Exploring Increasing Graduate Intensity in Occupations in India

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STRANDS IN THE LITERATURE
1. MISMATCH IN LABOUR MARKET…

O**ver-education**. A worker is overeducated if he has more education than required for his job.

Richard Freeman 1976, “The Overeducated American”

Over-education may occur if employers use education as a means of job-screening in labor markets with imperfect information (Spence, 1973).

2. MISMATCH IN LABOUR MARKET…

Occupation-education mismatch.
To fully utilize the stock of human capital it is essential to match the skills from education and the occupation job requirements.

Robst (2007), US college graduates obtain 11 per cent lower annual income if their major subject does not match the work.

Nordin, et.al., 2008, Income penalty for a field of education–occupation mismatch seems to be larger than the penalty for being overeducated/undereducated.

3. MISMATCH IN LABOUR MARKET…

Occupation choice model,
supply-side factors, concerned with whether differences in occupational status are the outcome of voluntary choices of individuals,
demand-side factors, primarily due to labour market constraints **or a combination of both** (Filer, 1986).

Multinomial Logit Model collapses the demand and supply influences into a common index and further cannot distinguish ordered and unordered ooutcomes.

SKILLS GAPS

Identifying Skill-gaps

1. '**Over-qualified'/ Over-education:** persons with tertiary education are hired for jobs/activities that do not require such qualifications. But given the over-supply of persons for such jobs, higher education (HE) is used as a transparent and easy screening device.

2. **Skill mismatch in technical education** where the person hired has a qualification that is different from the requirement for that particular job, e.g. engineers end up in Finance/Banking firms

3. **Quality skill mismatch:** Firms hiring for jobs that require persons with tertiary education complain that the quality/skills is inadequate for such activities. Consequence, significant training adding to the costs of firms. Poor quality of existing HE system in India.

Nature of Tertiary Education

1. Post school job oriented diploma/ certificate in technical education
2. Post school job oriented diploma/certificate education in non-technical fields;
3. Graduate education in technical fields like medicine and engineering; and
4. Graduate education in non-technical areas.

Appropriate Tertiary Education

- Appropriate tertiary education of type (1 and 2, non-graduate) would not only enhance employability but also reduce pressure on other types of HE.
- Type (3, graduate technical) often get into jobs that do not require technical skills.
- While problems of quality and inappropriate skill sets seem to exist for all the three, they are probably more acute for type (4, graduate non-technical).
- Non-technical graduates of type (4) get hired in jobs that require HE qualification due to over-supply

HE by General and Technical Education 21-59 years, 2009-10

General Education	Technical Education			
	No technical education	Technical degree	Technical diploma/ certificate	Total
21-59				**(10.6)**
Diploma/certificate (I)	3.5	0.0	7.6	11.1
Graduate & Above (II)	73.9	4.1	10.9	88.9
Total (I+II)	77.4	4.1	18.5	100.0
21-35				**(12.9)**
Diploma/certificate (I)	3.3	0.0	7.9	11.2
Graduate & Above (II)	72.0	4.7	12.1	88.8
Total (I+II)	75.3	**4.7**	**20.0**	100.0
40-54	**Declined**	**Risen**	**Risen**	**(8.0)**
Diploma/certificate (I)	3.3	0.0	6.5	9.9
Graduate & Above (II)	78.5	3.2	8.4	90.1
Total (I+II)	81.8	**3.2**	**14.9**	100.0

Skill Policy-1

- A skill policy that encourages non-graduate technical and non-technical diploma/ certificate holders into these lower graduate intensity occupations would help to close the skill gap and reduce the pressure on graduate HE.

- It will reduce the skill mismatch gap.

Skill Policy-2

- Introduction of a vocational training /skill training stream in the Metric Secondary Schooling curriculum.
- Skill training focused on these low graduate intensity occupations and the low technology

  knowledge intensive manufacturing and service sectors will again reduce pressure on the HE system
- Will help a large group of youth who are unable to continue into college education.

GRADUATE INTENSITY IN OCCUPATIONS

RESEARCH QUESTION

Education affects the **supply** of labour to an occupation.
Employer uses it as a screening device and that affects **demand**.
Difficult to distinguish demand and supply side factors that result in the existing **occupational structure**.

“To what extent various occupations require highly qualified labour and how has this been changing over the past decade in India?”

The Question falls into the second and third strand of literature of occupation-education mis-match and occupational choice models.

It is difficult to separate out the demand and supply side effects when modelling labour markets.

