process and have higher chances to get employment than the graduates with poor academic backgrounds. Considering this, two factors on academic background (percentage of marks scored and whether English as the medium of instruction or not in the senior secondary level of education) are included in the analysis. The common understanding here is that with more or less same academic background employers treat male and female separately in the recruitment process. For example, a male is preferred to female with weak academic performance if the job is in a remote area or needs frequent travelling.

---

institutions in the 2014 QS University Rankings, which grades higher education institutions of the BRICS countries: Brazil, Russia, India, China and South Africa.

Percentage of Marks Scored in Senior Secondary Level[10]*:* Graduates scoring higher percentage of marks in senior secondary examination may have better chance to be employed than the students scoring comparatively less. This is because most of the companies coming for campus recruitment also take note of the previous academic background of the graduates in their selection process. Further, it is important to find out its effect on employment and earnings by gender.

Medium of Instruction in Senior Secondary Level: It is widely felt that graduates with English as a medium of instruction will be able to perform better in the selection process and have a fair chance to get employment vis-à-vis the graduates with Hindi or regional language as their medium of study in senior secondary level. The effect of this on gender wise variation in employment and earnings are also discussed.

Secmed = 1, if the students have taught in English medium

= 0, otherwise, i.e., if the students have taught other than English medium

Alumni of the Institutions: Engineering institutions usually develop formal mechanisms to keep current students in touch with their fellow graduates via group mails, organising annual alumni meeting etc. This helps graduates to discuss the employment perspectives after completion of their programme of study. Fellow graduates share their job experiences and give guidelines to the fresh graduates which help them to get a better job. Thus, one can expect that the students enrolled in the institutions having a formal mechanism to keep in touch with their fellow graduates/alumni have higher likelihood of getting employment in the labour market than the students enrolled in the institutions where no formal mechanism has set up for alumni contact. It is commonly accepted that the impact of alumni contacts on employment work more effectively among males as compared to females. This is perhaps for the obvious reason that in the institutions having a formal and common mechanism to interact with their alumni, male students take advantages of it by talking to their seniors whereas female graduates hesitate for this to some extent.

---

[10] Percentage of marks scored by the students in the first three years of their engineering course would have been a better indicator to measure the quality of graduates than the percentage of marks scored in senior secondary examination, as considered in the present analysis. However, this information was not collected in the survey.

Alumni = 1, if there is any formal mechanism by the institutions to be in touch with their alumni

= 0, otherwise, i.e., if there is no formal mechanism by the institutions to be in touch with their alumni

Educational Loan: Graduates availed educational loan from commercial banks is likely to have higher probabilities to get employment in the labour market. It may be due to the fact that they have financial responsibility and would be ready to take any job after completion of their programme of study. Male graduates with educational loan will be more ready to take the job than that of females. This is due to the fact that the educational loan taken by female graduates are usually born by the parents whereas in most of the cases of male graduates, they take the responsibility to pay.

Eduloan = 1, if the students have availed educational loan from commercial banks

= 0, otherwise, i.e. if the students have not availed educational loan from commercial banks

Social Category: It is included as an explanatory variable to see how the social category matters for getting a job in the engineering labour market. It is generally observed that majority of the companies coming for on-campus recruitment belong to private sector who do not provide reservation to the students belonging to Scheduled Castes (SCs), Scheduled Tribes (STs) and Other Backward Classes (OBCs). This may lead to higher chances of getting employment by general category students than the students belonging to SCs, STs and OBCs. The effect is expected to be higher among females than males i.e. the female graduates from SC, ST and OBC will have less chance to get a job offer than males belonging to similar social category as they face double disadvantages, being female and belonging to lower social strata.

SC = 1, if the students belong to Scheduled Castes

= 0, otherwise

ST = 1, if the students belong to Scheduled Tribes

= 0, otherwise

OBC = 1, if the students belong to Other Backward Classes

= 0, otherwise

General (reference category) = 1, if the students belong to non-SC, non-ST and non-OBC
= 0, otherwise

Occupation of the Father: Generally it is felt that parents' occupation influences the probability of getting employment of their wards. For example, a student whose father is engaged in engineering field helps his/her child to get a job easily. Information on occupation of the parents was collected from sixteen occupation categories which are re-classified here into three: (a) professional or technical worker; (b) businessmen; and (c) others. The reclassification was done mainly due to less number of observations in many of the occupation categories such as clerical and related workers, service workers, farmers, fishermen and related workers, skilled workers (foreman, craftsman etc.), unskilled workers (ordinary labourer), retired, and workers not classified by occupation (athlete, actor, musician, unemployed, partially unemployed). All these occupation categories were included in the category of 'others'. The 'professional or technical worker' includes both junior and senior professional workers like doctor, professor, lawyer, architect, engineer, nurse, teacher, editor, photographer and bank employees. As there is a common understanding that sons follow the occupation pattern of their fathers more than daughters the effect of father's occupation on employment will be greater for male graduates compared to the females. It is pertinent to note here that mother occupation may be an important factor in determining the employment, however not included in the analysis. This is because there is not much variation in the mother's occupation as three-fourth of them are housewives, thus may not make much sense in the analysis.

