

WORK-LIFE BALANCE OF WORKING PARENTS: BEFORE AND DURING PANDEMIC

Angana Chatterjee, State Aided College Teacher, Department of Economics
Heramba Chandra College, Kolkata, angana16@gmail.com
Anwesha Chattopadhyay, Assistant Professor, Department of Commerce,
Jain University (SCS), Bangalore, a.anwesha@jainuniversity.ac.in

ABSTRACT

The essence of work-life balance is to maintain a healthy relationship between personal and professional lives. To begin with, the term 'work-life balance' was mostly associated with women, but in today's modern globalized world the term has an equal weightage for both men and women and more so ever if it is the case of working parents. In our study, we have concentrated on work-life balance of working parents across gender and professions before and during the pandemic. During our study we have observed that while before the pandemic the extent of work-life balance varied across professions, however during the pandemic the work-life balance has mostly deteriorated for more or less all the professions.

Keywords: Lockdown, Pandemic, Profession, Working parents, Work-life balance.

1. Introduction:

1.1. WORK-LIFE BALANCE (BRIEF HISTORY AND DEFINITION)

During the later stages of Industrial Revolution people were extremely over-worked to the extent of working for about 100 hours per-week, which posed serious health issues for the country. On October 24, 1940, after decades of worker movements, the US officially amended the Fair Labour Standards Act and adopted the 40-hour work week. This was the first move in giving workers back more time. The term work-life balance came into being during the 80's women's liberation movement, which advocated for flexible schedules and maternity leaves for women.

Today, work-life balance has shifted to assimilate both the issues and strategies aimed at effective time management for employees. It has also expanded to include burnout prevention and stress control. Today employees want better time management skills to spend time with their families and on their personal interests. And, unlike the 80s, there is increasing emphasis today in making work-life balance more gender neutral. Work-Life balance should be attainable and evenly distributed across genders. (2015 EY Global Generations Survey).

1.2. FOCUS ON WORK-LIFE BALANCE OF WORKING PARENTS BEFORE THE ONSET OF COVID-19 (ACROSS GENDER AND PROFESSION):-

While work-life balance is important for everybody across the world but it is the working parents who are the most vulnerable ones. The process of being a working parent is uniquely complicated and designed with unforeseen circumstances. Working parents have to be great at everything, in fact they just might have to be "A jack of all trades". That's really exhausting! It is a widespread trend that couple households now rely on both parents. Both have to be in the work to fulfil their needs and people are spending more time in office. Parents in the workforce are now a significant and ongoing pressure group calling for flexibility at work. The issue of work-life balance is increasingly becoming important as families are increasingly becoming nuclear and dual earners. Stress and other conflicts are increasing because of increasing and changing demands of organisation as well as increasing responsibilities of families.

More so ever, it is the female parent who has to bear the extra burden of juggling between family and work. Higgins et al. (1994) examined the impact of gender and life cycle stage on three components of work family conflict (i.e. role overload, interference from work to family and interference from family to work). The results indicated significant differences for gender and life cycle. Women reported experiencing significantly greater role overload than men. Again women were found to experience greater work to family interference than men. Interference was highest when the children were young, and lowest in families with older children. The findings of Mitra (2012), Meenakshisundaram & Panchanatham (2012), and Chandrasekar et al. (2013) suggest that employers need to provide some flexibility especially to female employees in order to make it possible for them to attend to their household responsibilities alongside their work without feeling any burden/ imbalance.

Sheryl Sandberg, chief operating officer of Facebook and founder of Leanin.org, said in an interview, "*I would change our working culture to help women at workplace. From a culture that teaches all of us that men should achieve and women should support others to the truth that everyone should achieve and everyone should support others.*"

Work-life balance also differs across professions. Different professions have different set-ups and different levels of involvement. The organizational perspective of work life balance is varied.

Nidhi Tewathia (2014), "Work-Life Balance in the IT Sector: A Case Study of Delhi" says that excessive pressure leads to stress. Many of the stressful life events are related to the workplace. Employees who start to feel the pressure to perform are likely to get caught in a downward spiral of increasing effort in order to meet rising expectations but no increase in job satisfaction. Many organizations in Delhi are trying to promote Work Life Balance (WLB) through initiatives which include flex times, part time work, provision of child care facilities etc. Yet, the respondents of the study have expressed their inability to balance professional and personal life. Many recent studies have brought out the alarming rates of divorces among IT couples and this is also one of the aftermaths of work life imbalances. Many also get into serious physical and mental ailments unable to handle their personal life and job together.

Work-life balance for teaching professionals has also become one of the greatest challenges. Teachers work load demand their time in the institution and also extend to their home in order to get prepared for the following day's lecture, apart from maintaining student records and attending to various institution related functional requirements. Teachers have to spend extra hours daily to be effective and productive in their profession so as to satisfy the students and update them self. For Self growth also they have to give time to their research and other activities. Thus it is the demanding need that Management function should plan and execute such policies which enable the employees to balance their personal and professional lives so as to enhance the productivity and reduce the stress and absenteeism.

Media industry people work in high stress levels and untimely hours of the day has put off many women professional away from this industry. Media professionals are one of the unlucky few who have a tough time sorting out their personal and professional lives. From extreme work stress to confrontations at home, finding mental peace becomes quite a catch. One report on women journalists in India points out that woman from small towns and rural areas who migrate to the cities with a journalist's job find safe and good accommodation a big hindrance towards continuing at the job.

It is difficult to establish the right balance between work and family in the healthcare sector. This is because most services by nature are perishable and have to be utilised instantly, means that the employee has to be physically present to serve at any time the service is required. Many doctors and nurses and paramedical staff are required to work long hours, night shifts and this causes a conflict between their

personal and professional roles. The natures of work at hospitals demand that the doctors, nurses and paramedical staff are present at the workplace at odd hours. This also has a toll on the employee's ability to take care of his own health; the employee is constantly juggling to ensure a balance between the care he gives to his patients and the care he gives to himself and his family. According to Sara Hedderwick, a consultant in infectious diseases at Belfast, there is no limit for what one wants to do to help patients get better, but to do that, health care professionals must ensure that they remain healthy too. Trying to achieve this fine balance between personal and professional commitments is very difficult, particularly for those who have families and dependants. This struggle often leads to stress in the employees life.

Thus we can conclude that to maintain work-life balance of working-parents in today's world across professions and gender is indeed a very difficult task, no matter what varied and innovative steps organisations take to maintain a healthy work -environment.

1.3. WORK-LIFE BALANCE OF WORKING PARENTS DURING THE PANDEMIC ACROSS GENDER AND PROFESSION:

During this pandemic, parents were caught in a difficult situation, tasked with making challenging decisions about their family and career daily. Working from home erased the boundaries between, the time that should be dedicated to work and the time that should be reserved for oneself. Regardless of gender and race, parents feared they will be negatively affected by employer decisions because they are parents. Most mothers and fathers have had to modify their work routines to adapt to caregiving needs and balance their family responsibilities. This disruption has left parents across genders, races, ethnicities, and job levels feeling guilty about caregiving responsibilities. Parents were concerned that they were not currently performing to the best of their abilities and that the Covid-19 crisis will affect their job security and career growth.

Many parents have also experienced intense personal challenges due to the coronavirus crisis, including suffering grief due to a loss of life. Overall, many have experienced financial hardship, with some having lost job-related income or faced difficulty getting needed resources.³ In particular, some parents reported having had to move their residence or ask a relative to move in with them to receive support.

A majority of mothers said, in absense of care-givers, they were primarily responsible for managing childcare tasks throughout the workweek, such as preparing meals, supervising homework, and even monitoring playtime with their child(ren), which was immensely tiresome. Mothers felt more guilt in attempting to meet work-life demands, and experienced more feelings of anxiety.

One of the hardest parts of teaching from home was the increasing blur between work mode and home mode. It was becoming increasingly difficult to find a balance while teaching from home and at the same time attending to family and child needs in absence of care givers. However, the uncertainty around when the educational institutes will reopen made finding the balance even more important. Also, a significant number of mostly aged teachers had to move out of their comfort zones and get accustomed to online mode of teaching. Preparation of study material was also a huge time-consuming factor for those with lack of familiarity with technology.

Health care workers like doctors, nurses, sanitation workers who were directly involved in the diagnosis, treatment and care of patients with COVID-19 were at risk of developing psychological distress and other mental health symptoms. A recent study in Wuhan, China demonstrated that women, nurses and frontline healthcare workers are particularly vulnerable to experiencing depression, anxiety, insomnia and distress in these extreme work conditions. The ever-increasing number of confirmed and suspected cases, overwhelming workload, extended shifts with increased volume and severity of patients, depletion of

PPE's, widespread media coverage, lack of specific drugs, job insecurity, financial instability, fear of carrying the virus to home or inability of visiting family due to pandemic and feelings of being inadequately supported all added up to the mental and physical burden of nurses. The speedy rise in COVID-19 cases worldwide has resulted in an immense rise in the work pressure of healthcare professionals across the world. In such a situation maintaining work-life balance seemed almost utopian. During the pandemic it has been observed that unemployment rate across industries has gone up drastically across the world as a result of a decrease in demand and interruption of workforce faced by companies. As per recent data unemployment in the U.S. had gone up from 3.5% to 15% since the onset of pandemic. In India too, many people were subjected to salary cut ranging anywhere from 5% to 60% and more. Some unfortunate ones even lost their jobs. As per a LinkedIn survey, "More than two in five media professionals feared their companies will fare worse in the next six months, exhibiting a gloomy outlook towards the short-term future. One in four manufacturing professionals and more than one in five IT professionals felt the same." The overall findings showed that one in three Indians have reported a decrease in their personal incomes, whereas 48 per cent of active job seekers and 43 per cent of full-time professionals anticipated fewer job openings in the near future. Shockingly many organisations had laid off or reduced salary without even formally informing the employees through emails or letters. Some media organisations had even asked their employees to go on indefinite leave without pay. In an alternative situation when the pandemic is over, employees would have to negotiate their pay package from a very low amount in case they decide to change their job or career.

2. Objectives

- To study the changes of work-life balance of working parents during and before pandemic gender-wise
- To study the changes of work-life balance of working parents during and before pandemic profession-wise

3. Research design:

- Type of data: Primary
- Tools to collect data: Questionnaire
- Sample size: 138
- Type of sampling: Convenient sampling
- Statistical tools: Chi-square test, Pie chart, Bar chart
- Software used: R and Microsoft Excel.
- Analysis:

Objective 1: Studying across gender

In our study, number of female respondents is 99 while number of male respondents are only 39. Due to shortage of time, there is lack of uniformity in the gender distribution in our study. All the respondent considered here are either a mother or a father. We will, henceforth, consider proportion or percentage in our analysis.

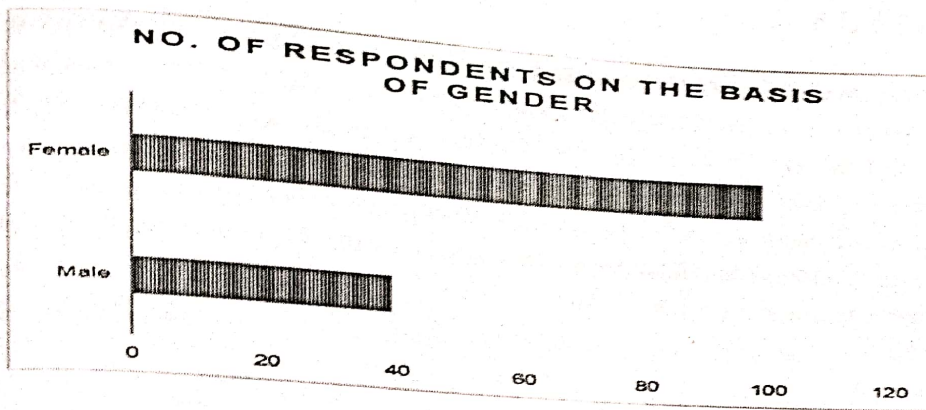


Fig 3.1: Bar diagram for male and female respondents

We asked the working parents whether they are able to balance their work in career as well as personal front and had received mixed responses. Before lockdown when they were having a normal lifestyle for years, 69% of male respondents confidently said that they can maintain work life balance skillfully while this figure for female respondents was only 24%. Negative answers were received from 23% fathers and 15% mothers. Most of the mothers (around 61%) felt that they do a lot to maintain for both the sides but may be they need to perform even better, while only 8% male came up with such response.

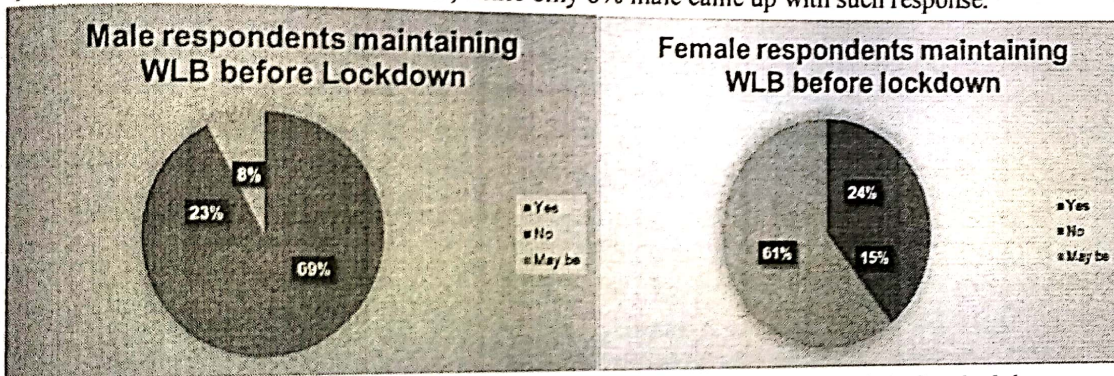


Fig 3.2: Pie charts exhibiting the work-life balance for males and female before lockdown

From Fig 3.2, it is absolutely clear that the lives of mothers and fathers are completely different. In our society, a lot of functions are expected from women and that is one of the most vital reasons that makes them feel that they are not doing enough. The result of the following chi-square test justifies the diagrams completely inferring that role of a mother and father are completely opposite in our societal structure. The hypothesis is defined as

H₀: Maintaining work life balance by mothers and fathers before lockdown are same

H₁: Maintaining work life balance by mothers and fathers before lockdown are not the same

Table 3.1: Chi-square test to test homogeneity of work-life balance among male and female before lockdown

Chi-square value	D.F.	p-value	Comparison	Decision
64.169	2	1.164×10^{-14}	Less than 0.5	Rejection of null hypothesis

Some changes are visible in Fig 3.3 that represent the data of the lockdown period. Percentage of fathers who were not able to balance two sides remained the same but the percentage of confident fathers decreased from 69% to 54%, whereas percentage of less confident fathers increased from 8% to 23%, which is really huge. This figure suggests that many fathers (15%) came under immense pressure at this

time and lost control over their confidence which was there before. Changes were also visible in case of mothers, but was relatively lower. Around 3% more mothers claimed to perform better on both sides bringing 24% to 27% while 6% more mothers failed to do so bringing up the number from 15% to 21%. During this situation also, most women (around 52%) were unsure about their capabilities. In both the cases, maximum women are continuously under pressure about their roles, responsibilities and duties on both the indispensable sides of their lives. They doubt whether their performance as mothers as well as employees are sufficient or not.

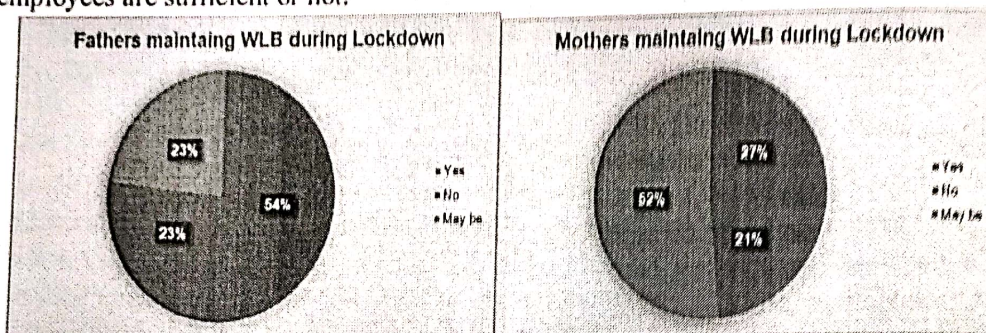


Fig 3.3: Pie charts exhibiting the work-life balance for males and female during lockdown

Similar test is run for the second time and similar results were found. There is no similarity in work life pattern between mothers and fathers even during lockdown. The hypotheses during lockdown is given by

H_{H0} : Maintaining work life balance by mothers and fathers during lockdown are same

H_{H1} : Maintaining work life balance by mothers and fathers during lockdown are not the same

Table 3.2: Chi-square test to test homogeneity of work-life balance among male and female during lockdown

Chi-square value	D.F.	p-value	Comparison	Decision
20.304	2	3.899×10^{-5}	Less than 0.5	Rejection of null hypothesis

Next we are interested to compare the situations of pre lockdown and during lockdown period, separately for mothers and fathers. The result of the test reveals that the condition of fathers were completely different during two time periods whereas it was same for mothers. This result keeps parity with the Fig. 3.2 and Fig 3.3 as both the diagrams reveal that most of the mothers are confused about their functions and performances. The hypotheses of the test go as follows.

H_{M0} : Mothers maintained WLB in both the periods uniformly

H_{F0} : Fathers maintained WLB in both the periods uniformly

Against the alternative hypotheses

H_{M1} : Mothers could not maintain WLB in both the periods uniformly

H_{F1} : Fathers could not maintain WLB in both the periods uniformly

Table 3.3: Chi-square test to test homogeneity of work-life balance separately for male and female in both time periods

Professionals	Chi-square value	D.F.	p-value	Comparison	Decision
Mothers	1.8933	2	0.388	>0.05	Accept
Fathers	9.0873	2	0.01063	<0.05	Reject

According to the opinion of the respondents (Table 3.4), 3.03% mothers felt that the work at office had increased during lockdown while for 7.39% fathers this had decreased. 69.23% fathers and 81.81%

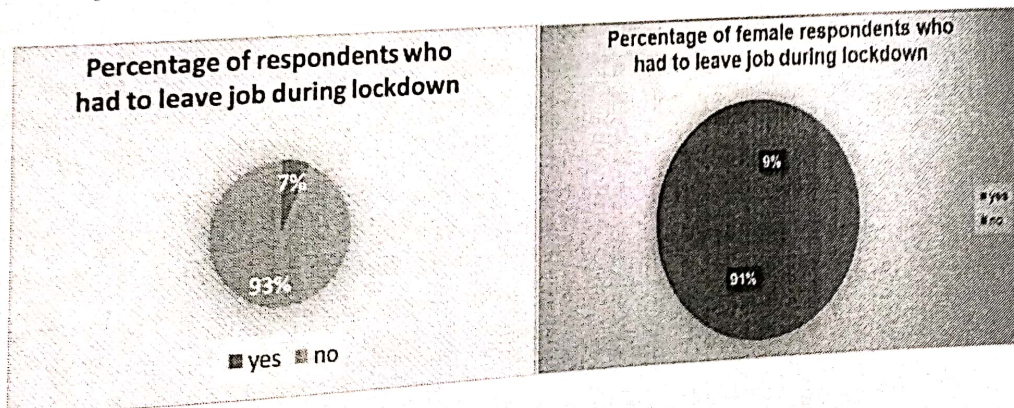
mothers opined that their work at home increased during the pandemic situation. So, overall, more women had faced increase of work pressure on both fronts. It is noteworthy that in spite of such drastic changes, maintenance of work-life balance by women were similar in both the situations.