OCCUPATIONAL CLASSIFICATION AND DATA

Data:
Household level data Employment and Unemployment Survey conducted by the National Sample Survey Organisation (NSSO), India, for three time periods: **1999-00 (55th round), 2004-05 (61st round) and 2009-10 (66th round).**

Occupational Classification:
2-digit NCO codes of 2004 used to classify occupations in each round. NCO 1968 codes are used in the NSSO survey of 1999-00 and 2004-05, and NCO 2004 codes are used in 2009-10 survey.

We have converted the NCO 1968 codes to NCO 2004 using the conversion table in order to make the three rounds comparable.

Classification of Occupation Groups by Graduate Intensity

- **Traditional >=** 60% Professionals such as engineers, doctors, solicitors, auditors, director, managerial executives, university college teachers, IT
- **Modern 40-59%** Associated professionals such as medical and scientific technicians, social scientists, technical salesman
- **New 15-39%** Marketing and sales managers, nurses and midwives, self employed enterprise owners, village officials, post/telephone/transport occupations
- **Niche 7-14%** Ticket collectors, shopkeepers, service workers, production workers, such as in chemical processing, rubber, paper and plastic products
- **Non-graduates <7%** Agricultural labourers, housemaids, construction workers and other manual labourers.

Labour Force 21-59 years by Occupation Categories 1999-00, 2004-05, 2009-10 (%)

	55th round, 1999-00	61st round, 2004-05	66th round, 2009-10
Traditional (>60%)	1.5	1.5	1.9
Modern (40-59%)	5.5	5.4	7.2
New (15-39%)	3.8	4.23	6.4
Niches (7-14%)	11.4	11.7	10.5
Non-graduate (<7%)	75.6	74.5	72.0
Unemployed	2.3	2.6	2.0

METHODOLOGY

First stage:
Changes observed in graduate intensity in occupational categories over time in two ways: 1. Comparing among the age cohorts 21-35 years and 40-54 years age groups for the three time periods and 2. Comparing three time points, 1999-00 and 2009-10.

Second stage:
Analysis we seek to investigate whether the probabilities of being employed in these occupation categories differ by gender, age, social group and education.

Using graduate intensive occupational classification, we estimate a multinomial logit model for the pooled sample and separately for each of the three rounds.

METHODOLOGY

A multinomial logit regression is a suitable model for a categorical dependent variable which takes more than two values which are not in order.

Occupational categories are coded as follows: 1-Non-graduate, 2-Traditional, 3-Modern, 4-New, 5-Niche, 6- Unemployed.
Estimate earnings function for each of these five occupation categories by OLS method.

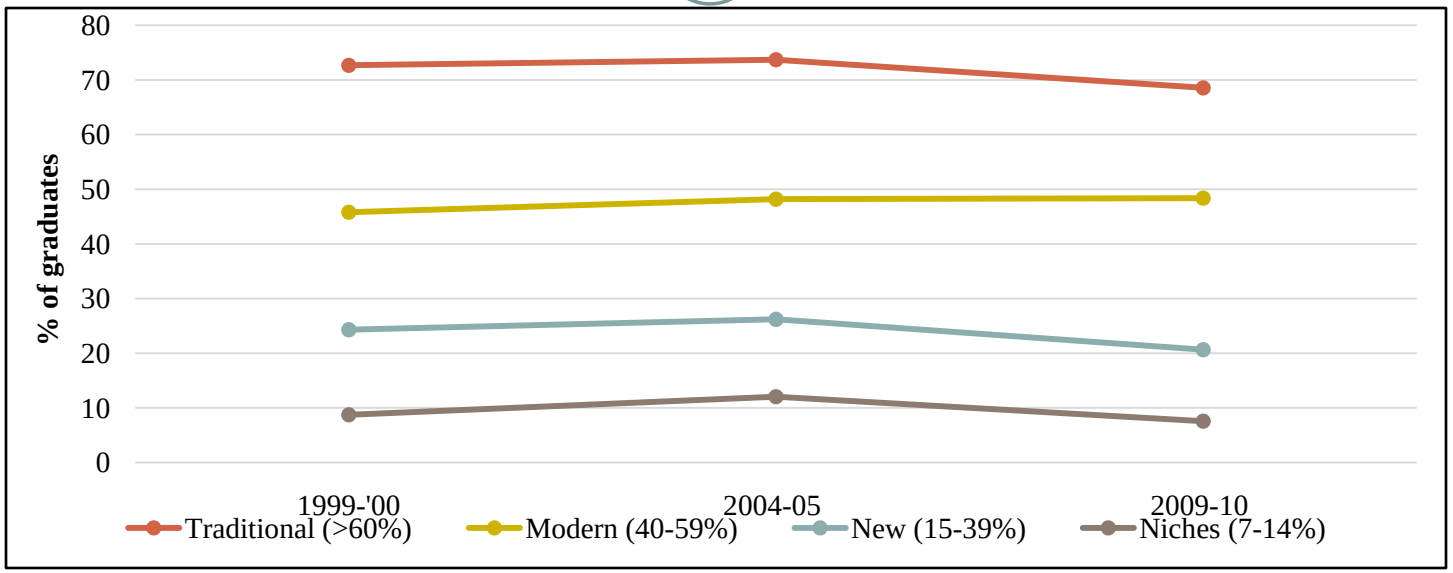
Probability of being in a particular occupation effecting one's earning. excluding it from the earnings equation will lead to bias and inconsistency. >>>>>>>>>>