Fathocpprf = 1, if father occupation is professional work
= 0, otherwise

Fathocpbsn = 1, if father occupation is business
= 0, otherwise

Fathocpoth (Reference Category) = 1, if father occupation is others (occupation other than professional work and business)
= 0, otherwise

Educational Level of the Parents: Educated parents (also other educated adult members of the household) are more aware of the benefits of education and invest more on it to provide quality education to their wards, which has been established in quite a number of studies (Kanellopoulos and Psacharopoulos, 1997; Dang, 2007; Masterson, 2012; Saha, 2013).

Therefore, a positive association between parents' education and the employment scope of graduates is usually expected. More educated parents are also well informed about the job market and give tips to their children to get a job without much difficulty than the students whose parents have not gone for higher level of education. To examine this fact, students were asked to report the highest level of education of both father and mother. In the analysis, the levels of education were converted to years of schooling, as it is considered as a better indicator and has been extensively used in the literature than that of the level of education. Many studies in the context of developing countries have widely observed pro-male bias in household spending on education and a few of these have also confirmed that the variation in household investment on education by gender is primarily due to the parents' preference for better quality education for boys (by investing more) over girls (Kingdon 2005; Aslam and Kingdon 2008; Lancaster et al. 2008; Himaz 2009; Zimmermann 2012; Azam and Kingdon 2013). For example, parents send their sons to good quality coaching centers for preparing them to get a seat in prestigious engineering institutions such as IITs and hesitate to invest on girl children and do not mind if she gets admission in any of the institutions. Thus, it is likely that the probability of employment among male graduates will increase more (compared to the female graduates) with the increase in the parents level of education, as parents are more worried to provide a job to their son (by investing more and providing quality education) than that of their daughters.

Result and Discussion

The survey data reveals that only 32 per cent of the graduates got employment in the year 2009-10. The possibilities for the low employment may include: (a) companies might have come for the recruitment of specific department of study; (b) it may be the case that companies have less requirement of manpower and hence, employed less number of graduates; and (c) it is quite possible that graduates might not have liked the jobs they have been offered, may be due to the mismatch of expectations between graduates and companies on earnings, location of the job, and other such employment factors. Also, around one-third of the students have wished to go for higher studies after completion of their undergraduate programme, which may be one of the reasons for not taking the offer through campus placement. In our sample, 40 per cent of males and 25 per cent of females have got job offer in 2009-10. Also, logit results show that all else equal, male students are more likely by 5 percentage points than females to be employed in the job market (column 2, Table 1). This finding is in agreement with literature, which emphasises

that science and engineering jobs have been traditionally male-dominated and women find themselves at a disadvantage position (Morgan, 1998; Graham and Smith, 2005; Rao, 2007). The gender difference in employment may also be attributed to: (a) the lack of adequate and suitable employment opportunities for women, and (b) deliberate discrimination in the job market against women which may be based on the employers' perception of women productivity or simply the prejudice against women. The descriptive as well as logit results provide strong and robust evidence of gender discrimination in the employment of engineering graduates. The concern here is how much of such differential in the job offer between men and women can be explained by taking account of the different individual, human capital and institutional factors.

The logit estimates reported in Table 1 show that the type of institution the graduates have enrolled has the strongest influence on their employment. As revealed from the marginal effect, graduates of private institutions had 36 percentage points less chance of getting employment compared to the graduates of government institutions. It is commonly observed that government institutions in India provide better quality engineering education and graduates from these institutions have higher employment scope in the labour market compared to students from private engineering intuitions (Choudhury, 2013). Further, both male and female graduates from government institutions are more likely to have jobs compared to private institutions. Interestingly, the effect of the type of institution on employment is higher among females than males. All else equal, women (men) students from the private engineering institutions are 51 (34) percentage points less likely to get job offer than the students who are from government engineering institutions (column 7 and 10, Table 1). Therefore, this supports the already stated argument that the lower participation of female graduates in the labour market is primarily due to their poorer access to government engineering institutions. Among the total female students surveyed in this study, as high as 75 per cent are from private institutions. In India, parents usually demand for better quality education of boys over girls and, therefore send their sons to prestigious engineering institutions such as IITs, and do not mind if the daughter gets admission in any of the institutions.