Table 3.4.: Percentage of male and female respondents on the basis of work pressure

	Work Pressure more in office after	Work Pressure more in office before	Work in office increased	Work Pressure more at home after	Work Pressure more at home before	work in home increased during lockdown
Male	46.15	53.84	-7.39	84.61	15.38	69.23
Female	51.51	48.48	3.03	90.9	9.09	81.81

Footnote: All the figures are in percentage

But not everyone had the same fortune. Lockdown had different type of effect on different people. While maximum people were coping with the new normal and was getting aligned to the latest lifestyle while there were few who had to make bigger compromises. Leaving job was one of them. It is one of the most difficult decision taken by any individual and the lockdown had compelled few people to do that too. According to our survey, 6.8% of the total respondents had to leave job. It was also observed that all of them were women who had to make this choice and all of them belonged to private educational institutes. Since this figure was very small, we tried to reach them to know the reason of such a drastic decision. In most of the cases, it was non-response. Few those who responded, had stated that this happened mainly due to lack of support at home. One respondent belonged to a joint family where husbands are not that helpful, while one had an infant daughter and nanny was not available during that period. One respondent said her husband used to stay away for job and could not come back home, so she had to leave her job to take care of the baby as any kind of domestic help was not safe at that moment. Women were the only one who suffered from job loss, almost 9 out of 100 women had to give up their dream jobs. All of them worked in private educational institute. Since all of them were teachers, we also calculated the proportion of female private teachers to quit their jobs and it was found to be 27%.



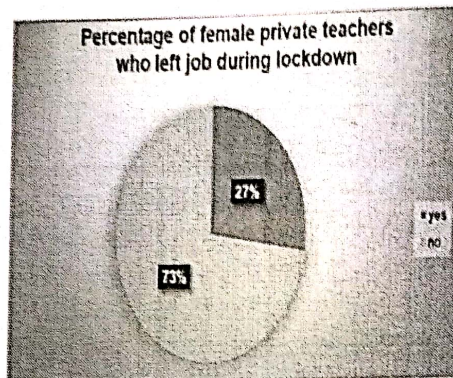


Fig 3.4: Pie-charts showing the percentage of respondents leaving the job

Objective 2: Studying across profession

We tried to cover a wide range of professionals in our study but due to lack of time, we received a disproportionate data as far as different types of professions are concerned. Approximately 45% of the respondents are from teaching background followed by IT that comprises of 22.2% of the total respondents. Next, we have in the ranking are the bankers that constitute approximately 13.3% and rest of the other professionals are less than 10% each.

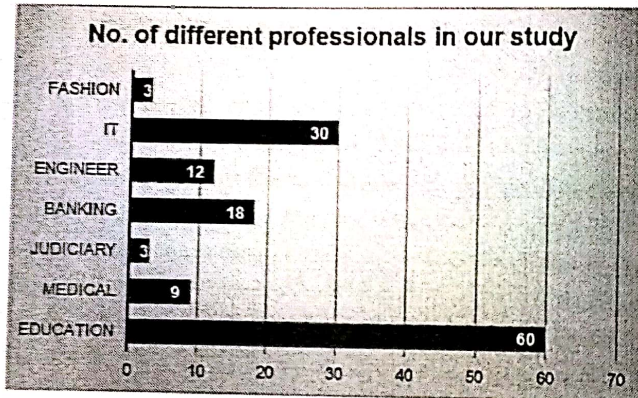


Fig 3.5: Bar chart showing number of different professionals

The roles, responsibilities and working hours vary largely from one profession to another. All the professions have their own sets of hazards which are different from others and these have already been discussed in section 1.2. Maintaining work-life balance will surely have different structure of graphs for different professional.

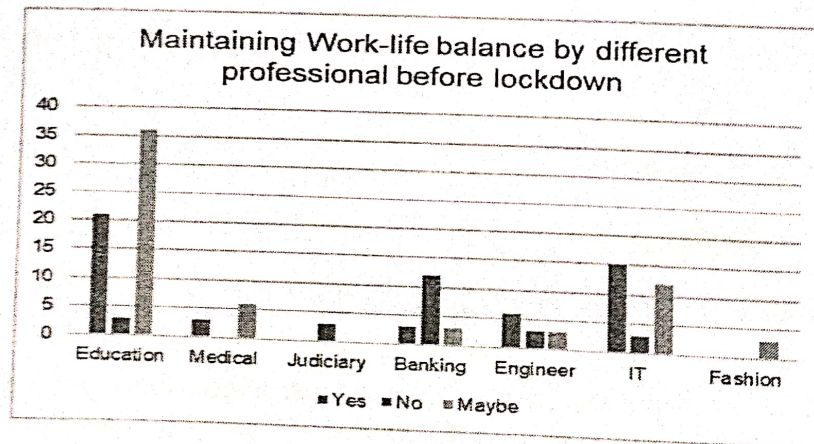


Fig 3.6: Bar chart showing different professionals maintaining work-life balance before lockdown
 According to the primary data collected, it was observed that 35% of academic professionals 33.33% of medical professionals, 16.67 % of banking professionals claimed to maintain work-life balance properly. Not a single respondent from fashion industry and judicial department were affirmative while 50% of IT professionals and 50% of engineers assured to be capable of balancing work and personal life in a proper way. To examine this fact further, we propose the following test. The hypothesis of the test is given by
 H_{01} : Maintaining work-life balance by all kinds of professionals is uniform before pandemic.
 H_{a1} : Maintaining work-life balance by all kinds of professionals is not uniform before pandemic.
 We perform chi-square test and obtain the following result.

Table 3.5: Chi-square test for testing homogeneity of Work-life balance across all professions before pandemic

Chi-square value	D.F.	p-value	Comparison	Decision
62.297	12	8.58×10^{-9}	Less than 0.5	Rejection of null hypothesis

Results of the test suggest that respondents belonging from different professional had different challenges and hence had different opinion about balancing their work and family. During pandemic and lockdown there were changes in adjustments in everyone's life. Some had a large impact, some had minor while some had no impact. For working parents, it was really challenging as their household work increased immensely. Around 57.7% had to work from home, 24.4% worked partially from office and home and rest had to go to office. Working from home had good and bad effects of its own.

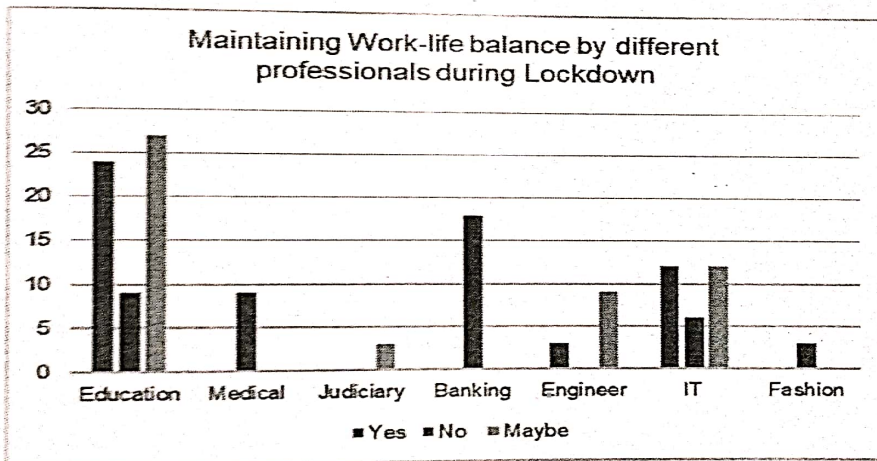


Fig 3.7: Bar chart showing different professionals maintaining work-life balance during lockdown
 40% of academic professionals, 33.33% of medical professionals, 40% of IT workers, 25% engineers and 16.67% bankers claimed to maintain work-life balance well during pandemic. Figures did not change for fashion industry and judicial department. We conduct a chi-square test and the hypothesis is stated as follows.

H_{02} : Maintaining work-life balance by all kinds of professionals is uniform during pandemic.
 H_{a2} : Maintaining work-life balance by all kinds of professionals is not uniform during pandemic.

We perform chi-square test and obtain the following result.

Table 3.6: Chi-square test for testing homogeneity of Work-life balance across all professions during pandemic

Chi-square value	D.F.	p-value	Comparison	Decision
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46.125	12	6.603×10^{-6}	Less than 0.5	Rejection of null hypothesis
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Results of the test suggest that respondents belonging from different professional had different challenges and hence had different opinion about balancing their work and family during pandemic too. So, it is difficult to conclude which period was proved to be better for each group. We will hence observe the data individually for each group of professionals. For teachers, broadly it was found that the percentage of those who are capable of managing both the lives perfectly increased from 35% to 44%. On the other hand, the percentage for those who cannot maintain also increase from 5% to 15%. The percentage of academic staff who were not sure about their status decreased from 60% to 45%. People belonging to the third group are not sure whether they are doing enough or their roles as parents and an employee are balanced or not. During pandemic, 5% from this group became positive about their roles and responsibilities while 10% became totally sure that are not capable of managing home and office any longer. So, it can be seen that even people belonging to same professional fraternity experienced differently.

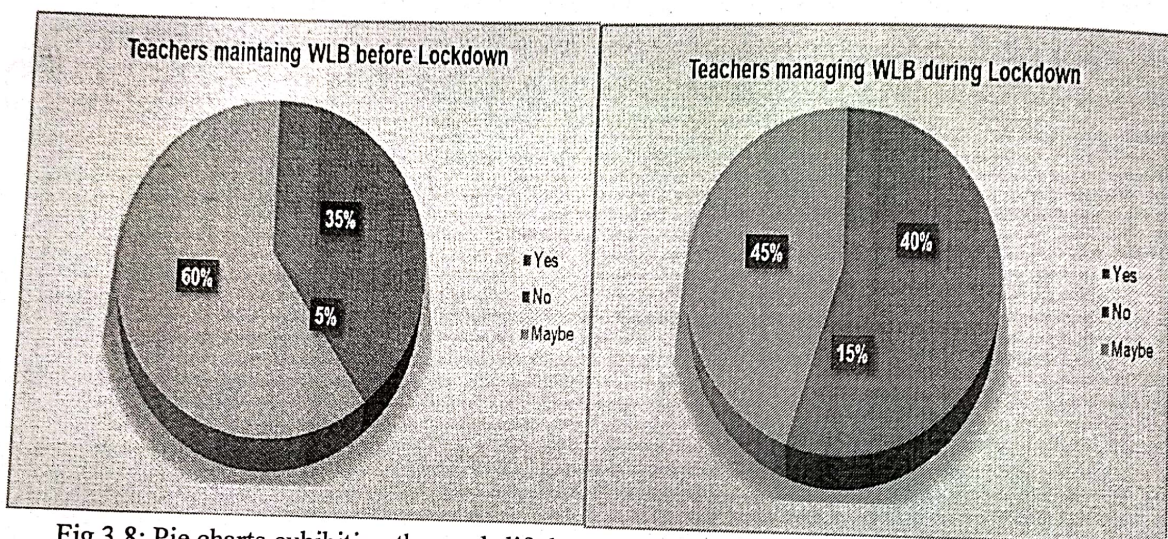


Fig 3.8: Pie charts exhibiting the work-life balance for teachers before and during lockdown

As far as healthcare professionals are concerned, they agreed that none of them were able to spend time with their dear ones due to the nature of their job. Only 33% were satisfied while 67% were not sure whether their roles were properly justified or not. The scenario aggravated during the lock-down because they were the front-line warriors and they had no option for working from home due to intense and increased workload. In fact, according to our study 100% medical professionals experienced work-life imbalance.

67% bankers found it difficult to maintain work life balance while only 16% were satisfied with what they were doing before the lockdown. 17% were quite unsure about their ways of dealing life. Similar to medical professionals, bankers work-life imbalance heightened during the lockdown. Although they could work partially from home but whenever they used work from office during pandemic, they had to work for longer hours. 100% of them experienced work-life imbalance.

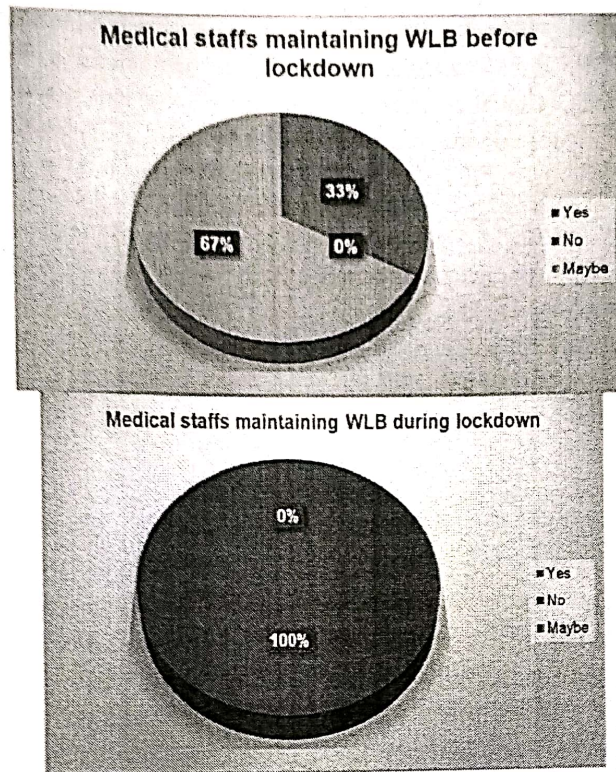


Fig 3.9: Pie charts exhibiting the work-life balance for healthcare sector before and during lockdown

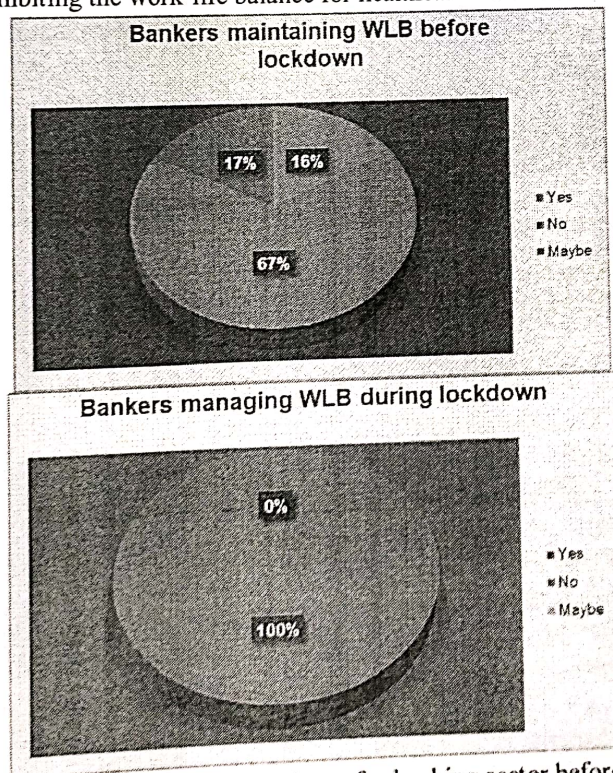


Fig 3.10: Pie charts exhibiting the work-life balance for banking sector before and during lockdown

Engineers had both type of experiences. The percentage of respondents being capable to maintain work life balance dropped from 50% to 25% while the percentage not being capable of coping with both family and work life dropped from 25% to 0% during lockdown. Both the dropped percentage entered the third group "Maybe". So, basically it was equally good and bad news for the engineers.

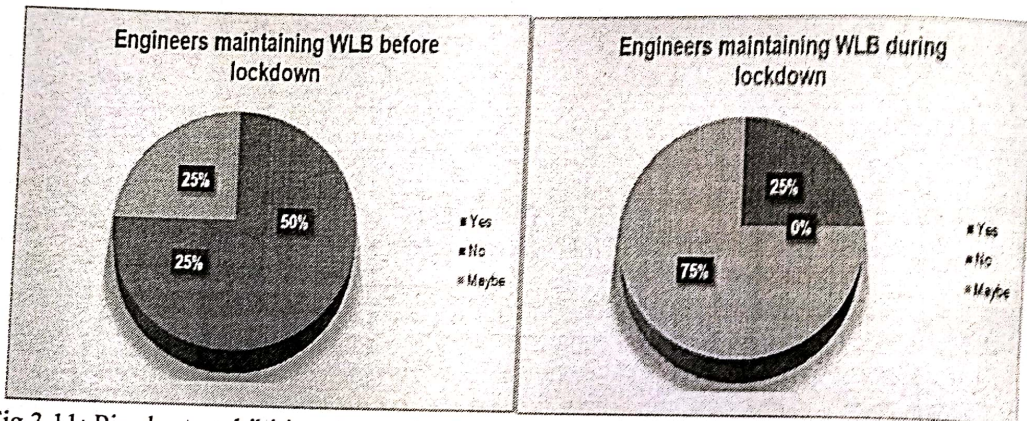


Fig 3.11: Pie charts exhibiting the work-life balance for engineers before and during lockdown. The respondents among IT professionals who were not confident enough about their time division between work and family kept their opinions unchanged in both the periods. Changes were observed in other groups, as percentage of people having positive answers decreased from 50% to 40% and those who gave negative answers increased from 10% to 20%.