Identifying variable: If anyone else from worker's household works in same occupation category (Traditional/Modern/..), 0 otherwise.

We use modified Heckman Model Following Dubin and McFadden two-step estimation method.

CHANGES IN INDIA'S GRADUATE OCCUPATIONS

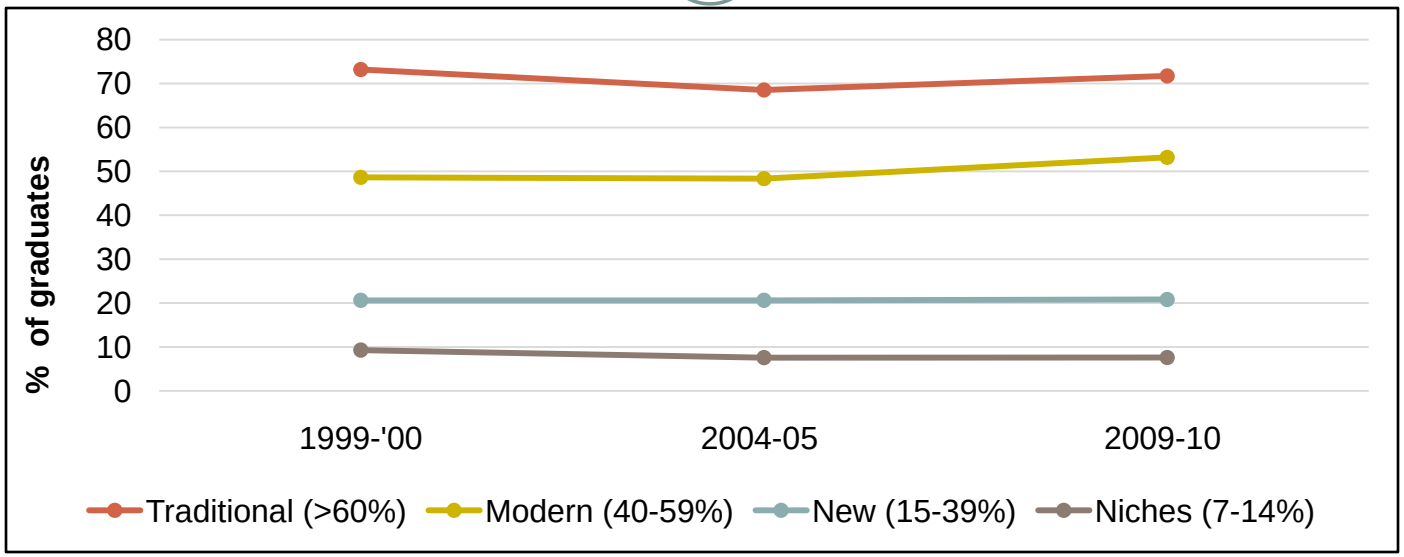
Figure 3a: Percentage of graduate workers in each graduate-intensive occupation group across years, **21-54 years**



- All working age group 21-54 years modern occupations rise in graduate intensity
- Traditional occupations, by definition had the highest percentage of graduate occupations, with slightly declining intensity.

…CHANGES IN INDIA'S GRADUATE OCCUPATIONS

Figure 3b: Percentage of graduate workers in each graduate-intensive occupation groups across years, **Younger cohort 21-35 years**



- **Modern Occupations** graduate intensity **rose sharply**
- **Traditional Occupations**, by definition had the highest percentage of graduate occupations, **rose sharply.**

…CHANGES IN INDIA'S GRADUATE OCCUPATIONS

Modern occupations were the ones that showed an increase in graduate intensity among all age groups particularly the younger cohort. (Table 3)

These occupations were mainly professionals such as life science and health professional, teaching associates and office and customer service clerks.