Students availing educational loan or not from commercial banks came out to be the second most important factor in determining the employment of graduates. The results show that students who availed educational loan were less likely to get employment than the students who have not availed loan. More clearly, as shown in the marginal effect, students taking educational

loan had 22 percentage points less chance to get employment than the students who have not taken educational loan. This does not go with the general observation that the students availing loans have financial obligations and hence have higher chance of joining in the job market. It is worthwhile to mention here that, of the total students availed educational loan from commercial banks, around 35 per cent have planned to go for further studies and may not have given importance to the employment. As expected, the effect of availing educational loan on employment is higher for females compared to males. The values of the marginal effect show that male students who have availed educational loan are less likely to get job offer by 20 percentage points whereas it is 30 percentage points for females. It supports the argument that the educational loan taken by female graduates are usually born by the parents whereas in most of the cases of male graduates, they take the responsibility to pay by engaging themselves in the labour market.

The third most important factor determining the employment of graduates is their social category. Engineering graduates of STs and OBCs are less likely to get employment compared to the graduates belonging to 'general' category. Employers may not prefer the graduates belonging to these social categories in recruitment. Approximately 33 per cent of graduates from general category got employment, whereas it is 26 per cent for OBCs, 19 per cent for STs. The effect of social category on gender discrimination in the employment of graduates gives some interesting findings. The male graduates belonging to SCs, STs and OBCs are less likely to get job offer than the general category students whereas it gives opposite result for females i.e. students belonging to SC, ST and OBC are more likely to get job compared to general. It is interesting to note that SC female students are 55 percentage points more likely to be employed compared to general category students and statistically significant at 5 per cent level of significance. This does not support the view that female students belonging to lower social category (double disadvantaged) have lower chances of getting employment. The finding rather encourages for larger participation of women from socially disadvantaged sections of the society in engineering education.

TABLE 1

Gender Differences in the Employment of Engineering Graduates: Logit Estimate

(1)	Coeff (2)	S.E. (3)	M.E. (4) (*dy/dx**)	Coeff (5)	S.E. (6)	M.E. (7) (*dy/dx**)	Coeff (8)	S.E. (9)	M.E. (10) (*dy/dx**)
Variable		*Total*			*Male*			*Female*	
Mgtpvt	-1.65***	0.22	-0.36	-1.56***	0.23	-0.34	-2.51***	0.83	-0.51
Deptit	0.14	0.22	0.03	0.23	0.23	0.05	-1.19*	0.81	-0.24
Secmarks	0.03**	0.01	0.01	0.02*	0.01	0.00	0.07*	0.05	0.01
Secmed	0.27	0.31	0.06	0.20	0.32	0.04	0.56	1.51	0.08
Alumni	0.25*	0.19	0.05	0.41**	0.21	0.09	-0.79	0.63	-0.13
Eduloan	-1.16***	0.24	-0.22	-1.01***	0.25	-0.20	-2.81**	1.18	-0.30
Gender	0.22*	0.26	0.05	...	...	...	...	...	...
SC	0.09	0.36	0.02	-0.02	0.39	0.00	2.48*	1.48	0.55
ST	-0.68*	0.42	-0.13	-0.91**	0.46	-0.17	1.43	1.53	0.31
OBC	-0.58*	0.47	-0.11	-0.68	0.51	-0.13	1.46	1.48	0.32
Fathocpprf	0.02	0.28	0.00	-0.10	0.29	-0.02	1.02	1.28	0.15
Fathocpbsn	0.19	0.32	0.04	0.25	0.33	0.06	-0.41	1.46	-0.07
Fathsch	-0.05	0.06	-0.01	-0.02	0.07	0.00	-0.75**	0.32	-0.13
Mothsch	0.09**	0.04	0.02	0.11**	0.04	0.02	0.29*	0.20	0.05
Constant	-2.54**	1.25		-2.62**	1.23		2.35	5.63	
Log-Likelihood	-357.69			-304.24			-41.68		
Pseudo R^2	0.16			0.15			0.35		
Observations	657			552			105		

Note: (a) ***significant at 1 per cent level of significance; ** significant at 5 per cent level of significance; *significant at 10 per cent level of significance

(b) (*) *dy/dx* is for discrete change of dummy variable from 0 to 1

The logit estimates show that the graduates from the institutions having formal mechanism to keep in touch with their fellow graduates (*Alumni*) have higher chance by 5 percentage points to get employment than the students of the institutions having no provision of alumni

association. It is perhaps due to the fact that institutions having alumni association put effort to organise talks and group discussions between the graduates and alumni on job market details, which helps them to get employment. For male only, having alumni association in the institute increases the likelihood of getting placement in the job market. However, having or not having any alumni association in the institution does not matter for the job offer of female graduates as the coefficient is statistically not significant (column 8, Table 1). This goes with the common understanding that male students take advantages of the existence of alumni contact in the institute by interacting with their seniors, whereas female graduates hesitate to some extent for this.