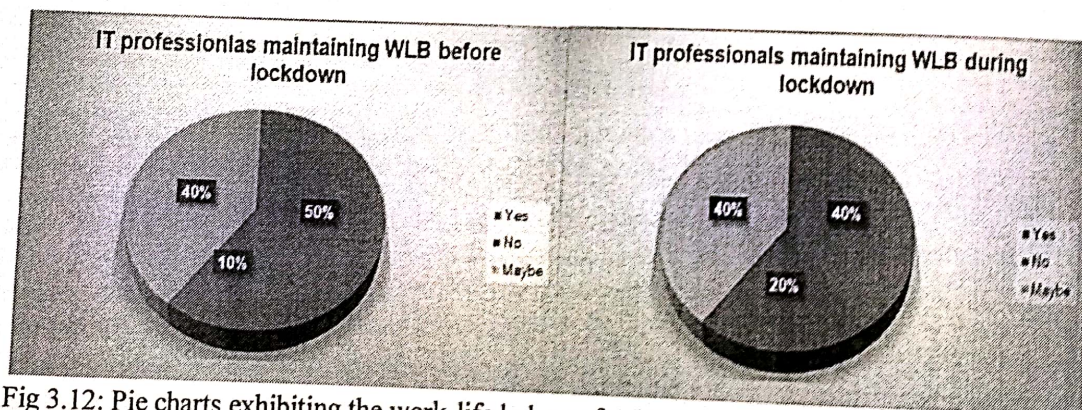


Fig 3.12: Pie charts exhibiting the work-life balance for IT workers before and during lockdown. People from judiciary department said that they were completely unable to maintain the balance between work and family before lockdown but the situation got easier for them during lockdown. They further added that although they had to suffer monetary loss as court was kept closed for a long time but they were benefitted in some other way which was not accessible before. On the contrary, respondents from fashion world had the reverse opinion. Initially they were somewhat able to manage both the sides of their lives but it became impossible during the lockdown although they were allowed to work from home. When asked about the reason, they pointed out that their work load was increased by their supervisors.

Next, it is necessary to test whether the situation was similar for these groups before and during pandemic. We define our hypotheses as follows.

H_{1A}: Academic professionals maintained WLB in both the periods uniformly

- H₁₁: Engineers maintained WLB in both the periods uniformly
 H₁₂: IT professionals maintained WLB in both the periods uniformly
 H₁₃: Medical professionals maintained WLB in both the periods uniformly
 H₁₄: Banking professionals maintained WLB in both the periods uniformly
 H₁₅: Judicial professionals maintained WLB in both the periods uniformly
 H₁₆: Fashion professionals maintained WLB in both the periods uniformly
 Against the alternative hypotheses
 H₀₁: Academic professionals could not maintain WLB in both the periods uniformly
 H₀₂: Engineers could not maintain WLB in both the periods uniformly
 H₀₃: IT professionals could not maintain WLB in both the periods uniformly
 H₀₄: Medical professionals could not maintain WLB in both the periods uniformly
 H₀₅: Banking professionals could not maintain WLB in both the periods uniformly
 H₀₆: Judicial professionals could not maintain WLB in both the periods uniformly
 H₀₇: Fashion professionals could not maintain WLB in both the periods uniformly

Table 3.7: Chi-square test for testing homogeneity of Work-life balance before and during pandemic

	Chi-square value	D.F.	p-value	Comparison	Decision
Academic	4.4587	2	0.1062	>0.05	Accept
Engineers	7	2	0.0302	<0.05	Reject
IT	1.33333	2	0.5134	>0.05	Accept
Medical	18	2	0.00001234	<0.05	Reject
Bank	7.2	2	.02732	<0.05	Reject
Judiciary	2.6667	2	0.1025	>0.05	Accept
Fashion	4.5	1	0.03389	>0.05	Accept

So, from the above chi-square test, it can be concluded that the responses furnished by the academicians, judicial, fashion and IT workers are homogenous in both the situations while it differs for the engineers. In lockdown situation none of the engineers claimed not to maintain work-life balance which seems to be a positive condition.

4. Conclusion and scope of further study:

Work-life balance was never same for men and women but the latter maintained its status in both the situations. But unfortunately, few women had to quit their jobs in order to take care of family, especially children. Lockdown had affected different professionals differently depending upon the magnitude of the job. Medical professionals and bankers had to face the worst scenario where as others had experienced both some positive and negative situations. During the pandemic when the parents were struggling to strike a balance between family and work, whether the child in question suffered or not, whether it affected their physical or mental health leaves a scope for further study.

References

1. Jackson, D & Young, V & Sander, A. (2020). Information and Communication Technologies and Work-Life Balance: Practical Recommendations for Employers and Individuals. 10.5772/intechopen.94429.

2. Nayeem, M., Tripathy, M. (2012), Work-Life Balance among Teachers of Technical Institutions, The Indian Journal of Industrial Relations, Vol. 47, No. 4, pp. 146-158.
3. Pahuja, S. (2017) "A Study on Work Life Balance of Working Parents in Educational Sector." *Asian Journal of Management*, Vol. 8, Issue 1, pp. 25-29.
4. Ramadorai, J. (2017), Work Life Balance of Women Professionals in Media Industry in India, The Phoenix Papers, Vol. 3, No. 1, pp. 278-284
5. Sakeerthi S, Rijesh K B, (2016), Work Life Imbalance of Employees in IT Sector- A Study Conducted at Nest Technologies, Trivandrum, International Journal of Scientific & Engineering Research, vol 7, Issue 11, pp. 780-792.
6. Schieman, S. & Badawy, P. & Milkie, M. & Bierman, A. (2020). Work-Life Conflict during the COVID-19 Pandemic.
7. Sharma, T. (2020). Journal of Perioperative & Critical Intensive Care Nursing. 10.35248/2471-9870.20.S1.151.
8. Shivakumar, K. and Pujar, V. (2016) Work Life Balance in the Health Care Sector, Amity Journal of Healthcare Management, Vol 1, Issue 2, pp. 45-54.
9. Trougakos, J. P., Chawla, N., (2020). Working in a Pandemic: Exploring the Impact of COVID-19 Health Anxiety on Work, Family, and Health Outcomes, Journal of Applied Psychology, Vol. 105, No. 11, pp. 1234-1245.
10. Walia, P. (2015), Gender and Age as Correlates of Work-Life Balance, Journal of Organisation and Human Behaviour, Vol 4, Issue 1, pp 13-18.
11. <https://www.catalyst.org/research/impact-covid-working-parents/>
12. <https://timesofindia.indiatimes.com/life-style/relationships/love-sex/with-pay-cuts-and-job-loss-coronavirus-pandemic-might-set-back-your-career-by-3-years-or-more/photostory/75596488.cms>

Growth performance of fruits production in the era of globalisation in West Bengal: a comparative study

Saddam Hossain Mondal*, Arup Kumar Chattopadhyay**

*Research Scholar, ** Professor of Economics

Department of Economics, University of Burdwan, Burdwan, West Bengal, India- 713104

saddamhossainmondal@gmail.com, arup.chatto@yahoo.co.in

Abstract

Objectives: Fruits production plays a significant role for improvement of economic wellbeing in the country. We have examined growth and instability of selected fruit crops and crop-groups namely, mango, banana, papaya, guava, litchi, other fruit groups, all fruits combined, total foodgrains, total non-food grains and all crops combined in West Bengal *vis-a-vis* India and also in Burdwan, a district of West Bengal during 2000-01 to 2014-15.

Methods: Here unconditional and conditional annual compound growth rates have been measured by fitting appropriate trend equations when the underlying series are found to be respectively stationary and non-stationary. Instability of those selected crops has been measured by using Cuddy-Della Valle index. The secondary data on area, production and productivity are collected from different issues of Statistical Abstract of West Bengal, Statistical abstract of India, Horticultural Handbook of India and RBI Handbook.

Findings: The production growth rates of crop-groups are found to be significantly positive in West Bengal and India. But in case of all fruits combined, Burdwan experienced significantly positive growth in its production. The production growth rate of papaya is significantly positive in Burdwan, West Bengal and also in India. The production growth rates of mango and litchi are significantly found to be positive in the country as well as in the state.

Application: The production instability of crop-groups except non-food grains is low compared to the individual fruit crops in our study areas. No positive relationship between growth and instability is found here in fruits farming.

Keywords: Conditional Growth, Unconditional Growth, ADF Test of Unit Root, Instability, Cuddy-Della Valle Index.

1. Introduction

Fruits are most important nutritious foods as source of vitamins like, vitamin-A, vitamin-B1, vitamin-B2, vitamin-B6, vitamin-C and folic acid, carbohydrates and proteins. In Pre-liberalisation period horticulture did not play any important role in West Bengal. After liberalisation the area of fruit crops increases because the Government of India took some policies namely: National Horticultural Mission, New National Agricultural Policy, Kissan Call Centre, Seed Bank, Farm Credit Package and Agricultural Product Market for improving agriculture sector in general and horticulture in particular. Further in recent times, the productivities of the traditional crops remain low or stagnant but the productivities of horticultural crops keep on increasing steadily those results into change in cropping pattern in favour of fruits farming [1].

Three fourth of total fruits in India is producing only in its 10 states namely, Andhra Pradesh (13%), Maharashtra (11%), Uttar Pradesh (11%), Gujarat (9%), Karnataka (8%), Tamil Nadu (7%), Madhya Pradesh (6%), Bihar (5%), West Bengal (4%) and Telangana (4%) during 2014-15 (Horticultural Statistics at a Glance 2015). India is the second largest fruits producing country in the world. 17.4% of world population lived in India and a larger part of its farming community is engaged in horticultural farming. The country also exports large amount of fruits and earns nearly 41053.76 lakh amounts of foreign currency (i.e., US \$) in 2013-14. The share of horticultural farming is more than 33% of total agricultural share in GDP of India (Ministry of Agriculture, GOI).

West Bengal is the 9th fruits producing state in the country. The State supplies nearly 4% share of the country's total fruits production during 2014-15. Many types of fruits are produced in this State, which are Mango, Banana, Papaya, Guava, Litchi etc. Mango is the main fruit of the State. The area of fruits cultivation is 228.25 thousand hectares out of total Gross cropped area of 9689.92 thousand hectares and net cropped area of 5238.39 thousand hectares in West Bengal in 2014-15. Total production of fruits is 3313.70 thousand tonnes in the State in 2014-15. Again in the district of Burdwan in West Bengal (which is our study area) irrigation facility is well developed, because there are so many rivers and canals passing through this district. Further, so many other types of irrigation facility like, deep tube well, shallow well etc. are also available here. It is to be noted here that Burdwan is traditionally known as rice bowl of the State; so the present state of fruits cultivation is an interesting area for study here.

We want to find out the production trends and variability in major fruit crops in Burdwan vis-à-vis West Bengal and India when the country is a developing labour surplus economy. Unemployment is the main problem of this country due to population pressures, lack of establishment of new industries and fixed amount of crop land. Fruits farming are a labour intensive cultivation. Further, the growth rate of fruit crops holds acceleration hypothesis in recent time in India when deceleration hypothesis operates here for traditional crops. If fruits farming increases in India and West Bengal, it helps reduce the main problem i.e., unemployment, hunger, food insecurity and deficit in the balance of payment in the country as well as the respective state.

2. Literature survey

Notable Scholars like [2-11], measured growth and variability of different types of crop in India. From these studies we have seen that the production growth rates of different types of foodgrains like wheat and rice increased after the Green Revolution period (i.e., after mid 1960s). But with the application of modern technology of seed-fertilizer-irrigation no significant effect has been observed in regard to increased production growth rates of other types of cash crops as well as horticultural crops during post 1965-66. In recent times the production growth rates of traditional crops began to decrease over time. But after the liberalization period, possibly due to market expansion and removal of barriers and restrictions farmers produce more and more horticultural crops resulting to acceleration in growth process in horticultural farming during the recent time period. However, we do not observe any earlier study that measured growth and variability in fruit crops in the region like Burdwan or West Bengal in this country. This research study is devoted to capture that literature gap.

3. Data base and Methodology

The study depends on time series secondary data during the period 2000-01 to 2014-15. The data are collected on area, production and productivity for major fruit crops namely, Mango, Banana, Papaya, Guava and Litchi, Other fruits and Total combined fruits in India, West Bengal and Burdwan from different issues of Statistical Hand Book, BAES, and Horticultural Hand Book of India. The index forms of data on area, production and productivity of Food grains, Non-Foodgrains and All Crops Combined are collected from different issues of Statistical Abstract in West Bengal and RBI Handbook.

Augmented Dicky-Fuller unit root test has been used for measurement of stationarity in agricultural time series data using the following equation: $\Delta Y_t = \alpha + \beta Y_{t-1} + \gamma t + \sum_j Q \Delta Y_{t-j} + \epsilon_t$(1) $j=1$ is taken as our study period is short and as in most cases AIC (Akaike's Information Criterion) is fulfilled for one period time lag. Further, as objective is to measure trend growth, here we have included trend component t along with intercept term in ADF test expression (1). Here the coefficient of Y_{t-1} represents the presence or absence of stationarity. More specifically, if β is found to be insignificant, it implies the presence of unit root; otherwise, the series would be stationary. Results of ADF test is not reported here separately because the stationarity (non-stationarity) of the series can be identified from its measured unconditional (conditional) growth rate. More specifically using ADF test if any series is found to be stationary we have applied the conventional trend analysis (fitting exponential trend: $\ln Y_t = \alpha + \beta t + \epsilon_t$) to measure growth rate. But in the presence of unit root in the data series one should not apply the usual trend equation analysis by OLS method for measuring growth rate.

In that situation, we have estimated the conditional growth rate using the following equation $\ln Y_t = \alpha + \beta \ln Y_{t-1} + \gamma t + \varepsilon_t \dots \dots \dots (II)$

Where, γ represents the conditional growth. More specifically, here the conditional growth rate is $\hat{\gamma} \times 100$. The instability has been measured by using Cuddy-Della Valle index.

$CDI = CV\sqrt{1 - R^2}$ where, CV is the coefficient of variation and R^2 is the coefficient of determination obtained from the estimation of the relevant trend equation.

4. Results and Discussion

1. Growth

From Table 1, we see that the conditional production growth rates of crop groups (whose corresponding time series are found to be non-stationary) like, all crops combined, total foodgrains and total non-foodgrains are found to be significantly positive in the country. The respective values are 3.1%, 3.8% and 2.7%. But the production growth rates of total fruits combined and total vegetables combined do not play any significant role in India. The production growth rates of total foodgrains and total non-foodgrains increased by the both area and productivity growth. But productivity played more significant role for improvement of production growth of all crops combined in the country.

Table 1. Estimated crop wise growth rates in India vis-a-vis West Bengal and Burdwan during 2000-01 to 2014-15

Crop name	India			West Bengal			Burdwan		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Mango	^c -0.7 (-0.58) [1.84]	^c 5.2*** (3.90) [1.97]	^c 1.1 (1.58) [2.03]	^c 0.9 (0.98) [1.76]	^c 5.7** (2.78) [1.87]	^u 1.1 (0.74) [2.70]	^u 1.1*** (6.20) [2.25]	^u -1.7 (-1.69) [2.14]	^c -2.4 (-1.44) [1.88]
Banana	^c 2.4 (1.72) [1.47]	^u 6.4*** (10.47) [1.58]	^c 0.9 (1.40) [1.45]	^c 0.0 (-0.03) [1.75]	^c 0.8 (0.37) [1.84]	^c 1.3 (1.44) [1.98]	^c 1.3 (1.40) [2.34]	^c 1.3* (2.07) [2.37]	^c -1.2* (-1.97) [1.93]
Papaya	^c 3.8** (2.40) [2.04]	^c 7.4** (2.43) [1.58]	^c 3.2*** (3.77) [1.52]	^c 0.1 (0.19) [2.40]	^c 1.6* (2.06) [1.74]	^u -0.3* (-1.79) [1.73]	^c 1.3** (2.26) [1.83]	^c 1.6* (1.95) [1.77]	^c 0.1 (0.29) [1.85]
Guava	^c 3.9** (3.01) [2.00]	^c 2.1 (1.68) [1.65]	^c 1.0 (1.78) [2.53]	^c -0.4 (-0.60) [1.71]	^c 0.8 (0.93) [2.50]	^c -1.4* (-2.03) [1.84]	^c 0.0 (-0.02) [2.39]	^c 0.2 (0.21) [1.79]	^c 0.1 (0.34) [2.03]
Litchi	^c 3.0** (2.71) [1.74]	^c 2.4** (2.27) [1.75]	^c -0.6 (-0.62) [1.69]	^u 3.3*** (15.87) [1.51]	^c 2.6* (1.92) [1.57]	^u -0.4 (-1.17) [1.85]	^u 1.1*** (10.65) [1.47]	^u 0.4 (1.75) [1.68]	^c -0.6** (-2.81) [1.71]
Other Fruits	^c 4.1 (1.26) [1.60]	^c 5.0*** (3.59) [1.96]	^c 0.2 (0.17) [2.10]	^u 1.3*** (7.19) [1.64]	^c 0.4 (1.01) [1.93]	^u -0.1 (-0.58) [2.61]	^c 0.4 (0.34) [2.33]	^u 0.7 (0.69) [1.76]	^u -0.8* (-1.90) [2.04]
Total fruits Combined	^c 0.6 (0.30) [1.78]	^c 3.1 (1.67) [1.40]	^c 1.2** (2.35) [1.95]	^c 0.5 (0.77) [2.03]	^c 2.8* (2.04) [1.93]	^c 0.9* (2.15) [1.82]	^u 1.9*** (8.50) [2.50]	^c 1.1** (2.38) [2.14]	^c -0.1 (-0.19) [1.89]
Total Vegetables combined	^c 2.1* (1.97) [1.81]	^c 3.1 (1.74) [1.57]	^c 1.9** (2.68) [1.77]	^c 1.1*** (3.16) [2.14]	^c 0.5 (0.72) [1.64]	^c 0.8* (1.80) [1.78]	^c 1.0 (1.21) [2.19]	^c 2.0* (1.84) [1.88]	^c 1.5*** (3.91) [2.50]
All Crops Combined	^c 1.7*** (4.28) [2.41]	^c 3.1** (2.42) [1.87]	^c 1.4 (1.66) [1.45]	^c -0.4 (-1.70) [1.54]	^c 1.8*** (3.25) [1.91]	^c 1.7** (2.72) [1.88]	^c -0.9** (-2.99) [1.99]	^u 1.0** (2.17) [1.60]	^c 1.4** (2.35) [1.93]
Total Foodgrains	^c 0.9*** (4.57) [2.40]	^c 3.8*** (4.36) [1.94]	^c 2.7*** (3.50) [1.77]	^c -0.8** (-2.39) [1.55]	^u 0.7** (2.41) [1.52]	^c 1.6*** (5.08) [1.41]	^c -1.0*** (-3.28) [2.08]	^u 0.2 (0.55) [1.57]	^c 0.5 (1.58) [1.55]
Total Non-Foodgrains	^c 2.3*** (3.17) [2.06]	^c 2.7** (2.27) [1.60]	^c 1.4* (1.92) [1.57]	^c 0.6* (2.05) [1.74]	^c 3.1** (2.40) [2.01]	^c 2.5** (2.25) [2.02]	^c -0.7 (-1.26) [1.90]	^c 1.9 (1.24) [1.79]	^c 2.9* (1.89) [2.04]

Source: Author's calculation based on BAES data (2000-01 to 2014-15)

Notes: *** Significant at 1% level, ** Significant at 5% level, *Significant at 10% level. t- Values are within parentheses and D.W values are within square bracket. 'C' represents conditional growth (when the underlying series is non-stationary) and 'U' represents unconditional growth (when the underlying time series is found to be stationary using ADF test)

The conditional production growth rates of all crops combined (1.8%), total non-foodgrains (3.1%) and total fruits combined (2.8%) are found to be significantly positive in West Bengal. In case of total foodgrains whose time series is found to be stationary, the unconditional production growth in the State is significantly positive (0.7%). The production growth rates of all crops combined, total foodgrains and total fruits combined increase due to mainly their productivity growth. But the production growth rate of total non-foodgrains is contributed by the both area and productivity growth in the State.