Among the young cohort there was an increase in graduate intensity among the traditional professionals, such as legislators, physical and engineering sciences and teaching professionals.

…CHANGES IN INDIA'S GRADUATE OCCUPATIONS

No upward movement across occupational categories between 1999-00 and 2004-05. (Table 4)

Between 2004-05 and 2009-10 three occupations shifted to the highest graduate intensive 'Traditional' occupation category.

Of these, two occupations are associate professionals and the third was customer services.

This probably indicates the greater need for highly qualified persons among the second rank of professionals

Occupations with improved or reduced graduate intensity during the years 1999-00, 2004-05 and 2009-10

	1999-00	2004-05	2009-10
Occupation with improved graduate population in the decade			
31 PHYSICAL AND ENGINEERING SCIENCE ASSOCIATE PROFESSIONALS	New	New	Traditional
33 TEACHING ASSOCIATE	Modern	Modern	Traditional
42 CUSTOMER SERVICES CLERKS	Modern	New	Traditional
81 STATIONERY PLANT AND RELATED OPERATORS	Niches	Non-graduate	Niches
82 MACHINE OPERATORS AND ASSEMBLERS	Non-graduate	Non-graduate	Niches
Occupation with reduced graduate population in the decade			
73 PRECISION, HANDICRAFT, PRINTING AND RELATED TRADES WORKERS	Niche	Niche	Non-graduate

REGRESSION ANALYSIS: RESULTS

LOGIT Analysis:

The multinomial logit estimates the odds ratio of participating in a particular occupation category considering one category as base.

Increase in graduate dummy from non-graduate to graduate degree has a **positive effect** on the odds of being 'Unemployed', or participating in 'Traditional', 'Modern', 'New' and 'Niche' when compared to 'Non-graduate' occupation (Table 5)

	Traditional	Modern	New	Niche	Unemployed
1999-'00	4.65***	3.44***	2.36***	1.30***	3.06***
2004-'05	4.61***	3.46***	2.36***	1.27***	2.84***
2009-'10	4.70***	3.24***	2.12***	1.19***	2.94***

REGRESSION ANALYSIS: RESULTS

LOGIT Analysis:

The marginal effects are computed for all the six alternative occupation categories including 'Non-graduate' (Table 6).

Table 6: **Marginal Effects of Graduate Dummy**

	Non-grad	Traditional	Modern	New	Niche	Unemployed
1999-00	-0.55***	0.13***	0.29***	0.06***	0.03***	0.04***
2004-05	-0.54***	0.12***	0.28***	0.07***	0.02***	0.05***
2009-10	-0.54***	0.14***	0.29***	0.08***	0.01*	0.02***

REGRESSION ANALYSIS: RESULTS

Earnings Function: Results correcting for occupation selection bias , Table 7.

- Returns to graduate and above level of education is highest for the ‘New’ occupations in 1999-00 while the returns are highest for ‘Traditional’ occupations in 2004-05 and 2009-10.
- ‘New’ occupations have high returns to graduate level of education in all three years. But DECLINING.
- Returns to graduate education increases slightly over time for occupations in ‘Niche’ category.
- Being female, upper caste and rural decreases the earning significantly in each occupation for all three time periods.
- Age has a non-linear effect on earnings with the square term being negative and significant in each of the occupation categories.

CONCLUSION:

- Our descriptive results show that Modern occupations are the ones that experience an increase in percentage of graduate workers.

- Marginal effects from the multinomial logit reveal that graduate degree gives highest chance to enter Modern Occupations, 29 percentage points, double that of Traditional occupations.
- >>>>> Possibility that modern occupations require more generic skills than the traditional occupations which require specific technical skills.
- **The marginal effects of the graduate dummy**, however, should be interpreted with caution as there may be several other factors affecting both occupational choice and being a graduate. Therefore, having a graduate degree might not have any causal effect on the occupational choice.

.....CONCLUSION

- **The earnings function**, however, throw up the result that the **traditional occupations** consistently obtain the highest returns to graduate education in all three years, while **modern occupation have moderate returns.**
- New occupation category has high, though declining returns to education during the decade.

.....CONCLUSION

- Overall, the job market in India has seen an increase in graduate intensity in occupations.

- This is particularly true for the traditional and modern, category of jobs.
- Returns to graduate education has also risen during the decade, particularly for the most graduate intensive occupations, but also for the lower graduate intensive occupations.

- This is partly driven by technological change and is a positive sign as it encourages participation in higher education.

THANK YOU