Among the two explanatory variables included under students' academic background, percentage of marks scored in the senior secondary examination (*Secmarks*) is statistically significant in determining the probability of getting employment (the result is significant at five per cent level). It appears that the companies coming for on-campus recruitment take into account the performance of the graduates at higher secondary level besides looking into their knowledge and skill acquired in the engineering course. Similar picture is found from the analysis of both male and female graduates, except the fact that its effect is marginally higher for females than males. This finding is in agreement with the literature, which emphasises human capital variables might be expected to capture a large portion of the gender variation in employment opportunities (Paula Stephan, 1996). The medium of instruction followed in the senior secondary level of education turned out to be statistically not significant. General impression that the teaching in English medium compared to non-English medium helps graduates to get a job easily is not supported in the study.

The results show that education of the mother is positively related with the employment of engineering graduates. With the increase in the mother's years of schooling by one year the probability of getting employed in the job market will go up by 2 percentage points. Between male and female, the effect of mothers' education on job offer is higher among females as compared to males. Having an educated mother in the family raises the likelihood of employment by 2 percentage points for males and 5 percentage points for female graduates. It is found that for all the three equations, the effects of other two related factors (father's occupation and educational attainment) are statistically not significant.

It is important to mention here that the department of study turned out to be statistically not significant in the determination of employment of graduates, though gives expected signs, except the female equation. The evidence does not support the hypothesis that higher propotionate of graduates in the courses such as electronics and commucation engineering, computer science and engineering, information technology etc. get employmnet than the graduates of courses like electrical engineering, mechanical engineering and civil engineering. The difference is found to be very less between the students of traditional and IT-related courses in getting employment, i.e., 33 per cent of graduates in traditional departments and 30 per cent in IT-related courses got employment in 2009-10. Hence, the general opinion that the demand for IT-related courses mainly due to its employment providing capacity is not supported in the present case. Perhaps this is because of the global economic slowdown which had affected in Indian job market very badly, particularly the IT-related fields. However, this issue indeed requires further and in-depth investigation.

4. Determinants of Gender Discrimination in Earnings

In this section, an attempt is made to find out the determinants of wage differentiation among male and female engineering graduates using OLS technique. Explanatory variables included in the model are: academic and current educational background of students, job characteristics, and individual and household factors. Equation used for OLS estimation is as follows:

$$lnEarnings = \alpha + \gamma_1 Gender + \gamma_2 Mgtpvt + \gamma_3 Deptit + \gamma_4 Jobtype + \gamma_5 Compforeign + \gamma_6 Compjoint + \gamma_7 Fathocpprf + \gamma_8 Fathocpbsn + \gamma_9 Fathersch + \gamma_{10} Secmed + \gamma_{11} Secmarks + \varepsilon \quad (Eqn.\ 2)$$

Where,

lnEarnings = annual earnings of engineering graduates (in logarithmic form)

α = constant

γ_i = respective coefficient of the explanatory variables

ε = error term

Explanatory Variables

Though the general tendency is to accept a job with higher earnings, in some cases students negotiate it with the nature and field of employment, place of posting, type of company etc. For example, students may take a job with relatively less earning in their native city or state than a

job with higher earning in faraway places. Hence, it is likely that the earnings of the graduates may differ significantly with the nature and field of job. Though the overall picture is this, its impact on earnings is expected to vary between male and female graduates. For example, there is a higher chance among female graduates to compensate the earning if they are posted in odd locations (mainly places far away from their native towns/city) whereas this may not be the case for male graduates. Similar is the case if female candidates are posted in a job other than their preference. Considering this, the OLS estimation includes two factors related to job market namely, field of employment and type of company students have got their employment; in addition to other explanatory variables (individual characteristics, household factors, academic background of the students, and current education status of students) that are used in the logit model and have discussed in section 3.

Field of Employment: Occupational difference by gender is an important characteristic in the Indian labour market and this has further contributed to the difference in the earnings. In the survey, graduates were asked to mention their job field they have got their employment through on-campus requirement. Jobs in which students have employed are classified as engineering and non-engineering. Jobs in engineering field include professional and technical works, whereas non-engineering jobs include human resource, marketing etc. Out of total students got job offer upon their graduation, 78 per cent have taken jobs related to engineering and the rest have gone for non-engineering jobs. The variable is defined as follows:

Jobtype = 1, if the students have employed in engineering related jobs;

= 0, otherwise, i.e., if the students have employed in non-engineering related obs.

Individuals select their occupation to maximise utility, which in turn, depends upon the earnings and other job related benefits, which includes both pecuniary aspects (like health and pension benefits) and non-pecuniary ones such as overall job satisfaction. One can expect that the choice of the type of job may be an important determinant of the earnings of both male and female students. Comparatively higher percentages of male graduates are from engineering related jobs than females (79 per cent against 74 per cent). It appears that the companies coming for the campus recruitment prefer male graduates for engineering jobs and females for non-engineering jobs.

Company Type: Companies came for on-campus recruitment to different institutions in Delhi are categorised as domestic, joint-venture and foreign. Around half of the male students got their job in foreign companies followed by domestic companies (41 per cent) and the least in joint-venture companies (14 per cent). But majority of the female students have got their jobs in domestic companies and restricting largely to this may limit their earnings. The 'type of company' included as an explanatory variable in the determination of annual earnings of the graduates is based on the hypothesis that the graduates employed in the foreign companies will earn more followed by the joint-venture companies and then domestic companies.