In case of Burdwan, the production growth rates of total fruits combined (1.1%) and total vegetables combined (2.0%) are found to be significantly positive but the growth rates of two other crop groups like, total foodgrains and total non-foodgrains remain insignificant. The unconditional production growth rate of all crops combined is significantly positive with value 1.0%. The production growth rates of total vegetables combined and all crops combined increase due to mainly productivity growth. The production growth rate of total fruits combined contributed mainly by the acreage growth in the district.

We get clear picture by extending this analysis crop wise. In case of India, we observe from Table 1 that the conditional growth rate in papaya production is significantly high at 5% level of significance with 7.4% growth, followed by mango with 5.2%, 'other fruits' with 5.0% and litchi with 2.4% in the country over the study period. The time series on banana production being stationary generates unconditional growth of 6.4% in the country. The production growth rate took place mainly due to area growth for litchi but we have seen that both area and productivity played significant role for the production growth of papaya. In the country we do not get any clear picture of area and /or productivity growth for production growth of a few fruits like, mango, banana and 'other fruits'. The relative contributions of area and productivity are found to be mostly positive but all insignificant for these fruits in the country.

In case of West Bengal, we see (Table 1) that the conditional production growth rates of three types of fruit namely, mango, papaya and litchi are significantly positive with values 5.7%, 1.6% and 2.6% respectively over the study period. Further, the conditional production growth rates of some other fruits, like banana, guava and 'other fruits' in West Bengal are found to be positive but insignificant. The conditional growth rates in production of litchi take place due to area growth. In the state we do not get any clear picture of area and /or productivity growth for production growth of mango and papaya.

In case of Burdwan, the conditional production growth rate of papaya is found to be significantly positive with 1.6% followed by the growth rate of banana with 1.3%. The conditional production growth rates are found to be positive but insignificant for guava but the unconditional production growth rates are found to be insignificant for two other crops namely, litchi and 'other fruits' of the district. The production growth rates of papaya took place due to area growth in the district.

2. Instability

Production instability has been measured by using Cuddy-Della Valle (CDV) index. We have divided the production instability into three classes namely, low instability, medium sized instability and high instability.

1. When CDV index takes the value from 1 to 8, it is recognized as low instability.
2. For medium sized instability the value of this index is taken from 8 to 15.
3. High instability is identified when CDV index takes the value from 15 to 22.

From Table 2, we see that the production instability of crop-groups like, all crops combined (6.20), total foodgrains (5.43), total non-foodgrains (6.92), total fruits combined (3.46) and total vegetables combined (4.25) are found to belong to the category of low values in the country.

The production instability of total vegetables combined is very low with CDV index value 1.29 followed by all crops combined (4.59), total foodgrains (4.69) and total fruits combined (6.60) but the production instability of total non-foodgrains (11.20) is found to be of medium size in the State. The production volatility of only total non-foodgrains is found to belong in the category of high values with CDV index value 18.47 but for all other crop groups like, all crops combined (7.13), total foodgrains (6.88), total fruits combined (4.14) and total vegetables combined (6.51) the production instability is found to be low in the district.

Table 2. Estimated crop wise instability in India vis-a-vis West Bengal and Burdwan during 2000-01 to 2014-15

Crop name	India			West Bengal			Burdwan		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Mango	5.12	6.06	9.75	2.56	19.84	20.19	3.70	15.23	19.69
Banana	5.21	8.75	5.84	4.28	8.36	6.89	5.42	5.08	6.06
Papaya	9.20	15.98	7.20	2.46	3.26	4.88	5.49	6.40	3.29
Guava	4.98	7.64	6.02	2.14	2.62	3.31	5.04	3.44	5.92
Litchi	3.40	9.62	13.44	4.02	9.88	5.92	4.27	12.71	2.51
Other Fruits	18.88	9.44	15.92	3.67	4.25	2.51	15.42	17.81	7.34
Total fruitsCombined	6.85	3.46	5.76	1.78	6.60	4.70	4.61	4.14	4.16
Total Vegetablescombined	2.79	4.25	2.35	0.92	1.29	1.27	8.08	6.51	2.74
All Crops Combined	2.19	6.20	4.71	2.76	4.59	4.06	3.70	7.13	5.70
TotalFoodgrains	1.75	5.43	4.34	3.25	4.69	1.73	3.66	6.88	3.71
Total Non-Foodgrains	3.56	6.92	6.50	2.44	11.20	11.15	7.25	18.47	17.13

Source: Author's calculation based on BAES data (2000-01 to 2014-15)

Note: Values are estimated crop wise using CDV index

In regard to individual crops, the production instability of papaya is highest in the country with CDV index value 15.98. The production instability of mango (6.06) belongs to the category of low values followed by guava (7.64). Three other crops namely, banana (8.75), litchi (9.62) and 'other fruits' (9.44) are within the medium class of instability in the country. In case of West Bengal we see that the production instability of mango is very high (19.84). The production instability of two other crops namely, banana (8.36) and litchi (9.88) are found to belong in medium class, while the production volatility of guava is very low with CDV index value 2.62 preceded by papaya (3.26) and 'other fruits' (4.25). In case of Burdwan, other fruits played more volatile role in production with CDV index value 17.81 followed by mango (15.23). The production instability of a few other crops namely, banana (5.08), papaya (6.40) and guava (3.44) are found to be in low class, while the production instability of litchi (12.71) is found to be of medium size in the district. Further, from Table 3 we see that out of 33 numbers of cases 13 cases represent that there is an inverse relationship between growth and instability, while only 2 other cases show a positive relation. Rest 18 cases represent that there is no relationship between growth and instability in fruits production. From this scenario we may come to the conclusion that the growth and instability are either negatively related to each other or they are independent for fruit crops production.

Table 3. Association between growth and instability in agricultural production in India vis-a-vis West Bengal and Burdwan during 2000-01 to 2014-15

	Low Instability	Medium Instability	High Instability
Significantly positive growth	India: [Mango, Total Foodgrains, Total Non-Foodgrains, All Crops Combined] West Bengal: [Papaya, All Crops Combined, Total Foodgrains, Total Fruits Combined] Burdwan: [Total Fruits Combined, Papaya, Banana, Total Vegetables Combined, All Crops Combined] Total Number of cases: 13	India: [Banana, Litchi, 'Other Fruit'] West Bengal: [Litchi, Total Non-Foodgrains] Total number of cases: 5	India: [Papaya] West Bengal: [Mango] Total number of cases: 2
Insignificant growth	India: [Total Fruits Combined, Total Vegetables Combined] West Bengal: [Guava, 'Other Fruits', Total Vegetables Combined] Burdwan: [Guava, Total Foodgrains] Total number of cases: 7	West Bengal: [Banana] Burdwan: [Litchi] Total number of cases: 2	India: [Guava] Burdwan: [Mango, 'Other Fruits', Total Non-Foodgrains] Total number of cases: 4
Significantly negative growth			

Source: Author's calculation based on BAES data (2000-01 to 2014-15)

5. Conclusion

The production growth rates of crop-groups like, all crops combined, total foodgrains and total non-foodgrains have been significantly positive in India and West Bengal, while only all crops combined played a significant role in the district. The production growth rate of all fruits combined has been significantly positive both in Burdwan and West Bengal. The production growth rates of crop-groups occur due to both area and productivity growth in the country, while productivity played a vital role for improvement of production growth rate in Burdwan and West Bengal.

The production growth rate of all fruits combined takes place due to productivity growth in West Bengal but acreage growth is more responsible component for betterment of its production growth rate in the district. The production instability of all fruits combined is found to be low compared to that of individual crops or crop-groups. The fruits are, in general, high valued and nutritious crops compared to the traditional crops. Most of the farmers in the country are aware of the profitability of fruits farming but they are remaining still stuck in traditional crop farming. However, fruits cultivation is comparatively costly than traditional farming. Many types of cost are involved in fruits farming like, irrigation cost, marketing cost, storage cost, transportation cost etc. more over fruits are perishable in nature. Most of the Indian farmers belong to marginal group. It resulted that they cannot afford these types of cultivation cost. But fruits farming produce opposite result in Burdwan and West Bengal which are also dominated by marginal farmers. This result may occur due to availability of steady local markets for fruits. From this scenario we may come to conclusions that the farmers of West Bengal and Burdwan are more price responsive and consciousness about the nutritious foods. The acreage growth rate of all fruits combined increases in the district. It is implied that the farmers begin to change the cropping pattern from traditional crops to fruit crops in the district.

6. Reference

1. S.H. Mondal, A.K. Chattopadhyay. Pattern of growth and instability in crop production in Burdwan during 2000 to 2013: a comparative study. *Research Bulletin*. 2018; 43(4).
2. V. Saravanapandeeswari, B. Vanitha. Growth of area, production and productivity of banana (*Musa paradisiaca*) cultivation in Theni District, Tamil Nadu – an analysis by component elements. *Indian Journal of Agriculture Research*. 2018; 52(2), 107-110.
3. N.A. Patil, R.A. Yeledhalli. Growth and instability in area, production and productivity of different crops in Bengaluru division. *International Journal of Agriculture, Environment and Biotechnology*. 2016; 9(4), 599-611.
4. S. Ali, A. Jabbar. Growth and variability in area, production and yield of selected fruit crops in khyber Pakistan. *Pakistan Journal of Agricultural Research*. 2015; 28(1), 64-69.
5. K. Vinayaka, S. Lokapur, R. Gurikar, R. Hosali. Growth and instability analysis of fruit crops in india – an economic analysis. *Journal of Environmental Science, Computer Science and Engineering and Technology*. 2014; 3(4),1808-1813.
6. T.A. Bhat, T. Choure. Study of growth and instability in raw silk production and marketing in India. *European Journal of Business and Management*. 2014; 6(14), 1-5.
7. B. Krisnan, A. Chanchal. Agricultural growth and instability in western himalaya region: an analysis of Himachal Pradesh, India. *Journal of Agriculture and Life Sciences*. 2014; 1(1), 1-7.
8. R.P. Sing, N. Rani. To study growth rate of area, production and productivity of fruit crops in Jharkhand. *Journal of Economics and Social Development*. 2013; 9(1), 1-9.
9. S. Rani, H. Shah, A. Ali, B. Rehman. Growth, instability and price flexibility of major pulses in Pakistan. *Asian Journal of Agriculture and Rural Development*. 2012; 2(2), 107-112.
10. M.P. Wasim. Trends, growth and variability of major fruit crops in Balochistan - Pakistan: 1989-2009. *ARPN Journal of Agricultural and Biological Science*. 2011; 6(12), 1-10.
11. R.C. Kumawat, P.C. Meena. Growth and instability in area, production and yield of major spice crops in Rajasthan. *Journal of Spices and Aromatic Crops*. 2005; 6(14), 1-10.

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An Endeavour to empirically verify the ‘Feminisation ‘U’ Hypothesis’ of female labour force participation rate in India (1991-2016)

Suravikar Roy

Guest Lecturer, Department of Economics, Heramba Chandra College, Kolkata - 700029, West Bengal, India
karsuravi@rediffmail.com

Abstract

Objectives: This paper aims at empirical investigation of the ‘U’ pattern of association between female labour force participation rate in India and its determinants using secondary data for the period (1991-2016).

Methods/Statistical analysis: To test the validity of this ‘feminisation ‘U’ hypothesis’ a scatter diagram has been presented to display the association between FLFP and GDPPCPPPCONST for the period (1991-2016). Contrary to the earlier studies two distinct ‘U’ pattern of movement for two different periods period 1: (1991-2005) and period 2: (2005-2016) have been noticed and separate OLS regression using linear and quadratic models for period 1 and period 2 respectively have been carried out.

Findings: Regression results suggest that for both the periods quadratic models explain the influence of GDP per capita better on female labour force participation rate and this verifies the ‘feminisation ‘hypothesis’. This is consistent with the existing literature and adds value to them as it is based on updated data. Some other factors like school enrolment, secondary, female (% gross) (FSC), school enrolment, secondary, male (% gross) (MSC), Employment to Total Population Ratio (ETPR), fertility rate (FERT) are also incorporated for analysing their possible influence causing this pattern of association. The ‘U’ pattern of association between FLFP and FSC and FLFP and FERT, FLFP and MSC are also noticed which proves the nonlinearity between i. FLFP and FSC and ii. FLFP and FERT, iii. FLFP and MSC.

Application/Improvements: We find twice the evidence of ‘U’ shaped pattern of association between FLFP and GDPPC PPP cost which might indicate that the association might be oscillatory in nature which can be empirically tested.

Keywords: Female, Labour force, India, Feminisation, ‘U’ shaped.

1. Introduction

The participation of women in the workforce has an essential role to play in the development process of a country. A declining trend of female labour force participation rate in a country like India may jeopardise the growth of the country. It is pertinent to analyse the trend and pattern of association between female labour force participation rate (FLFP) and its determinants. FLFP is hypothesised to follow a nonlinear ‘U’ shaped pattern as a country develops. A couple of studies have tried to sketch this ‘U’ shaped picture of female labour force participation rate as a country develops [1-4].

According to the ‘feminisation ‘U’ hypothesis’ the influence of growth on female labour force participation rate is supposed to be convex. i.e., FLFP initially declines with growth and then rises in the long run [1]. Explanations for this ‘U’ shaped hypothesis has been provided as-in a poor country, women engage themselves in subsistence farming. With further development of the country, people shift their economic activity from agriculture to industry.

There is a rise in level of education, fall in fertility rate and weakening of social stigma. So women become able to take advantage of new jobs in the emerging sectors which are now more family friendly. At a household level with increase in a husband’s wages, negative income effect dominates the supply of female labour, when wages for women start to increase, however, the substitute effect becomes dominant and women are encouraged to increase their labour supply [5].

There is a stream of research on the investigation of Feminisation 'U' hypothesis. Some have used econometric techniques for verifying the Hypothesis [1], [2], [12]. Many studies confirm the existence of feminisation 'U' hypothesis [6], [7]. The various findings of their research suggest the following: It is suggested that policies to enhance growth alone may be ineffective mostly in developing countries to promote women's labour force participation. In addition to that, better labour market policies are required to get any desirable outcome as far as female labour force participation is concerned.

In [1] South Mediterranean countries, removing barriers for the entry of females in the labour force has the effect of increase in their participation. The resulting economic benefit has growth enhancing effect in South Mediterranean countries [2]. In the Indian context, there are relatively few empirical studies to verify this hypothesis. In [8] was the first to mention that India is behaving according to feminisation 'U' hypothesis and it was made popular by [9]. Some researchers have tried to empirically identify the causes responsible for this pattern of association. Some researchers state that "other family income" has a strong role to play in falling female labour force participation. Women with more education generally marry into rich families which induce them to withdraw from labour force [3]. In addition to improvement in literacy rate in states like Uttarakhand, efforts to create employment opportunities for the educated females are essential for encouraging female labour force participation in rural as well as urban regions [2].

In [10] noticed a strong 'U' shape in the relation between education and female labour force participation, and there is a turning point in urban areas having shifted from completion of middle school to completion of secondary education [10-11]. However, there are some studies which questioned the validity and existence of 'U' shaped hypothesis [13-14]. A study found that the Middle East and North America (MENA) region did not reveal a 'U' shaped relationship between female labour force participation and gross domestic product [2]. Some studies have found that in high income and upper middle income economies, the existence of the 'U' shaped relationship was verified positively, but in the low-income economies, the 'U' shaped curve was instead found to be an inverted one [13]. Some other study has also detected an inverted U shaped relationship between income and female labour force participation rate [15]. In [16] their research has also conducted a state level analysis and they did not find much support for a 'U' shape of female participation in the Indian case. So there is a growing debate among the researchers on the verification on 'U' shaped feminisation hypothesis. This calls for an extensive research on the said topic incorporating other factors also which might have influence on this pattern of association.

This paper focuses on empirical verification of 'U' shape hypothesis and also incorporating factors like female and male school enrolment, fertility rate, employment to population ratio etc. To give a comprehensive analysis of the 'U' shaped feminisation hypothesis, a recent data has been used to enrich the work and to get an up-to-date analysis.

2. Data source and Methodology

1. Data source

Secondary data has been used in this paper obtained from 'World Development Indicator', World Bank. Time series regression analysis has been carried out to prove the convexity of the hypothetical relationship between female labour force participation rate and GDPPCONST for the period [1991-2016]. MS EXCEL software has been used to perform the regression.

The definition of the variables: FLFP: Labour force participation rate, female (% of female population ages 15+) (modelled ILO estimate): Labour force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labour for the production of goods and services during a specified period. GDPPCONST: GDP per capita, PPP (constant 2011 international \$): GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates.

An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.

It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2011 international dollars. FSC: school enrolment, secondary, female (% gross): Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.

FERT: Fertility rate, total (births per woman): Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year. MSC: school enrolment, secondary, male (% gross): Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject or skill oriented instruction using more specialised teachers.

ETPR: Employment to population ratio, 15+, total (%) (Modelled ILO estimate): Employment to population ratio is the proportion of a country's population that is employed. Employment is defined as persons of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period (i.e. who worked in a job for at least one hour) or not at work due to temporary absence from a job, or to working-time arrangements. Ages 15 and older are generally considered the working-age population.