Dummy variables for type of company are defined as:

Compforeign = 1, if the students have employed in a foreign company;
= 0, otherwise, i.e., if the students have not employed in a foreign company.

Compjoint = 1, if the students have employed in a joint-venture company;
= 0, otherwise, i.e., if the students have not employed in a joint-venture company.

Compdomestic = 1, if the students have employed in a domestic company;
= 0, otherwise, i.e., if the students have not employed in a domestic company.

The *Compdomestic* is taken as the reference category in the analysis.

Result and Discussion

Since pay is the primary reason why most people work, earnings expectations are very important to graduates (Carvajal et al., 2000). In this study, of the 377 engineering students, who have got employment through on-campus recruitment, around 80 per cent have reported their first year earnings offered, which was Rs. 4.43 lakh per student per annum. The annual average salary offered to the male students was Rs. 4.5 lakh while the females received Rs. 3.98 lakh. The OLS results show that, male engineering graduates earn around 54 per cent more than females, as expected (column 2 Table 2). Several other studies have also found similar results, both in India and elsewhere (Kingdon, 1998; Toumanoff, 2005). What are the different factors those contribute for gender differences in the earnings of engineering graduates? Not surprisingly, it is the institutional factors that tend to be the strongest and significant determinants of earnings. Students from government engineering institutions like IITs earn

significantly more than those are from private engineering institutions. Annual average earnings of private graduates are 43 per cent less than the graduates of government institutions.

Difference in the earnings may be due to the fact that students from government institutions are more skilled and competent (because of the quality education) compared to the students of private institutions and hence, bargain for more salary. Major reasons emphasised in different studies for better quality education provided in government institutions in India include, the availability of trained faculties and physical infrastructure such as laboratories, classrooms, hostels etc.[11] As revealed from the institutional questionnaire of the survey, in 2009-10, average number of faculty in government engineering institutions was 140 whereas it was 90 in private institutions. Furthermore, the average number of faculty with Ph.D. qualification was 123 in government institutions and it is merely 12 in private institutions.[12] Similarly, average number of books and journals available in the libraries of government engineering institutions was 133 thousand whereas it was just 16 thousand in private engineering institutions. The earning to study in the government engineering institutions is higher for both male and female graduates but with different degree. Male students from private institutions get 46 per cent less salary than government institutions whereas for females the figure is 33 per cent. Both the coefficients are statistically significant at 1 per cent level of significance. This reveals that the choice of institution matters more on earnings of male graduates compared to females. As discussed in section 3, the reverse is true as per the employment is concerned i.e. the male students from government institutions are having higher probability of getting a job compared to private institutions and females. This evident that the female students are paid better irrespective of the institutional affiliation once they manage to get a job, which is not the case among male graduates.

[11] See Rao (2006); and Biswas *et al.* (2010) for a detailed discussion on quality related aspects of technical education in India.

[12] This large difference is mainly due to the inclusion of IIT Delhi in government engineering institutions where out of 357 full-time faculty 351 hold Ph.D. degree. Excluding IIT Delhi, the average number of faculty with Ph.D. qualification in government engineering institutions is 38 which is still three times higher than private engineering institutions.

Table 2
Gender Differences in the Annual Earnings of Engineering Graduates: OLS Estimate

	Coeff	SE	Coeff	SE	Coeff	SE
Variable	*Total*		*Male*		*Female*	
Mgtpvt	-0.43***	0.08	-0.46***	0.09	-0.33***	0.12
Deptit	-0.07*	0.08	-0.10*	0.09	-0.06*	0.11
Secmarks	0.01**	0.00	0.01*	0.01	0.02*	0.01
Secmed	0.01	0.13	0.01	0.14	0.13	0.20
Gender	0.54**	0.06	...	...	...	...
Jobtype	-0.15**	0.08	-0.20**	0.09	0.10	0.12
Compforeign	0.03	0.07	0.04	0.08	0.09	0.11
Compjoint	-0.07	0.11	-0.08	0.13	0.00	0.13
Fathsch	-0.01	0.02	-0.01	0.02	-0.03	0.04
Mothsch	0.01	0.02	0.01	0.02	0.02	0.03
Constant	0.95	0.49	1.06	0.51	0.17	0.90
R Square	0.21		0.21		0.52	
Adjusted R Square	0.18		0.17		0.35	
F-Value	6.12***		5.64***		3.01***	
Observations	232		198		34	

Note: ***significant at 1 per cent level of significance; **significant at 10 per cent level of significance