3. Discussion

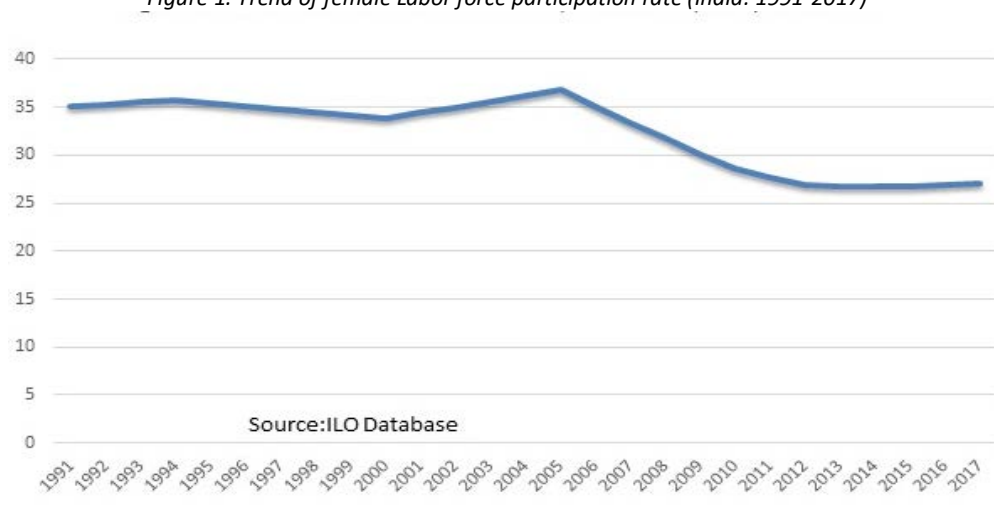
1. Analysis of the nonlinear association of FLFP

This paper aims at empirical investigation of the pattern of association between female labor force participation rate in India and its determinants. Existing literature suggests that there is evidence of a ‘U’ shaped pattern of association between FLFP and economic development.

To test the validity of this ‘feminisation hypothesis’ a scatter diagram (Figure 1) has been presented to display the association between FLFP and GDPPCPPPCONST for the period (1991-2016).

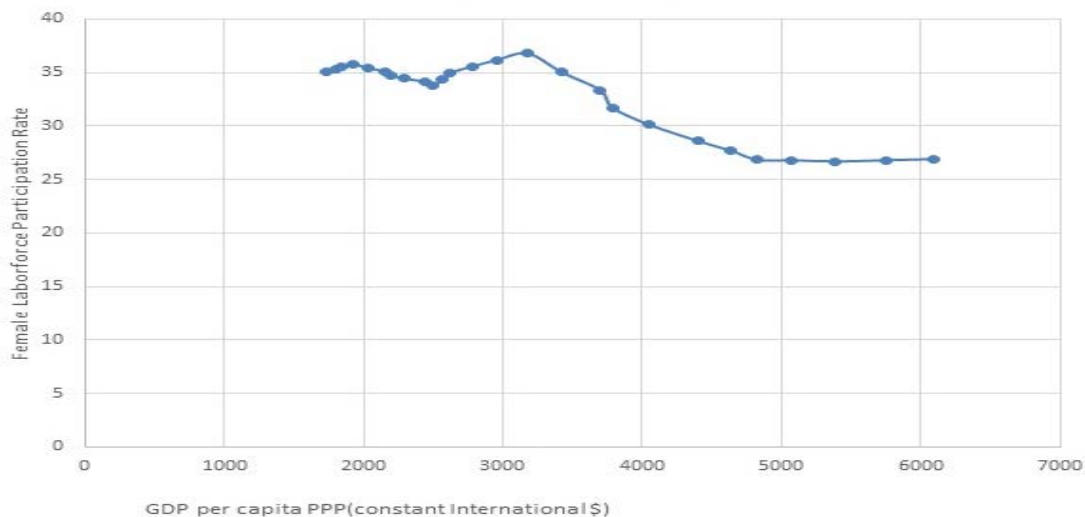
Figure 1 reveals that in the period 1991-2017 there are two distinct ‘U’ pattern of movement, one from 1991 to 2005 another from 2005 to 2017. There is a hypothesis that the relationship between female labor force participation rate and development has been ‘U’ shaped. To see the association we consider.

Figure 1. Trend of female Labor force participation rate (India: 1991-2017)



The scatter diagram (Figure 2) shows that for the period considered here (1991-2016) there has been two distinct ‘U’ pattern of movement. So two different periods has been considered (1991-2005) and (2005-2016). We run separate regressions for the two periods concerned as below: Period 1: 1991-2005.

Figure 2. Scatter diagram showing association between GDP per capita PPP (constant 2011 International \$) and Female labor force participation rate (India: 1991-2016)



Source: World Development Indicator, World Bank

1.1. Linear model

$FLFP_t = a + bGDPPC_t + U_t$ at time period t, U_t = Disturbance term at period t, regression results can be summarised in (Table 1,2): Regression coefficient is not statistically significant at 5% level of significant (t tabulated at 5% level of significance for 14 d.f is 2.144). Moreover R^2 value is only 0.07 very low. This suggests that the linear regression is not the best fit. The model is improved by incorporating square of GDPPC $PPPCONST$, i.e, run a quadratic regression as follows:

Table 1. Female Labor force participation rate and GDP per capita, PPP (constant 2011 International \$)

Year	FLFP	GDP per capita, PPP (constant 2011 international \$)
1991	35.033	1737.615
1992	35.258	1796.532
1993	35.488	1845.149
1994	35.722	1930.113
1995	35.408	2036.796
1996	35.083	2149.366
1997	34.76	2194.903
1998	34.439	2288.048
1999	34.124	2445.751
2000	33.816	2495.047
2001	34.391	2570.428
2002	34.975	2623.33
2003	35.566	2783.004
2004	36.167	2955.205
2005	36.777	3178.829
2006	35.032	3419.931
2007	33.341	3698.777
2008	31.703	3786.633
2009	30.114	4049.805
2010	28.576	4404.697
2011	27.69	4635.879
2012	26.829	4827.56
2013	26.797	5073.605
2014	26.686	5389.904
2015	26.8	5754.065
2016	26.908	6092.648

Table 2. Regression results: regression of FLFP on GDPPC (linear model) (period 1)

Summary output								
<i>Regression Statistics</i>								
Multiple R	0.2672							
R Square	0.0714							
Adjusted R square	-1E-05							
Standard error	0.7785							
Observations	15							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	0.606	0.61	1	0.3			
Residual	13	7.879	0.61					
Total	14	8.4849						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	34.021	1.1307	30.1	2E-13	32	36.46	32	36
GDPPCPPPCONST	0.0005	0.0005	1	0.336	-0	0.002	-0	0

2.2. Quadratic model

$FLFP_t = a + bGDPPC_t + c(GDPPC_t)^2 + U_t$, $t =$ at time period t , $U_t =$ Disturbance term at period t . Regression results (Table 3) can be summarised as follows: Regression results are much better than the earlier linear regression. The R^2 is 0.67 so good fit. GDPPCPPPCONST and GDPPCPPPCONST2 are statistically significant at 5% level. GDPPCPPPCONST has negative coefficient meaning FLFP decreases with increase in GDP Per capita initially. This can be explained as when per capita income increases female join less in the laborforce. GDPPCPPPCONST2 has a positive coefficient which indicates that after a specific level of GDP Per capita the returns to FLFP by increasing GDPPCPPPCONST are increasing, i.e, the change in slope of FLFP is positive for further increase in GDPPCPPPCONSTANT which proves the convexity and hence the ‘U’ shaped pattern.

Table 3. Regression results: regression of FLFP on GDPP (Quadratic model) (period 1)

Summary output								
<i>Regression statistics</i>								
Multiple R	0.8199							
R Square	0.6723							
Adjusted R square	0.6177							
Standard error	0.4814							
Observations	15							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	2	5.7044	2.85	12.31	0			
Residual	12	2.7805	0.23					
Total	14	8.4849						
	<i>Coefficients</i>	<i>Standard error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	52.269	3.9524	13.2	2E-08	44	60.88	44	61
GDPPCPPPCONST	-0.0152	0.0034	-4.5	7E-04	-0	0.008	-0	-0
GDPPCPPPCONST2	3E-06	7E-07	4.69	5E-04	0	5E-06	0	0

The period (1991-2005) can be viewed as the immediate post liberalisation period when it was expected that with liberal policies, easy entry of foreign investment, more emphasis on export production, employment generation and labour force participation would increase. But initially the Indian economy faced a fall in labor force participation rate till 2000, after which it started to increase in the period between 1999-2000 and 2004-05 [NSSO 55th round and 61st round]. Major employment was created in the services (hotel, business, transport, banking services), trade, mining and quarrying, manufacturing. There was a fall in employment generation in agriculture though a significant proportion of population was still preoccupied in agriculture. The major share of this employment was informal sector employment period 2, period: (2005-2016).

1.1. Linear model

$$FLFP_t = a + bGDPPC_t + U_t$$

t=at time period t, U_t =Disturbance term at period t

Regression results are summarised in (Table 4). The estimated regression coefficients seem to be good enough to convince us to use the linear model. This is evident by the high R^2 value (0.80), statistically significant t value (t tabulated value for 5% level of significant at 11 d.f is 2.20). Regression coefficient is –live as expected. But if we again use the quadratic model we get better results as shown below:

Table 4. Regression results: regression of FLFP on GDPPC (Linear model) (period 2)

Summary output								
Regression statistics								
Multiple R	0.8945							
R square	0.8002							
Adjusted R square	0.7802							
Standard error	1.6912							
Observations	12							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	114.55	115	40.05	0			
Residual	10	28.602	2.86					
Total	11	143.16						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	45.387	2.5154	18	6E-09	40	50.99	40	51
GDPPCPPPCONST	-0.0035	0.0005	-6.3	9E-05	-0	-0.002	-0	-0

2. Quadratic model

$$FLFP_t = a + bGDPPC_t + c(GDPPC_t)^2 + U_t$$

t=at time period t, U_t =Disturbance term at period t

Regression results are summarised in (Table 5). R^2 value has been as high as 0.99 coefficients of GDPPCPPPCONST and GDPPCPPPCONST2 are highly statistically significant (Very high t ratios). As evident GDPPCPPPCONST has negative coefficient showing the negative impact on FLFP. GDPPCPPPCONST2 has positive coefficient which proves the convexity and ‘U’ pattern of association. Now we proceed to determine the other factors responsible for this pattern of movement of FLFP.

Table 5. Regression results: regression of FLFP on GDPP (Quadratic model) (period 2)

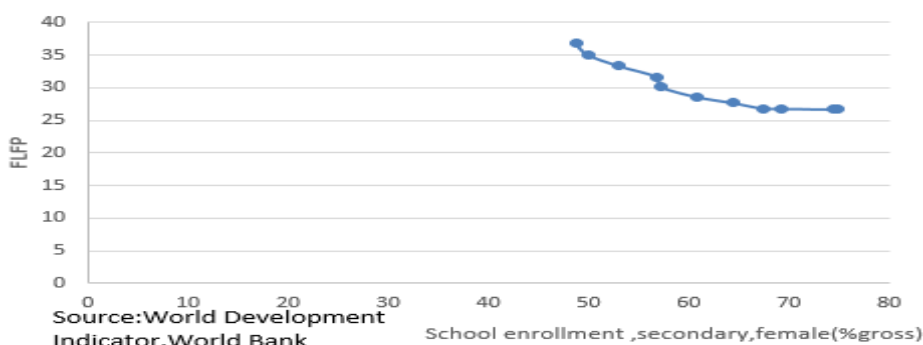
Regression Statistics								
Multiple R	0.9961							
R Square	0.9922							
Adjusted R Square	0.9905							
Standard Error	0.3514							
Observations	12							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	2	142.05	71	575.1	0			
Residual	9	1.1114	0.12					
Total	11	143.16						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	87.27	2.8552	30.6	2E-10	81	93.73	81	94
GDPPCPPPCONST	-0.0223	0.0013	-18	3E-08	-0	-0.019	-0	-0
GDPPCPPPCONST2	2E-06	1E-07	14.9	1E-07	0	2E-06	0	0

We include factors like school enrolment, secondary, female (% gross) (FSC), school enrolment, secondary, male (% gross) (MSC), Employment to Total Population Ratio (ETPR), fertility rate (FERT). Period considered is (2005-2015). Because of lack of availability of data we consider this period only for analysis. The empirical regression model used here is furnished below:

$$FLFP_t = a + bGDPPCPPPCONST_t + GDPPCPPPCONST_2 + cFSC_t + dMSC_t + eETPR_t + fFERT_t + U_t$$

t=at time period t, U_t =Disturbance term at period t

Figure 3. Association between FLFP and school enrolment, secondary, female (%of Gross)



Source: World Development Indicator, World Bank

Table 6. Regression results: regression of FLFP on GDPPC, FSC, MSC, ETPR, FERT

Summary output								
Regression Statistics								
Multiple R	0.9997							
R square	0.9995							
Adjusted R square	0.9986							
Standard error	0.1354							
Observations	11							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	6	134.141	22.35684	1219.7	1.79E-06			
Residual	4	0.073317	0.018329					
Total	10	134.2143						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-17.45	23.29723	-0.74902	0.4955	-82.1335	47.2334	-82.1335	47.2334
GDPPCPPPCONST	-0.009	0.003115	-2.8047	0.0486	-0.01738	-8.8E-05	-0.01738	-8.8E-05
GDPPCPPPCONST2	8E-07	2.36E-07	3.421579	0.0267	1.52E-07	1.46E-06	1.52E-07	1.46E-06
FSC	0.0898	0.104034	0.863249	0.4367	-0.19904	0.37865	-0.19904	0.37865
MSC	-0.048	0.083536	-0.57253	0.5976	-0.27976	0.184106	-0.27976	0.184106
ETPR	1.2205	0.727729	1.677128	0.1688	-0.8	3.240994	-0.8	3.240994
FERT	0.5641	16.86215	0.033456	0.9749	-46.2527	47.38098	-46.2527	47.38098

Regression results can be summarised in (Table 6) only ETPR is statistically significant at 20% level of significance. FSC, MSC and FERT coefficients are not insignificant at 5% level of significant. FSC is not statistically significant. This may be due to the feminisation hypothesis. We can see the scatter graph between FLFP and FSC as given in (Figure 3). The scatter diagram (Figure 3) again shows the 'U' shaped association. So we rather include a nonlinear, quadratic relation between FLFP and FSC. Let us consider the following regression model:

$$FLFP_t = a + bFSC_t + c(FSC_t)^2 + U_t$$

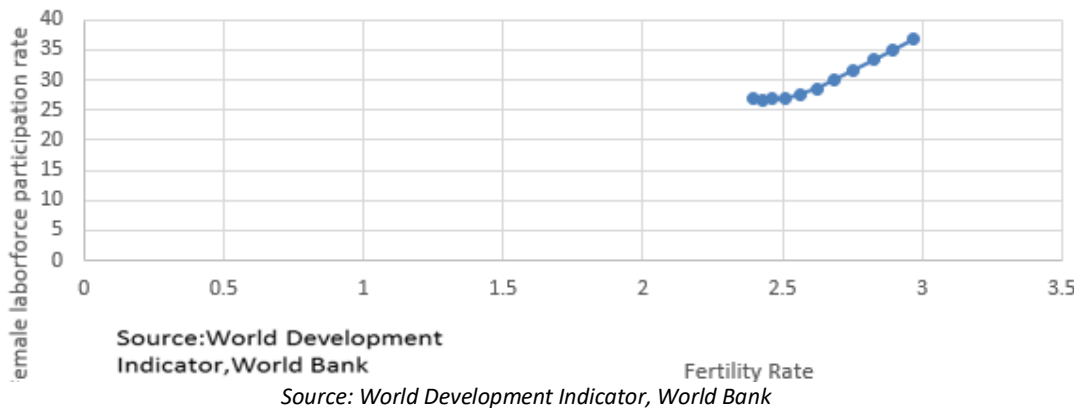
t=at time period t, U_t =Disturbance term at period t

Table 7. Regression results: regression of FLFP on FSC (Quadratic model)

Summary output								
Regression Statistics								
Multiple R	0.994926							
R Square	0.989878							
Adjusted R Square	0.987347							
Standard Error	0.412093							
Observations	11							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	2	132.8558	66.42789	391.1645	1.05E-08			
Residual	8	1.358567	0.169821					
Total	10	134.2143						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	122.1826	7.189526	16.99452	1.46E-07	105.6035	138.7616	105.6035	138.7616
FSC	-2.65685	0.235564	-11.2787	3.43E-06	-3.20006	-2.11364	-3.20006	-2.11364
(FSC) ²	0.018461	0.001898	9.727696	1.04E-05	0.014084	0.022837	0.014084	0.022837

The regression results can be summarised in (Table 7). Both FSC and (FSC)² coefficients are statistically significant at 5% level of significance. This proves the nonlinearity [‘U’ shaped association] between FLFP and FSC. The insignificant t ratio for FERT coefficient also calls for a similar scatter graph and regression as presented in (Figure 4).

Figure 4. Association between fertility rate and female labor force participation rate



This also shows a ‘U’ shaped pattern of association.

The regression model:

$$FLFP_t = a + bFERT_t + c(FERT_t)^2 + U_t$$

t=at time period t, U_t=Disturbance term at period t

Regression results can be summarised in (Table 8). Fertility rate coefficient is very highly negatively related to FLFP and statistically significant at 5% level of significance. But positive (FERT)² indicates that after a certain rate of FLFP decline any further increase in fertility rate will increase FLFP giving a ‘U’ shaped association. May be this rising portion can be explained as with further increase in fertility rate and as education increases, with more educated and skilled female population FLFP will start increasing. The association between MSC and FLFP has been portrayed in (Figure 5) given after references. To model the association between MSC and FLFP following regression has been run:

$$FLFP_t = a + bMSC_t + c(MSC_t)^2 + U_t$$

t=at time period t, U_t=Disturbance term at period t

Table 8. Regression results: regression of FLFP on FERT (Quadratic model)

Summary output								
<i>Regression Statistics</i>								
Multiple R	0.996719							
R Square	0.993448							
Adjusted R Square	0.99181							
Standard Error	0.331544							
Observations	11							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	2	133.335	66.66748	606.5013	1.84E-09			
Residual	8	0.879371	0.109921					
Total	10	134.2143						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	150.6744	24.74028	6.090247	0.000293	93.62325	207.7256	93.62325	207.7256
FERT	-108.918	18.58466	-5.86063	0.000378	-151.774	-66.0616	-151.774	-66.0616
(FERT)2	23.81273	3.475793	6.851021	0.000131	15.79754	31.82793	15.79754	31.82793

Regression results have been summarised in (Table 9). MSC coefficient has become statistically significant proving the 'U' pattern of association between MSC and FLFP. MSC has a negative coefficient which can be explained as when male education increases their employment as well as earning increases which induces female not to join outside employment opportunities.

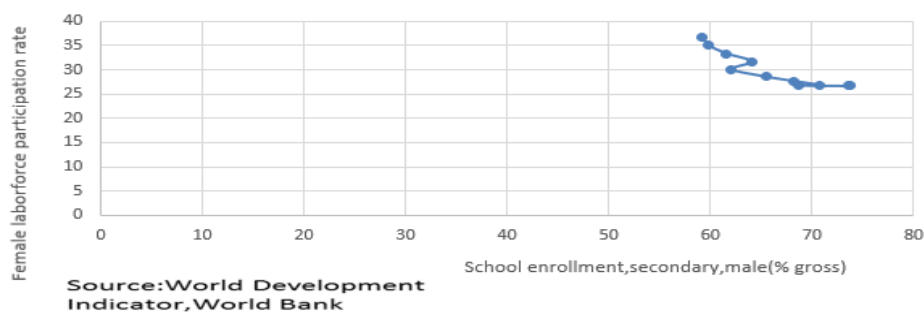
(MSC)² coefficient is positive. This indicates that after falling shape there is a turning point in FLFP after a certain level of MSC any further increase in MSC will increase FLFP.

This can be explained as when male education increases they realise the importance of female employment, there is receding social stigma against working women and all these contribute to rising FLFP.

Table 9. Regression results: Regression of FLFP on MSC (Quadratic model)

Summary output								
<i>Regression Statistics</i>								
Multiple R	0.970348							
R Square	0.941575							
Adjusted R Square	0.926969							
Standard Error	0.990041							
Observations	11							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	2	126.3729	63.18645	64.46409	1.17E-05			
Residual	8	7.841444	0.980181					
Total	10	134.2143						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	337.7214	64.56568	5.230664	0.000792	188.8327	486.6101	188.83	487
MSC	-8.6757	1.94936	-4.45054	0.002138	-13.1709	-4.18047	-13.17	-4.2
(MSC)2	0.060477	0.014643	4.130176	0.003298	0.026711	0.094244	0.0267	0.09

Figure 5. Association between school enrolment, secondary, male and female labor force participation rate



Source: World Development Indicator, World Bank

3. Summary of findings

This paper aims at empirical investigation of the pattern of association between female labor force participation rate in India and its determinants. Existing literature suggests that there is evidence of a 'U' shaped pattern of association between FLFP and economic development. To test the validity of this 'feminisation hypothesis' a scatter diagram has been presented to display the association between FLFP and GDPPCPPPCONST for the period (1991-2016) which shows that (Figure 2) for the period considered here there has been two distinct 'U' pattern of movement for two different periods period 1: (1991-2005) and period 2: (2005-2016). We run separate regressions for the two periods considered. We run OLS regression using linear and quadratic models for period 1 and period 2 respectively. Regression results suggest that for both the periods' quadratic models explain the influence of GDPPCPPPCONST better on FLFP. So this verifies the 'feminisation hypotheses, i.e. the 'U' pattern of nonlinear association between FLFP and GDPPCPPPCONST.

To analyse the factors other than GDPPCPPPCONSTANT which impact FLFP we include factors like school enrolment, secondary female (% gross) (FSC), school enrolment, secondary, male (% gross) (MSC), Employment to Total Population Ratio (ETPR), fertility rate (FERT) as independent variables. Due to lack of available data we can only analyse for the period (2005-2015), i.e., the second period. We use a linear model and find only ETPR is found statistically significant at 20% level of significance. This necessitates seeing the pattern of association between i. FLFP and FSC and ii. FLFP and FERT, iii. FLFP and MSC. The scatter diagram reveals the nonlinear association ['U' shaped] between i. FLFP and FSC and ii. FLFP and FERT, iii. FLFP and MSC. When we use quadratic models we get better significant statistical results. This proves the nonlinearity ['U' shaped association] between i. FLFP and FSC and ii. FLFP and FERT, iii. FLFP and MSC.

3. Conclusion and Scope of Further Research

All these results highlight the fact that there is a need to encourage education for both men and women, development of skill, access to better training programmes, access to childcare as well as other supportive institutions and legal measures to ease the burden of domestic duties, enhance women's safety, and encourage private sector development in industries and regions that can increase job opportunities for women in developing countries. Emphasis is needed on keeping young girls in school and ensuring that they receive a good quality education, beyond junior secondary level, and are able to take advantage of training opportunities. Removal of societal barriers, progressive thinking and mind-set are critical to boost up FLFP in India. For the period (1991-2016) as a whole we find twice the 'U' shaped pattern of association between FLFP and GDPPCPPPCONST. So this indicates that the association might be oscillatory in nature which can be empirically tested. Also the impact of physical and social infrastructure on FLFP can be empirically analysed. The role of education needs further investigation. It appears that increased female education is not always associated with commensurate rise in labour market participation. The role of both micro and macro policies need to be investigated more clearly. The role of trade and structural policies need to be investigated. Policies should have the target of reducing occupational segregation in India such as discouraging discriminatory employment practices and promoting skills development for women in industries and occupations with the greatest potential for employment growth. This requires further analytical work in this area. Measures to boost up female labour force participation should be accorded utmost priority.

4. References

1. A. Luci. Female labour market participation and economic growth. *International Journal of Innovation and Sustainable Development*. 2009; 1-13.
2. P. Verme. Economic development and female labor participation in the Middle East and North Africa: a test of the U-shape hypothesis. The World Bank. 2014; 1.
3. E. Chatterjee, S. Desai, R. Vanneman. Indian paradox: rising education, declining women's employment. *Demographic Research*. 2018; 38(31), 1-26.
4. A. Agarwal, D. Joshi. Goldin's 'U'-shaped curve hypothesis on female labour participation rate: a case study of Uttarakhan. *International Journal of Development Research*. 2015; 5(3), 3903-3907.
5. S. SherVerick. Female labor force participation in developing countries. IZA World of Labor 2014 *International Labour Organization*, India, and IZA, Germany. 2014.
6. S. Tsani, L. Paroussos, C. Fragiadakis, I. Charalambidis, P. Capros. Female labour force participation and economic growth in the South Mediterranean countries. *Economics Letters*. 2013; 120(2), 323–328,
7. K. Fregert, O. Çakır. The relationship between economic development and female labor force participation within the framework of u-shaped hypothesis: evidence from Turkey. *Department of Economics Master Thesis*. 2008; 1-61.
8. J.N. Sinha. Dynamics of female participation in economic activity. *Proceedings of the World Population Conference*, Belgrade. 1967; 4, 336-7.
9. C. Goldin. The U-shaped female labor force functions in economic development and economic history. NBER Working Paper No. 4707. 1994; 1-49.
10. S. Klasen, J. Pieters. What explains the stagnation of female labor force participation in Urban India? *The World Bank Economic Review*. 2015; 29(3), 449–478.
11. S. Klasen. What explains the low and stagnating female labour force participation in India? *International Growth Centre(IGC) Ideas for India*. 2017.
12. S. Kapsos, E. Bourmpoula, A. Silberman. Why is female labour force participation declining so sharply in India? ILO Research Paper No. 10, *International Labour Office*. 2014; 1-59.
13. E. Lechman, H. Kaur. Economic growth and female labor force participation verifying the U-feminization hypothesis. New evidence for 162 countries over the period 1990-2012. *Economics and Sociology*. 2015; 8(1), 246-257.
14. I. Gaddis, S. Klasen. Economic development, structural change, and women's labor force participation. *Journal of Population Economics*. 2014; 27(3), 639-681.
15. Levels of Development and Female Labour Participation Rates in Rural India. file:///C:/Users/INDJST/Downloads/MPRA_paper_84602a.pdf. Date accessed: 10/2016.
16. R. Lahoti, H. Swaminathan. Economic development and Women's Labor force participation in India. *Journal: Feminist Economics*. 2016; 22(2).

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Intergenerational Occupational Persistence: Recent Evidence from Indian States

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Sweta Lahiri¹ and Tushar K. Nandi²

Abstract

This article studies intergenerational occupational persistence using three recent rounds of a nationally representative sample survey from India. More than 60 percent of Indians are employed in the industry where their fathers are also employed. We find that individuals from Scheduled Tribes (ST) and Hindus have higher occupational persistence than those from the General Class (GEN) and Muslims, respectively. Persistence in general is higher in rural areas. We find considerable interstate and intrastate variations in the incidence across General Category States (GCSs) and Special Category States (SCSs). It has remained almost unchanged among GCSs on average, whereas it has decreased gradually for SCSs. Large inter-regional disparity exists within states between rural and urban areas and between capital and non-capital districts. Such disparity is found to be higher among GCSs. Bihar, Madhya Pradesh, Chhattisgarh and Jharkhand are the GCSs with large and increasing occupational persistence. Nagaland, Arunachal Pradesh, Meghalaya and Mizoram are the SCSs with persistence of above 70 percent. Using a probit estimation analysis, we find family background (father's education in rural area and ownership of productive assets) to have a

¹ Centre for Studies in Social Sciences, Calcutta, West Bengal, India.

² Department of Humanities and Social Sciences, Indian Institute of Science Education and Research (IISER), Kolkata, West Bengal, India.

Corresponding author:

Tushar K. Nandi, Department of Humanities and Social Sciences, Indian Institute of Science Education and Research (IISER), Kolkata, Mohanpur, Nadia, West Bengal 741246, India.

E-mail: nandi.tushar@gmail.com



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significant and consistent influence on intergenerational persistence compared to own education. Results in general indicate that background factors play a stronger role than education does in the choice of occupation among Indians.

Keywords

Intergenerational persistence, occupational mobility, labour market, transition, India

Introduction

India has experienced a high rate of economic growth in the last two decades or so. This has helped the country to lift a significant proportion of people from below the poverty line. However, inequality has remained a persistent concern throughout the entire phase of economic growth. A particular concern is that the benefit of economic growth has not percolated to all sections of the population. The debate on ‘jobless growth’ versus ‘inclusive growth’ has gained importance in popular media, as well as in academic and policy communities.

Inequality in labour market outcomes often results from inequality of opportunities. One way to examine the extent to which the labour market provides equal opportunities to all participants is to look at outcomes from an intergenerational perspective—correlation between outcomes across generations (Black & Devereux, 2010; Bowles & Gintis, 2002). This strand of literature emphasizes the role of inequality of opportunities which is primarily caused by intergenerational transmission of socio-economic status. This is often the case for countries with immensely unequal socio-economic conditions for its population. In the presence of strong intergenerational linkages, the labour market may not appear a level playing field to all its participants, and gains from growth naturally fail to trickle down properly to the whole population. Emran and Shilpi (2011) stressed that genetic endowment is the fundamental source of intergenerational linkage. Apart from the genetic link, parents can directly influence the levels of initial capital stock through investing in offspring’s education and transferring physical and financial capital. Despite the renewed interest in literature in exploring observed differences in the economic outcome from an intergenerational perspective, occupational mobility in the context of developing countries is less interrogated and empirical evidence almost non-existent.

In this article, we analyse intergenerational persistence of occupation in India. Our objective in this article is to quantify the occupational persistence in recent times, the period when India has experienced a relatively high level of economic growth. Previous work in the Indian context includes Hnatkowska et al. (2012) and Nandi (2016). Our article is close to the analysis presented in Nandi (2016). We extend his analysis by using three recent rounds of a nationally representative sample survey to analyse the interstate variations in persistence. By persistence here, we refer to the phenomenon of individuals being in the same industries as

their fathers. Using data from the three latest rounds of the Employment–Unemployment Survey of the National Sample Survey Office (NSSO), we find that such persistence has been very high, more than 60 percent, in recent years. We present descriptions of the intergenerational occupational persistence based on caste, religious groups and area of residence. Individuals from Schedule Tribes (STs) have higher persistence than those from the General Caste (GEN), and Hindus have higher persistence than Muslims. Occupational persistence is higher in rural areas than in urban areas. In the descriptive analysis, we observe that education is consistently negatively associated with persistence. Among the General Category States (GCSs), persistence has remained almost unchanged on average, while it has decreased gradually for Special Category States (SCSs) and Union Territories (UTs). We find that GCSs like Madhya Pradesh, Chhattisgarh, Orissa and Bihar have a very high level of intergenerational persistence. Goa, Kerala and Tamil Nadu have a relatively low level of persistence. We observe persistence to fall considerably below the national average among the SCSs. However, Nagaland, Arunachal Pradesh, Meghalaya and Mizoram are the SCSs with persistence still above 70 percent. Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Tripura are the states identified with very low levels of intergenerational persistence under this category. There exists large inter-regional disparity within a state (between rural and urban areas and between capital and non-capital districts). Comparing occupational persistence across rural/urban and capital/non-capital regions within states, we find that there is considerable disparity among these regions in terms of economic opportunities, resulting in differences in persistence within states. Persistence in general is low among the UTs. We use a probit model to identify the determinants of persistence. The estimation results show that the association between education and persistence is weak, more so in urban areas. Rather, father's education, in rural areas, and ownership of productive assets, in both urban and rural areas, have significant effects on intergenerational occupational persistence. The results, in general, indicate that family background plays a stronger role than education in the choice of occupation among Indians. There is an indication that differences across castes and religions have been declining in recent years. The rest of the article is organized as follows. The following section provides a description of the data used in the article. The third section presents intergenerational occupational mobility in the form of a transition matrix and a comparison of Indian states and regions within states. The second-last section presents the estimation results of the probit model. The last section concludes the article.

Data and Descriptive Statistics

We use data from the Employment–Unemployment Surveys in India, carried out by the NSSO, to analyse the issue of intergenerational persistence of occupation in the context of 17 GCSs, 11 SCSs and 7 UTs in India. NSSO is the primary source of data on various labour market indicators from a nationally representative sample of households. The organization has been collecting data since 1972–1973

and provides a vast amount of detailed socio-economic and demographic information on each individual of the households selected in the sample across all the states of India. Data used in this article come from 2004–2005 (61st round), 2009–2010 (66th round) and 2011–2012 (68th round)—the three latest rounds of the Employment–Unemployment Survey in India. For employed individuals, the industries are recorded in the three rounds using the respective five-digit National Industrial Classification (NIC) codes of 1998, 2004 and 2008.

Intergenerational persistence of occupation is conceptualized as a situation wherein the father and son are employed in the same industry. Before presenting a detailed analysis of the incidence, we present a brief description of how the samples are selected for the analysis. We select employed male individuals provided their fathers are alive and information on their employment is also available. We also restrict the sample to sons who are 15–40 years old and whose age gap with their father is at least 18 years. This helps to avoid very uncommon cases, like one wherein the son is 50 years old and the father 75 years old and still working and a case wherein the father–son age difference is too low and indicative of misreporting. Hence, we have employment information on a subset of the working-age group.

Table 1 provides the basic information about the samples. There are 35,935 observations in 2004–2005, 25,428 in 2009–2010 and 24,068 in 2011–2012. It is

Table 1. Description of the Sample

Year	2004–05	2009–10	2011–12
Average age			
Son	24	24	25
Father	53	54	54
Own Education (%)			
No formal education	28	19	21
Primary education	19	16	15
Secondary education	39	44	43
Higher secondary (HS)	7	10	11
More than HS	8	9	11
Caste(%)			
ST	8	9	9
SC	20	21	19
OBC	43	42	47
General	29	28	26
Religion (%)			
Hindu	83	82	81
Muslim	13	14	14
Christian	2	2	1
Other religion	3	3	3
Rural	80	79	77
Number of Observations	35935	25428	24068

Source: Authors' calculation using data from NSSO's 61st (2004–2005), 66th (2009–2010) and 68th (2011–2012) rounds.

important to note that each observation stands for a father–son pair in our analysis. Table 1 shows that the average age of a son and his father in the sample from 2004–2005 is 24 and 53, respectively. The average age of the son remains so in 2009–2010 and increases marginally in 2011–2012. Looking at the different educational levels, in all the rounds, we have more than 20 percent sons with no formal education, though the percentage is much lower in recent years compared to 2004–2005. We find that in 2004–2005 nearly 40 percent of these employed sons are with secondary education. This is followed by those with ‘No formal education’ (28 percent) and then those with ‘Primary education’ (19 percent). Less than 10 percent of these employed sons are with an educational level beyond Higher Secondary (HS). In other words, we find that most of the sons (whose fathers are also in the family) are employed with an education below the HS level. Only 8 percent of these employed sons have a degree or college-level qualification. This pattern remains unchanged for 2009–2010 and 2011–2012. One observation in this regard worth mentioning for the 2 years is that the percentage of employed sons with secondary and college-level education increases. However, the percentage of employed males of age 15–40 years with higher education (HS and above) still remains below 30 percent. Hence, we cannot rule out the possibility of restricted job market choices among this group, because of the lower levels of education.

Most of these employed male individuals in the 2004–2005 sample are from the Other Backward Class (OBC) (43 percent), followed by GEN (29 percent), Schedule Caste (SC) (20 percent) and ST (8 percent). We find a similar distribution among the caste categories in the following two rounds, with a slight fall in the percentage of individuals from SC and GEN and an increase in the percentage of those belonging to OBC. Looking at the religion-wise distribution, we find that these employed male individuals are mostly from Hindu households (more than 80 percent). Our sample comprises 80 per cent observations from rural areas for 2004–2005, which marginally falls to 77 percent for 2011–2012.

Table 2 reports the intergenerational occupational persistence across caste and religious groups. It also provides data on persistence for different age groups, educational levels and places of residence (urban/rural) for all the social and religious categories. Intergenerational persistence is defined as a phenomenon in which a father–son pair is observed to be employed in the same industry (identified by the five-digit NIC), while intergenerational mobility is manifested when they are employed in different industries. The numbers in the first column of Table 2 present the intergenerational persistence for the full sample in a survey round. The first number, 62, in the table indicates that during 2004–2005, 62 percent of the employed sons of age 15–40 were working in the same industry as their father. It is important to note that we use sample weights in our analysis, so the numbers represent population figures. We find that the persistence increases to 65 percent for 2009–2010, and in 2011–2012, the percentage again falls down to 62 percent. Looking at persistence among different age groups, we find that the percentage increases with age, except for sons belonging to the 25–29 age group. In other words, the percentage of sons employed in the same industry as their fathers is considerably lower among those sons aged 25–29 years. This pattern prevails for

(Table 2 Continued)

	Full Sample	GEN	OBC	SC	ST	Hindu	Muslim	Christian	Others
Higher Secondary (HS)	65	70	64	49	79	65	61	61	68
More than HS	40	45	41	28	34	41	46	14	45
Area of Residence									
Rural	70	69	70	68	79	71	65	56	72
Urban	47	49	49	39	32	46	52	33	48
2011-12									
All	62	56	63	60	77	63	56	57	62
15-24	62	56	62	63	76	64	57	64	58
25-29	58	53	61	52	72	58	55	46	66
30-34	64	55	66	66	85	65	51	57	72
35-40	66	63	68	57	79	67	62	49	62
Education									
No Formal Education	71	63	70	75	79	74	62	86	69
Primary	65	55	67	58	85	66	58	80	70
Secondary	62	60	63	58	75	64	55	58	58
Higher Secondary (HS)	60	58	62	56	71	62	52	40	55
More than HS	41	41	43	31	52	42	26	25	68
Area of Residence									
Rural	67	62	68	66	81	69	59	68	66
Urban	44	44	45	40	40	41	51	31	50

Source: Authors' calculation using data from NSSO's 61st (2004-2005), 66th (2009-2010) and 68th (2011-2012) rounds.

all the different social and religious groups except for Muslims. This interesting pattern suggests that for most individuals, age 25–29 might be a period to explore new employment options, after which they are more likely to fall back on their father's occupation.