The second most important factor determining the offered earnings of graduates is the field of job they are employed. Regression coefficient suggests that the graduates employed in engineering firms earn 15 per cent less than the students employed in non-engineering fields. It appears that the companies coming for the campus recruitment prefer the male students in engineering jobs and female students in non-engineering jobs. This may be one of the macro reasons for less participation of women in the discipline of engineering education in India. It does not support the general presumption and the findings of the study by Graham and Smith (2005) that the earnings in engineering related jobs are higher than non-engineering related jobs. Higher earnings from non-engineering related jobs in India may be one of the important reasons for the recent trend of engineering graduates to work in the fields other than engineering. It is

surprising to note that the offered earnings of the male graduates who have offered their jobs in the engineering related fields is around 20 per cent less than the graduates who have got the offer in non-engineering related fields. But the effect of *Jobtype* on the earnings of female graduates is found to be positive though statistically not significant. More clearly, female graduates who have offered the job in engineering related fields are paid higher than non-engineering fields.

After type of institution and field of employment, department of study (*Dept_IT*) came out to be the third most significant factor in determining the annual earnings of students. The payoff to study in IT-related courses is 7 per cent less than that of traditional courses. It does not confirm the general opinion that IT-related graduates get higher earnings than the graduates of traditional courses, which requires a detailed probe. However, the impact of the slowdown of IT sector (which started in the middle of 2008) may be an important factor for such finding. The impact of *Deptit* on earnings varies by gender: for male, studying in IT-related courses declines earnings by 10 per cent; for female, studying in IT-related courses lowers earnings up to 6 per cent. Thus, this evident that studying in IT-related courses costs more for females compared to males which may be due to the fact that the female graduates might have opt for non-IT jobs which gives them better payoffs.

The human capital variable (academic background of the student) is strongly related to get higher wages. Out of the two such variables (*Secmarks*, *Secmed*) included in the model only the percentage of marks scored in senior secondary examination turned out to be statistically significant and positively associated with the earnings of both male and female graduates. Students with better results in the senior secondary level are offered higher wages while the students with poor performance are earning less. Scoring one per cent more in senior secondary examination raises earnings by one per cent for male and two per cent for female graduates. Chakravarty and Somanathan (2008), using data of 242 final-year students of IIM-Ahmedabad, have also found that academic performance of the students is an important determinant of salary offered to them. An increase of one grade point in the first year Grade Point Average (GPA) is estimated to increase the wage by more than 40 per cent.

5. Conclusion

The study specifically analyses the gender discrimination in the employment opportunities and offered earnings of engineering graduates in Delhi. The author finds that the share of women graduates are less than that of men to get a job offer. Similarly, employers offer substantially higher payoff to male graduates compared to females. The findings suggest that female graduates are discriminated in both the employment and earnings offered to them. Interestingly, gender differences in earnings are much more pronounced than in job prospects. While some of the gender pay gap can be explained by the nature of the jobs and companies, it has some wider implications like professional inequality between genders. Therefore, the possible reasons of gender differences in the earnings such as women work less, leave early due to family obligations, hesitation for moving etc. cannot be avoided. Not surprisingly, the institutional factors (particularly, type of institution and branch of study) are strongly related with the gender discrimination in employment and offered earnings of graduates. Some other important factors responsible for the gender discrimination in employment and earnings include the academic background, contact with the alumni, educational level of the mother and social category. The findings of the paper supports the major hypothesis of the study, i.e. both human capital and socio-economic factors are likely to account for the gender discrimination in employment and earnings of engineering graduates.

The lower level of participation among women in the discipline of engineering may be partly explained due to the gender discrimination in the labour market. More clearly, unfavourable labour market conditions and unattractive educational returns in the form of low wages reduce the women participation in this discipline. In case of women it works as a vicious circle. In a sense, the labour market discrimination reduces the women participation in engineering and the less participation further reduces their scope to work. Using a household survey data of Andhra Pradesh on employment and wages, Tilak (1980) has also given similar argument, i.e., in the case of the weaker sections, education and labour market results a vicious cycle – less amount of education bleak employment opportunities, unattractive educational returns in the form of low wages and hence less investment in education in the future (p. 112). Thus, to increase the women participation in the discipline of engineering, among other steps, the gender discrimination in the labour market need to be minimised.

The findings of the study have a few policy implications. It is important to note here that even though the graduates of private institutions are investing comparatively more than the graduates of government institutions, their probability of employment through on-campus recruitment is less and it is more so in case of females. Furthermore, the graduates of private institutions who have got employment earn less than the graduates got employment from government institutions. Thus, the private engineering institutions need to improve their quality to increase the employability of its outturn in the labour market. Further, providing better quality of education to women especially by investing on them and creating a women friendly work environment are some of the important ways to increase the scope of employment and earnings of female engineering graduates. The effort in this direction will not only help to bridge the gender gap in the labour market, will also increase the access to females in engineering education.

Two important limitations of the paper are: first, the choice and measurement of variables were restricted in the analysis, as the study had used data of an international study conducted by NUEPA. Information on some of the important variables would have been collected and used to enrich the quality of analysis of the study. For example, the study has examined only the effect of demand-side factors on gender differences in employment and the offered earnings of engineering graduates. Due the lack of information in the survey data, supply-side factors of labour market are not considered in the analysis, even though that is expected to affect the gender discrimination in the labour market. Different employers/companies coming for the campus placement to recruit engineering graduates have their own polices for the employees which influence the choice for a job in the labour market differently between male and female graduates. For instance, the female graduates may consider the working conditions (specifically transfer, and maternal and child-care policies) of the employers seriously before accepting the job offer. On the other hand, male graduates are more concerned on the offered earnings rather than other terms and conditions.

Second, the analysis was carried out by considering only Delhi as the area of study and similarly, it has focused only on engineering education without including other disciplines of higher education. Therefore, any generalisation or extrapolation of findings to the rest of the country needs to be done cautiously. However, Delhi being the capital city of India, students have come from different parts of the country and also from different socio-economic settings to

pursue their undergraduate level engineering programme, and thus, to some extent these results can be generalised. Out of the total students surveyed for the study, 60 per cent were from Delhi and rest 40 per cent had come from 20 other major states of India. Nevertheless, the study has made a unique start in taking some of the very important factors in analysing the gender discrimination in the employment and earnings of engineering graduates. Promising avenues for future research may include, among others, examining the gender discrimination in labour market by taking the graduates who are already in the labour market, studying the employer's perspective (supply side factors) on engineering labour market etc. There is also a need for comparative studies to find out if these results can be generalised in other fields of technical and professional education such as management, law, and medicine, as the present study is only limited to engineering education.

Acknowledgements

I am grateful to Professor Jandhyala B. G. Tilak for his comments and suggestions to improve the paper and also allowing me to use the NUEPA survey data. An earlier version of this paper was presented in an international Conference on Education and Gender organized by European Union research group on Education and Gender, at Izmir University of Economics, Turkey (16-17 May, 2014). I wish to acknowledge Dr. Kristof De Witte and other participants of the conference for their useful comments. The author is solely responsible for interpretation or any error in the analysis.

References

Aslam, M. And Kingdon, G.G. (2008): "Gender and household education expenditure in Pakistan", *Applied Economics*, 40 (20), pp. 2573-2591.

Azam, M. and Kingdon, G.G. (2013): "Are Girls the Fairer Sex in India? Revisiting Intra-Household Allocation of Education Expenditure", *World Development*, 42, pp. 143-164.

Biswas, G., Chopra K.L., Jha C.S. and Singh D.V. (2010): *Profile of Engineering Education in India: Status, Concerns and Recommendations*, New Delhi: Norosa Publishing House.

Carvajal, M. J., Bendana, D., Bozorgmanesh, A., Castillo, M. A., Pourmasiha, K., Rao, P., and Torres, J .A. (2000): "Inter-gender differentials between college students' earnings expectations and the experience of recent graduates", *Economics of Education Review*, 19 (3), June, pp. 229-243.

Chakravarty, S. and Somanathan, E. (2008): "Discrimination in an Elite Labour Market? Job Placements at IIM-Ahmadabad", *Economic and Political Weekly*, 43 (44), November 1, pp. 45-50.

Choudhury, P. K. (2013): "Determinants of Employment Probabilities and Expected Earnings of Engineering Graduates: An Empirical Study in Delhi, India", *Journal of Income and Wealth* 35 (2), July-December 2013, pp. 131–146.

Dang, H. (2007): "The Determinants and impact of private tutoring classes in Vietnam", *Economics of Education Review*, 26 (6), December, pp. 683-698.

Graham, J. W. and Smith, S. (2005): "Gender difference in employment and earnings in science and engineering in the US", *Economics of Education Review*, 24 (3), June, pp. 341-354.

Himaz, R. (2009): "Is there a boy bias in household education expenditure?", Working Paper No. 46, Young Lives, Department of International Development, University of Oxford, UK.

Kanellopoulos, C. and Psacharopoulos, G. (1997): "Private education expenditure in a 'free education' country: The case of Greece", January, *International Journal of Educational Development*, 17 (1), pp. 73-81.

Kingdon, G. G. (1998): "Does the Labour Market Explain Lower Female Schooling in India", *Journal of Development Studies*, 35 (1), October, pp. 39-65.

Kingdon, G.G. (2005): "Where has all the Bias Gone? Detecting Gender Bias in the Intro-Household Allocation of Educational Expenditure", *Economic Development and Cultural Change*, 53 (2), January, pp. 409-451.

Klasen, S. and Pieters, J. (2012): "Push or pull? Drivers of female labor force participation during India's economic boom", IZA Discussion Papers, No. 6395. (Bonn, Institute for the Study of Labor).