We also find that higher levels of education are consistently associated with lower likelihood that a son and his father will be in the same industry. Comparing the persistence for different levels of education, we observe that with a movement from no education to college or university-level education (more than HS), persistence goes down by more than 30 percentage points for 2004–2005, 2009–2010 and 2011–2012. Consecutive levels of higher education are associated with a decline in the persistence; however, there is variation in the magnitude of decrease across the time periods. The fall in persistence with higher education has two noticeable phases, the first with a movement from no education to primary education and the other with a movement from the HS level to above the HS level.

We observe that the sons with at least primary education are considerably less likely to be in their father's industry compared to the sons without any formal education, almost by 7, 5 and 6 percentage points for 2004–2005, 2009–2010 and 2011–2012, respectively. A second leap is observed with a movement from 'HS' to 'More than HS', reducing the persistence level by 17, 25 and 19 percentage points for the three respective time periods.

Across all the social (except the STs) and religious groups, such a pattern is observable. The likelihood of a father–son duo being in the same industry remains nearly unaltered with a movement from no formal education to primary education if the son is from an ST household, for 2004–2005 and 2009–2010. The fall in persistence with a movement from 'HS' to 'more than HS' is higher among STs for 2004–2005, followed by GENs, OBCs and SCs. However, the pattern changes for 2011–2012, where 'more than HS' is found to be most effective in lowering the persistence in the case of SCs, followed by OBCs, STs and GENs. Here, we may conclude that higher education was most effective in lowering the persistence among the STs in the first two phases (2004–2005 and 2009–2010). However, such association is considerably weak in 2011–2012.

We also find that intergenerational persistence is the highest among the STs, followed by OBCs, SCs and GENs, for 2004–2005. This holds well for the full sample and for all the age groups except for the older age group (35–40 years). We find the persistence among SC male individuals for this age group (35–40) to be the highest. Persistence is lowest among the GEN individuals for this age group. However, we do not find any such pattern for the following two periods. For both 2009–2010 and 2011–2012, the sons from ST households are most likely to be in their father's industry, and those from SC households are least likely. This pattern also remains the same for all the age groups.

Persistence is noticeably higher among the rural individuals. It increases for 2009–2010 in both rural and urban areas. However, it seems that the persistence in both the areas comes down during 2011–2012. In both rural and urban areas, the STs have the highest persistence. Individuals from GEN and SC have the lowest persistence in rural and urban areas, respectively. Furthermore, it appears that the persistence among STs increased in rural areas by 6 percentage points,

from 75 percent to 81 percent, between 2004–2005 and 2011–2012. Looking at the percentage for different religions, we find persistence is lower among ‘Other’ religions, followed by Hindus, Muslims and Christians. However, for sons in the 35–40 age group, the likelihood to be in the same industry as the father is highest among the Muslims and lowest among the Christians. In rural (urban) areas, Hindus have higher (lower) persistence than Muslims in all years. The Hindu–Muslim difference in persistence in rural areas increased between 2004–2005 and 2011–2012 (from 8 to 10 percentage points).

From Table 2, we conclude that the incidence of persistence is lowest among the sons in the 25–29 age group and highest among the sons in the 35–40 years age group. The inverse association between the education and intergenerational persistence in general is strong for all the castes except STs (especially with a movement from ‘HS’ to ‘more than HS’ for 2004–2005 and 2011–2012).

Transition Matrix and Comparison Across and Within Indian States

In this section, we present an analysis of the transition across industries from one generation to the next and a comparison of different Indian states. We also provide a comparison of intergenerational persistence within a state across capital and non-capital regions.

Transition Matrix

Table 3 presents a transition matrix—cross tabulation of industries of a son against that of his father. A row in a transition matrix gives the distribution of the sons’ industries, given the employment of the father in a particular industry. A transition matrix is widely used to present the movement from one industry to another across the generations (see Beller & Hout, 2006; Hnatkovska et al., 2012; Kumar et al., 2002; Louw et al., 2006; Majumder, 2010).

Based on the percentage concentration of fathers and sons in 21 main industries, we have grouped them into six broad industry categories for the transition matrix. The six categories are: agriculture and allied industries (Agri), manufacturing (Manu), construction (Const), wholesale and retail trade (W&R), transport (Trans) and other industries (Other). The upper and lower panels of Table 3 present the distribution of sons’ employment in different industries (son’s industry), given their father’s industry, for rural and urban areas, respectively. The diagonal elements of the matrix give the measure of persistence, and the off-diagonal elements show mobility across generations.

In rural areas, intergenerational persistence is highest in the agriculture and allied sectors, with nearly 78 percent of the sons of agricultural workers working in the same sector. This is followed by manufacturing, construction and wholesale and retail trade for 2004–2005, in all of which persistence is higher than

Table 3. Transition Matrix: Occupation of Father-son Pairs

NSS rounds	2004-05					2009-10					2011-12							
	Son's industry																	
Father's industry	Rural																	
	Agri	Manu	Const	W & R	Trans	Other	Agri	Manu	Const	W & R	Trans	Other	Agri	Manu	Const	W & R	Trans	Other
Agri	78	4	5	5	3	5	79	4	7	3	3	4	77	4	8	4	3	4
Manu	15	65	6	6	2	5	8	72	8	5	2	6	10	64	10	6	4	5
Const	16	8	62	5	5	5	12	8	70	3	4	4	10	5	74	5	3	3
W & R	18	10	6	53	5	8	15	7	9	60	5	5	15	10	11	52	6	6
Trans	30	10	8	9	33	8	14	10	17	3	48	8	20	11	19	12	30	8
Other	28	8	5	10	4	46	18	9	10	11	7	46	19	6	8	8	6	53
Father's industry	Urban																	
	Agri	Manu	Const	W & R	Trans	Other	Agri	Manu	Const	W & R	Trans	Other	Agri	Manu	Const	W & R	Trans	Other
Agri	43	12	9	17	8	10	57	7	11	11	6	8	53	10	9	10	5	13
Manu	1	69	6	10	5	10	1	67	4	9	2	16	1	70	5	9	3	13
Const	0	17	51	14	4	14	1	11	60	10	6	12	1	16	56	9	6	12
W & R	2	13	5	69	4	8	1	10	4	72	4	10	1	12	4	64	4	15
Trans	2	17	11	22	27	20	2	18	13	15	31	22	1	16	10	20	26	27
Other	2	17	7	17	9	48	1	13	10	16	6	53	1	14	6	16	7	56

Source: Authors' calculation using data from NSSO's 61st (2004-2005), 66th (2009-2010) and 68th (2011-2012) rounds.

Abbreviations used: "Agri"= Agriculture - Fishing, "Manu"= Manufacturing, "Const"= Construction, "W&R"= Wholesale -Retail trade, "Trans"= Transport and "Other"= All other industries

50 percent. For 2009–2010, persistence in most of the industries is higher than the 2004–2005 levels. The degree of persistence marginally falls in 2011–2012 in agriculture, manufacture and wholesale and retail trade. One observation worth mentioning is that the percentage of sons working in the construction industry if their father is also working in the same increased considerably from 2004–2005 to 2011–2012, almost by 12 percentage points (from 62 percent to 74 percent). It has become the second largest industry in terms of persistence in rural areas after agriculture and allied sectors. Persistence in the manufacturing industry remains unchanged between the two periods. Persistence is found to be least in the transport industry.

In urban areas, persistence is the highest in manufacturing and wholesale and retail trade, with almost 69 percent of sons being likely to work there given their father is employed in these industries. In the following period (2009–2010), persistence remains the highest in the wholesale and retail sector (72 percent). The manufacturing industry ranks second in terms of persistence, with 67 percent of sons working in the same. In the last phase (from 2004–2005 to 2011–2012), the persistence has decreased and increased in wholesale & retail and manufacturing by 8 and 3 percentage points respectively. Persistence has also increased in the construction during 2004–2005 to 2011–2012 by 5 percentage points. The incidence is least in the case of the transport industry, like in the case of rural areas. We also observe a pattern, similar to that in rural areas, of an increase in persistence in 2009–2010 and a slight fall in 2011–2012.

To sum up, we find that persistence in the rural area remains highest in agriculture but it has noticeably increased in the construction sector. For the periods 2004–2005 and 2009–2010, persistence is considerably high in the wholesale and retail and manufacturing industries in urban areas. For 2011–2012, persistence is the highest in the manufacturing industry, followed by the wholesale and retail and construction industries. The construction sector has seen a noticeable rise in the incidence of persistence. However, the extent of rise in the persistence is found to be much higher in rural areas (almost by 12 percentage points) than in urban areas. In both rural and urban areas for 2011–2012, for fathers employed in the service sector, the likeliness of their son being in the same industry has increased.

Persistence in Different Indian States

Table 4, probably the most unique part of this descriptive analysis, shows the prevailing interstate disparity across the 17 major states, often called GCSs, 11 SCS and 7 UTs in terms of persistence of occupation across generations. It also presents the incidence of persistence across rural and urban areas within states as well. We find the level of persistence to be higher in rural areas compared to urban areas, on average. This is indicative of the fact that people in urban areas are supposed to have greater access to information, skills, technology and diversified job opportunities compared to their rural counterparts. In general, we find the difference in rural and urban persistence to increase among GCSs, from 24 to 26

Table 4. Intergenerational Occupational Persistence in Different States

General Category States (GCS)	All			Rural			Urban		
	2004-05	2009-10	2011-12	2004-05	2009-10	2011-12	2004-05	2009-10	2011-12
	Punjab	58	62	53	62	67	59	45	54
Haryana	55	54	67	54	60	71	58	39	49
Rajasthan	55	63	58	58	67	59	46	48	54
Uttar Pradesh	63	69	65	67	72	68	47	60	55
Bihar	78	81	84	80	82	85	54	68	65
West Bengal	56	59	53	61	62	59	33	43	35
Jharkhand	65	66	73	68	69	77	30	50	49
Orissa	68	66	66	69	68	68	43	48	53
Chattisgarh	74	72	78	79	78	80	40	51	65
Madhya Pradesh	75	83	78	80	88	83	51	58	54
Gujrat	63	69	64	69	69	72	44	50	41
Maharashtra	58	59	60	68	71	70	37	36	40
Andhra Pradesh	58	58	54	62	63	61	40	40	32
Karnataka	68	70	55	73	78	62	47	48	39
Goa	12	20	31	17	10	7	8	60	57
Kerala	28	28	23	28	29	23	27	24	24
Tamilnadu	50	58	43	67	68	50	37	40	31
GCS average	62	66	62	67	71	68	43	47	44
Jammu & Kashmir	49	41	43	47	41	44	55	42	40
Himachal Pradesh	44	40	41	42	40	41	58	39	44
Uttarakhand	58	45	52	62	48	61	45	35	38
Sikim	75	55	68	74	56	71	92	39	41
Arunachal Pradesh	85	83	75	85	84	77	54	55	52
Nagaland	82	84	84	85	83	83	58	100	85
Manipur	66	67	57	72	71	59	35	49	51

(Table 4 Continued)

(Table 4 Continued)

General Category States (GCS)	All			Rural			Urban		
	2004-05	2009-10	2011-12	2004-05	2009-10	2011-12	2004-05	2009-10	2011-12
Mizoram	80	75	70	88	85	81	56	56	52
Tripura	63	50	53	64	53	56	40	24	29
Meghalaya	76	71	71	79	73	75	21	36	49
Assam	78	79	64	79	80	64	52	52	56
SCS average	67	63	56	68	65	58	50	42	43
Chandigarh	29	35	44	51		77	22	35	43
Delhi	45	44	39	2	85	19	47	42	40
Daman & Diu	44	81	42	64	91	49	30	60	0
Dadra	28	64	31	30	72	28	14	24	53
Lakshdweep	5	7	21	3	3	3	16	18	31
Pondicherry	38	22	24	31	15	26	43	28	22
Andaman & Nicobar	41	34	48	49	41	52	22	14	39
UT average	43	43	39	28	63	31	45	41	40

Source: Authors' calculation using data from NSSO's 61st (2004-2005), 66th (2009-2010) and 68th (2011-2012) rounds.

percentage points, between 2004–2005 and 2011–2012. However, such disparity has decreased among SCSs, on average from 18 to 15 percentage points. Observing the average levels of persistence, we find them to be higher among the SCSs compared to the GCSs for 2004–2005. However, between 2004–2005 and 2011–2012, we find the GCS average to remain at the national level (62 percent) while we see the SCS average gradually decline and fall below the national average (56 percent).

There are GCSs like Bihar, Madhya Pradesh, Chhattisgarh and Jharkhand where the probability of a son working in his father's industry remains well above the GCS average for 2004–2005 (with 78 percent, 75 percent, 74 percent and 65 percent persistence in the respective states) and continue to be so in the following two periods, with a noticeable rise in the level of persistence (84 percent, 78 percent, 78 percent and 73 percent for 2011–2012, respectively). The same pattern is found for rural and urban areas. Another observation worth mentioning in this regard is that in Karnataka (both in rural and urban areas), also the likelihood of persistence was very high during 2004–2005 and 2009–2010 but fell considerably below the national average during 2011–2012. Goa is identified to have the lowest overall and rural persistence. However, it is also the state where the incidence is found to be considerably higher in the urban areas post the 2004–2005 period. Besides, the likelihood of a father–son duo being in the same industry in urban Goa increased spectacularly from 7 percent to 57 percent between 2004–2005 and 2011–2012. Goa is followed by Kerala, Tamil Nadu, Andhra Pradesh, West Bengal and Punjab, where persistence is not only lower than the national averages in both urban and rural areas but also has gone down between 2004–2005 and 2011–2012. Haryana and Rajasthan are the two states with a persistence level just below and above the GCS average for rural and urban areas, respectively. Persistence in these states has increased between 2004–2005 to 2011–2012.

In Uttar Pradesh and Gujarat, the persistence is almost the same as the GCS average. It has marginally increased from 63 percent in 2004–2005 for either state to 65 percent for Uttar Pradesh and 64 percent for Gujarat in 2011–2012. The pattern remains the same for rural and urban areas. Therefore, we can broadly classify the states into the following categories: 'persistence above all state average and increasing', 'persistence above average and decreasing', 'persistence below average and increasing', 'persistence below average and decreasing' and 'persistence at average and marginally increased'. We conclude with the observation that irrespective of the level, persistence is increasing in Haryana, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Chhattisgarh, Madhya Pradesh, Gujarat, Maharashtra and Goa. For the rest of the states, it is decreasing.

Persistence is well above the SCS average in Arunachal Pradesh, with 85 percent of the sons working in the same industry as their father. This is followed by Nagaland, Mizoram, Assam, Meghalaya and Sikkim, with persistence levels of 82 percent, 80 percent, 78 percent, 76 percent and 75 percent, respectively. One of the observed features of the SCSs is that persistence has considerably decreased in all the states except Nagaland for the following two periods. We find a similar pattern to prevail in the rural areas of these states as well. With exception in Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim, we find

persistence to be higher in rural areas compared to their urban counterparts. Among the former three states, persistence is found to remain below the SCS average throughout the periods under consideration. However, persistence in the rural areas of these three states is found to be higher than the SCS rural average in 2004–2005. In the following two periods, persistence falls considerably below the average in both the rural and urban areas. Tripura and Manipur are the states where persistence is at the SCS average.

Persistence in general is very low in the UTs compared to the GCSs and SCSs. However, the pattern of persistence is quite different in the UTs. From this perspective, the UTs may not appear comparable with the SCSs and GCSs. Persistence is lowest in Lakshadweep, followed by Pondicherry. Persistence in Delhi and Daman and Diu was considerably higher than the UT average, followed by Andaman and Nicobar for 2004–2005, and it remained so in the following two periods. One observation in this regard worth mentioning is that persistence has increased spectacularly in Daman and Diu between 2004–2005 and 2009–2010. Then, it has come down in 2011–2012, but Daman and Diu still continued to be the UT with a persistence level higher than the UT average. For 2011–2012, persistence is found to be the highest in Andaman and Nicobar, and in Delhi, it has come down to the average level.

In rural areas, persistence is the highest in Daman and Diu, followed by Chandigarh and Andaman and Nicobar. In Dadra and Pondicherry, the persistence is in line with the rural average. Though this pattern is not typically followed in the following two periods, Chandigarh is found to be the UT with the highest rural persistence, with almost 77 percent of the sons aged 15–40 working in the same industry as their father. Persistence in Daman and Diu and Andaman and Nicobar has considerably decreased, but the level is well above the rural average. Persistence was the lowest in Delhi, followed by Pondicherry and Dadra, in 2011–2012. The level is quite below the average.

In urban areas, persistence is the lowest in Dadra, followed by Lakshadweep, Andaman and Nicobar and Chandigarh with almost 14 percent, 16 percent and 22 percent of the sons working in the same industry as their father in 2004–2005, respectively. The level is well below the urban average. However, the pattern is strikingly different for 2011–2012. For this year, persistence in all these UTs has increased and gone almost above the average. In urban areas, persistence is found to be at average in Delhi and Lakshadweep, with almost 40 percent and 39 percent of the sons found to be employed in their father's industry, respectively. We find persistence to disappear in Daman and Diu in 2011–2012 in the urban areas after a rise from 30 percent to 60 percent between 2004–2005 and 2009–2010.