Lancaster, G., Maitra, P., and Ray R. (2008): "Household Expenditure Patterns and Gender Bias: Evidence from Selected Indian States", *Oxford Development Studies*, 36 (2), pp. 134-157.

Masterson, T. (2012): "An Empirical Analysis of Gender Bias in Education Spending in Paraguay", *World Development*, 40 (3), March, pp.583-593.

Morgan, L. A. (1998): "Glass-ceiling effect or cohort effect? A longitudinal Study of the Gender earnings gap for engineers, 1982-89", *American Sociological Review*, 63 (4), August, pp. 479-483.

Rao, S.S. (2006): "Engineering and Technology Education in India: Uneven Spread, Quality and Social Coverage", *Journal of Educational Planning and Administration*, 20 (2), January-April, pp. 205-225.

Rao, S. S. (2007): "Neglected Terrain in the Quest for Equality: Women in Elite Engineering and Technology Education", in Tilak. J.B.G. (ed.), *Women's Education and Development*, New Delhi: Gyan Publishing House, pp. 187-212.

Saha, A. (2013): "An Assessment of Gender Discrimination in Household Expenditure on Education in India", *Oxford Development Studies* 41(2), pp.220-238.

Stephan P. E. (1996): "The economics of science", *Journal of Economic Literature*, 34 (3), September, pp. 1199-1235.

Tilak, J. B. G. (1980): "Education and Labour Market Discrimination", *Indian Journal of Industrial Relations*, 16 (1), January, pp. 95-114.

Toumanoff, P. (2005): "The effects of gender on salary-at-hire in the academic labor market", *Economics of Education Review*, 24 (2), April, pp. 179-188.

UGC: University Grants Commission, New Delhi, *Annual Reports* (for the year 2009-10 and 2011-12).

Woytek, K.E., Newiak M., Kochhar K., Fabrizio S., Kpodar K., Wingender P., Clements B., and Schwartz G. (2013): "Women, work and the Economy: Macroeconomic Gains from Gender Equity", Staff Discussion Note 13/10, International Monetary Fund, Washington, September 2013.

Zimmermann, L. (2012): "Reconsidering Gender Bias in Intra-Household Allocation in India", *Journal of Development Studies*, 48 (1), January, pp. 151–163.

Appendices

Table A1
Institution-wise number of students surveyed for the study

S. No.	College Name	Institution type	Students Surveyed
1.	Indian Institute of Technology, Delhi	Central Government	73
2.	Faculty of Engineering and Technology, Jamia Milia Islamia	Central Government	103
	Sub-Total (Central Government)		176
3.	Ambedkar Institute of Technology	State Government	68
4.	Delhi College of Engineering	State Government	159
5.	Netaji Subhash Institute of Technology	State Government	76
	Sub-Total (State Government)		303
	Total Government (State + Central)		*479*
6.	Bharati Vidyapeeth's College of Engineering	Private	56
7.	Guru Premsukh Memorial College of Eng.	Private	201
8.	Guru Teg Bahadur Institute of Technology	Private	49
9.	HMR Institue of Technology and Management	Private	109
10.	Maharaja Agrasen Institute of Technology	Private	87
11.	Maharaja Surajmal Institute of Technolgy	Private	197
	Total (Private)		*699*
	Total		**1,178**

Source: Compiled by the author from NUEPA survey data.

Table A2

Summary Statistics of the Variables used in the Logit and OLS Model

Variables	NOB	Mean	SD	Min	Max
Dependent Variables					
Employment	1178	0.36	0.48	0	1
LnEarnings*	232	443	0.56	151	738
Individual Characteristics					
Gender	1178	0.84	0.37	0	1
SC	1178	0.10	0.30	0	1
ST	1178	0.05	0.22	0	1
OBC	1178	0.07	0.25	0	1
General	1178	0.78	0.42	0	1
Household Factors					
Fathocpproff	1178	0.63	0.48	0	1
Fathocpbsn	1178	0.22	0.42	0	1
Fathocpoth	1178	0.15	0.36	0	1
Fathsch$	1104	14.64	1.89	0	16
Mothsch$	1070	13.42	3.09	0	16
Student's Academic Background					
Secmarks@	1178	77.58	9.23	45	99
Secmed	1178	0.85	0.35	0	1
Student's Current Education Status					
Mgtpvt	1178	0.59	0.49	0	1
Deptit	1178	0.76	0.43	0	1
Eduloan	1178	0.24	0.42	0	1
Alumni	657	0.38	0.49	0	1
Job Characteristics					
Jobtype	287	0.78	0.41	0	1
Compforeign	302	0.45	0.49	0	1
Compjoint	302	0.14	0.35	0	1
Compdomestic	302	0.41	0.49	0	1

Notes: (a) The number of observations (NOB) is 1,178 except for some variables with missing information. Weighted means and standard deviations (SD) are reported, which were corrected for the differences in sampling probabilities.

(b) * = Rs. in thousand; $ = years of schooling; @ = percentage of marks