Persistence Within States

Table 5 provides a comparison of intergenerational occupational persistence across regions within a state. For the simplicity of presentation, we have divided each state in two types of regions—state capital and non-capital regions—and reported the information for GCS and SCS.¹ They are considered separately at the

Table 5. Occupation Persistence in Capital and Non-capital Regions of Indian States

States (Capital)	2004-05		2009-10		2011-12	
	Capital District	Non Capital districts	Capital District	Non Capital districts	Capital District	Non Capital districts
Punjab (Chandigarh)	29	58	35	62	44	53
Haryana (Chandigarh)	29	58	35	54	44	67
Rajasthan (Jaipur)	39	57	45	65	37	61
Uttar Pradesh (Lucknow)	42	63	36	70	29	66
Bihar (Patna)	57	79	68	82	73	84
West Bengal (Kolkata)	35	57	41	59	52	53
Jharkhand (Ranchi)	74	63	30	70	76	72
Orissa (Bhubaneswar-Khroda)	57	68	86	65	79	66
Chattisgarh (Raipur)	49	77	58	75	77	78
Madhya Pradesh (Bhopal)	38	75	55	83	50	78
Gujarat (Gandhinagar)	74	63	54	63	31	64
Maharashtra (Mumbai)	44	61	35	62	34	64
Andhra pradesh (Hyderabad)	59	58	18	59	26	56
Karnataka (Bangalore)	47	70	44	74	30	59
Goa (Panaji-North Goa)	2	18	43	16	32	29
Kerala (Thirubananthapuram)	44	26	9	30	22	23
Tamilnadu (Chennai)	34	51	7	60	25	44
GCS average	47	63	42	67	41	64
JammuKashmir (Srinagar)	45	50	36	44	37	46
Himachal Pradesh(Shimla)	72	38	64	37	65	36
Uttaranchal (Dehradun)	48	59	43	44	17	58
Sikim (Gangtok)	69	75	25	57	48	69
Arunachal Pradesh (Itanagar)	19	85	80	83	17	75
Nagaland (Kohima)	88	80	82	83	98	83

(Table 5 Continued)

(Table 5 Continued)

States (Capital)	2004-05		2009-10		2011-12	
	Capital District	Non Capital districts	Capital District	Non Capital districts	Capital District	Non Capital districts
Manipur (Imphal)	35	70	52	69	38	60
Mizoram (Aizwal)	76	82	64	80	54	78
Tripura (Agartala)	61	64	49	51	49	57
Meghalaya (Shillong)	51	83	70	71	41	83
Assam (Dispur)	78	78	73	79	51	64
SCS average	51	68	47	65	38	58

Source: Authors' calculation using data from NSSO's 61st (2004-2005), 66th (2009-2010) and 68th (2011-2012) rounds.

Notes: Chandigarh- an UT and Capital of both Punjab and Haryana.

Bhubaneswar is in Khorda District.

Mumbai is the Summer capital district and Nagpur is the Winter capital district of state of Maharashtra.

time of showing the inter-regional disparity, because they share some characteristics that are distinctly different from each other.² For capital, we have taken the district where the capital is located. The underlying hypothesis is that unequal economic opportunities or disparity in economic growth within a state has profound implications for job choice and is reflected in intergenerational occupational persistence. Often, the state capital is better endowed in terms of information, educational, financial and employment opportunities. Hence, we can expect the persistence to be comparatively higher in the non-capital districts of a state compared to the capital districts. The column of capital district in Table 5 reports the percentage of sons working in the same industry as their father in the capital of the corresponding state, whereas the column of non-capital district reports the average persistence level in the rest of the districts of the state. We observe that persistence is considerably lower in the capital districts compared to the non-capital districts for the three periods for both GCSs and SCSs. Besides, we also find the overall persistence to consistently decline in the capital districts, whereas in the rest of the districts the incidence is found to increase considerably. This resulted in the capital district–non-capital districts disparity increasing from 16 to 23 percentage points and from 17 to 20 percentage points among GCSs and SCSs between 2004–2005 and 2011–2012, respectively. Though increasing, such disparity is found to be comparatively lower among the SCSs compared to the GCSs, on average. However, we find large variations in this disparity among the individual states. We observe that in some of the states, the persistence in the capital district is even higher than that in the rest of the states. There are states showing a decline in the persistence in the capital district only, thereby resulting in increasing disparity between the capital and non-capital regions.

Bihar, Madhya Pradesh and Chhattisgarh, the states with high and increasing persistence, show a noticeable rise in the incidence in the capital districts compared to the non-capital districts, by nearly 16, 28 and 12 percentage points, respectively, between 2004–2005 and 2011–2012. The situation implicates that along with those in the non-capital districts, the job market opportunities in the capital of these states, over time, are becoming highly unequal.

Persistence is found to be considerably higher in the capital of Gujarat, Andhra Pradesh, Kerala and Jharkhand. However, one noteworthy observation is that persistence in the capital districts of these states has consistently declined and fallen below the average persistence level of the capitals of the rest of the states (41 percent), except in the case of Jharkhand. The persistence in the other districts of Gujarat, Andhra Pradesh and Kerala remains almost in line with the overall average of the states. However, we also notice that within-state disparity in terms of persistence in Gujarat and Andhra Pradesh remains very high. Persistence is found to be nearly 30 percentage points higher in the non-capital districts compared to the capital districts of these states for 2011–2012.

Persistence in the capital district (Ranchi) of Jharkhand is not only very high but also has increased between 2004–2005 and 2011–2012. In the non-capital districts too, the overall persistence remained high, increasing considerably from 63 percent to 72 percent.

Among the other states, persistence is found to have increased consistently in the capital of Punjab, Haryana, West Bengal and Orissa. Unlike in Haryana, Punjab and West Bengal, persistence has gone down in the non-capital districts of the rest of the states between 2004–2005 and 2011–2012.

Uttar Pradesh and Karnataka are the states with the percentage of persistence at and above the GCS average. The capital district–non-capital districts disparity in persistence is spectacularly increasing in these two states. It went up by 35 and 29 percentage points, respectively, in these states in 2011–2012. This gap is accompanied by fall in persistence in capital district along with almost no change in persistence in the non-capital districts. Apart from these two states, Rajasthan and Maharashtra are the two states worth mentioning with a growing within-state disparity in persistence. In their case, however, the growing difference in persistence is mostly because of the continuous increase of persistence in the non-capital districts and fall of persistence in the capital districts.

One can classify the entire phenomenon of intra-state variations in persistence into the following two categories: states with growing inter-regional disparity (Rajasthan, Gujarat, Maharashtra, Uttar Pradesh, Andhra Pradesh and Tamil Nadu) and states with falling inter-regional disparity (Punjab, Haryana, West Bengal and Kerala). However, falling inter-regional disparity is not always accompanied by a fall in the persistence level in both the capital and non-capital regions. In some states, we observe an increase in the persistence of the capital district (Punjab and West Bengal). Kerala is an exception in this case, where the fall in the disparity is accompanied by a fall in the persistence level in both groups of districts. Tamil Nadu is a state that is also experiencing a considerable fall in the persistence level in both the groups but with an increase in intra-state disparity.

On an average persistence has considerably decreased in SCS from 2004–2005 to 2011–2012 in both capital and non-capital districts. Except in Himachal Pradesh, Nagaland and Assam, persistence in general is lower in the capital districts of the SCSs for 2004–2005. Inter-regional disparity is found to be the highest in Arunachal Pradesh (67 percentage points), followed by Mizoram (35 percentage points), Himachal Pradesh (33 percentage points) and Meghalaya (31 percentage points), for 2004–2005. With exception to Himachal Pradesh and Nagaland, we find persistence to fall in the capital district by a considerably larger extent compared to that in the non-capital districts, resulting in an increase in inter-regional disparity among the SCSs. We sum up our findings from Table 4 and Table 5 in the following way. The SCSs are witnessing a fall in the incidence of intergenerational persistence on average along with a fall in the rural–urban disparity. However, the states are also experiencing higher inter-regional disparity resulting from the much slower pace of the fall in persistence in the non-capital districts compared to that in the capital districts. On the other hand, the GCSs, where the average persistence remains almost unchanged at the national average of 62 percent, are experiencing rise in rural–urban disparity. The inter-regional disparity is found to fall (between 2004–2005 and 2011–2012) in most of the states, such as Punjab, Haryana, Bihar, West Bengal, Chhattisgarh, Madhya Pradesh, Goa and Kerala. However, this situation in most of these states has been accompanied by an increase in the level of persistence in the capital districts

(except in Kerala). The situation is not only alarming but also implicates the fact that employment opportunities are becoming scarce in the capital districts of the GCSs. The situation of the SCSs, on average, may appear to be ushering in development, but the employment opportunities do not seem to percolate to all the regions equally.

Estimation Results

We use a simple probit estimation to assess the role of own education, parental education and household assets in influencing the probability of intergenerational persistence of occupation. Our dependent variable takes the value 1 if the son and father work in the same industry, and 0 otherwise. Within the category of individual determinants, we include age, education and other background variables, such as caste, religion, parental education and household assets. We examine the effect of educational attainment with the underlying hypothesis that better-educated individuals always have better employment opportunities and more ease to opt for employment in a number of industries. This, in turn, is expected to reduce the probability of persistence. Parental education as proxy for household income also is expected to be positively associated with the probability of intergenerational mobility. Father's self-employment in an urban area and land ownership in a rural area are used as the indicators for household ownership of assets. Lambert et al. (2011) find a significant importance of inheritance (productive household asset) and parental traits for intergenerational occupational mobility in Senegal. However, the term 'asset' may not address the entire dynamics of the existence of land and enterprise of a household influencing the probability of its father-son duo being in the same industry. These ownerships may impact the probability in the following two opposite ways. One, these 'assets' may encourage the son to overcome financial constraints and enable him to acquire a higher level of education and opt for an occupation of his choice, not necessarily in the industry where his father is employed. Two, we cannot ignore the possibility that the father's occupation often serves as one of the vital sources of the son's network of job-related information. This information often provides for greater ease of entry in the same industry where the father works (the job hierarchy may differ depending on the occupation), enabling his offspring to avoid uncertainty arising from job market competition. In either of the above cases, ownerships can be acknowledged as an asset having a negative and positive impact on the possibility of persistence. In this context, we must not rule out the possibility of these ownerships leading to intergenerational persistence being the consequence of financial destitution. That is, the size of the enterprise or landholding may be too meagre to overcome the poor financial conditions. This ultimately results in the formation of an insufficient level of employable skills, leaving an individual with no options but to join the family enterprise. Therefore, the existence of these assets may encourage or discourage a son to work in the industry same as his father. Thus, instead of having such ownership, the individual from the poor family continues to be trapped by the inequality in

opportunities. In order to assess all these issues, we construct necessary variables and incorporate them in the analysis.

We also incorporate district fixed effects in order to account for district-specific aggregate factors that may affect the employment conditions in different industries. Table 6 reports the marginal effects and standard errors from the probit estimation with all the variables we have mentioned so far, separately for urban and rural areas for the three rounds of the survey.

The estimation results (Table 6) show that age does not have any significant association with the probability that sons work in the same industry as their father in rural areas. In urban areas, however, the older sons are significantly less likely to be in the industry where their father is employed.

We observe education to play a significant and varying role in increasing occupational mobility among the sons in rural and urban area respectively. In other words, the negative marginal effects of the consecutive levels of education suggest that sons become less likely to work in the same industry as their father if their education level is high. Not only are the marginal effects of education negative, but their magnitude also increases with the level of education. Therefore, own education appears to be one of the major determinants of occupational mobility. This also gains support from the descriptive analysis. However, in 2004–2005 such an effect is observable for all the consecutive levels of education only in rural area. For the following rounds, we find the significance of the lower levels of education to disappear, and only higher (college and university) education remains significant in exerting a negative impact on the probability of persistence. We also find the magnitude of the marginal effect of higher education to decline over time. In urban areas, we find almost a similar pattern, with only college-level education having a significant negative impact on the probability of persistence for 2004–2005 and 2011–2012. The year 2009–2010 in this context seems to be exceptional, with negative and significant marginal effects for all educational levels.

A general observation in this regard is that in both rural and urban areas sons with a qualification beyond the HS level are only able to get a job outside the industry where their fathers work. Therefore, until the sons acquire college degree or equivalent level of education, they are not significantly likely to opt a job in the industry different from their father.

We find that the significance of caste in determining the probability of persistence has almost disappeared in recent years in rural areas. Sons are found to be more likely to be in their father's industry if they belong to an ST household in a rural area for 2004–2005 and 2011–2012. For 2009–2010, persistence is found to have significantly declined among the SCs in rural and urban areas. The estimation results show that only Muslim sons are significantly less likely to work in their father's industry than Hindus in rural areas for all the study years. In the context of urban areas, we do not find a similar pattern for 2009–2010. However, we do not find any such significant Hindu–Muslim difference in intergenerational persistence in urban areas for 2011–2012.

We also incorporate parental education in our model, which serves as a proxy for the permanent income of a household and innate ability. Although we find

Table 6. Probit Estimation Results of Intergenerational Occupational Persistence

Area of residence Variables	2004-05						2009-10						2011-12					
	Rural		Urban		Rural		Urban		Rural		Urban		Rural		Urban			
	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error		
Age	0.000	0.001	0.005***	0.002	0.018	0.022	0.006***	0.002	0.000	0.001	0.008***	0.002						
Own Education																		
Primary education	-0.029***	0.013	0.019	0.036	0.018	0.022	-0.026	0.042	-0.038	0.024	-0.021	0.040						
Secondary education	-0.073***	0.012	0.015	0.032	-0.003	0.020	-0.085***	0.035	-0.043**	0.021	-0.036	0.034						
Higher secondary (HS)	-0.145***	0.019	-0.048	0.040	-0.003	0.027	-0.128***	0.046	-0.051*	0.027	-0.086	0.043						
More than HS	-0.279***	0.021	-0.140***	0.043	-0.212***	0.032	-0.227***	0.048	-0.199***	0.029	-0.203***	0.043						
Caste																		
ST	0.054**	0.021	-0.033	0.073	0.034	0.029	-0.129**	0.062	0.128***	0.030	0.013	0.059						
SC	-0.011	0.015	-0.108***	0.034	-0.048**	0.021	-0.067*	0.036	-0.004	0.022	-0.060*	0.034						
OBC	0.000	0.012	-0.020	0.025	-0.042**	0.018	-0.036	0.026	0.010	0.019	-0.050*	0.026						
Religion																		
Muslim	-0.083***	0.017	-0.033	0.029	-0.067***	0.024	0.019	0.031	-0.082***	0.024	0.032	0.029						
Christian	-0.064	0.041	-0.011	0.086	-0.047	0.049	-0.032	0.080	0.057	0.053	0.081	0.089						
Other religion	0.118***	0.032	0.021	0.052	0.114**	0.051	0.060	0.059	-0.014	0.059	0.157**	0.055						
Father's education																		
Primary education	-0.012	0.013	-0.032	0.031	0.022	0.019	0.016	0.034	0.000	0.020	-0.041	0.031						
Secondary education	-0.070***	0.013	-0.068**	0.028	-0.032*	0.018	0.005	0.030	-0.042**	0.019	-0.035	0.029						
Higher secondary (HS)	-0.110***	0.030	-0.047	0.048	-0.118***	0.043	0.042	0.048	-0.107***	0.038	-0.037	0.049						
More than HS	-0.249***	0.033	-0.065	0.050	-0.183***	0.048	-0.014	0.054	-0.254***	0.042	-0.068	0.047						
Mother's education																		
Primary education	-0.026	0.016	-0.032	0.029	-0.021	0.023	-0.066	0.034	-0.060**	0.025	-0.029	0.032						
Secondary education	-0.011	0.022	0.011	0.030	-0.024	0.026	0.030	0.034	-0.043	0.027	0.029	0.033						

(Table 6 Continued)

(Table 6 Continued)

Area of residence	2004-05			2009-10			2011-12			
	Rural	Urban	Urban	Rural	Urban	Urban	Rural	Urban	Urban	
Variables	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error	M. Effect	S. Error
Higher secondary (HS)	-0.047	0.088	0.115*	0.064	0.229*	0.122	0.072	0.081	0.106	0.068
More than HS	0.069	0.089	0.020	0.067	-0.459**	0.240	0.072	0.098	0.147**	0.062
Household ownerships										
Land Owned	0.032***	0.003			0.027***	0.004		0.004		
Family Enterprise			0.278***	0.021			0.221***	0.022	0.189***	0.021
Log pseudo likelihood	-23982720		-6179892.5		-20899795		-6629147.1		-20581955	
Pseudo R ²	0.1443		0.1746		0.1992		0.185		0.2072	
No. of observation	24494		8529		16079		7187		15149	

Source: Authors' calculation using data from NSSO's 61st (2004-2005), 66th (2009-2010) and 68th (2011-2012) rounds.

Notes: All specifications include district fixed effects.

*, **, *** stand for 10%, 5%, and 1% significance respectively.

considerable variations in the marginal effects across the areas of residence and periods of survey, there is an indication that the father's education is negatively associated with the probability of the son being employed in the same industry, especially in rural areas. We observe that sons with more educated fathers are less likely to be employed in the same industry as their father. Besides, such probability decreases at an increasing rate with the level of the father's education. To be more precise, if the father has a college or university education, the probability that his son will work in a different industry is more than in the case of a son whose father has an HS education. For 2009–2010 and 2011–2012 too, we find a similar pattern to prevail in rural areas, though the magnitude of the marginal effects decreased between 2004–2005 and 2011–2012. However, we do not find any such association between father's education and persistence in 2009–2010. In 2011–2012 this particular factor in urban area exhibited an expected sign (discussed at the outset of the estimation analysis) but has not appeared significant. To sum up, we say that the father's education has a strong impact on intergenerational persistence. Being one of the crucial indicators of the family income and innate ability, the father's higher education indicates the possibility of sound financial health of the family and reach of the father's network. Coark and Heisz (1999) find a strong effect of the father's network on the hiring process of their offspring. A higher permanent income of the household enables the son to find a better job or at least a job of the same quality in an industry other than where his father is employed, with greater ease.

Unlike the father's education, the mother's education is hardly found to have any significant consistent association with the probability of persistence for 2004–2005 in rural areas. A noteworthy observation in this context is that in urban areas, intergenerational persistence of industry is found to be significantly higher among those sons whose mother had a tertiary-level (college or university) qualification, for 2011–2012. During 2009–2010 in rural area sons with higher secondary educated mothers are significantly less likely to be in the father's occupation. However, no such association is observed during 2011–2012.

Ownership of productive assets can influence a household's decision to invest in a son's employable-skills formation. This in turn may have a favourable influence on the incentive of the son to search for employment opportunities elsewhere. Variables for the household productive assets are represented by the household enterprise (proxied by father's self-employment) and landownership (in hectares) in urban and rural areas, respectively. The results suggest that the probability of persistence increases with landownership and that the relative strength of this factor in explaining the incidence of persistence has increased over time. Comparing the three periods of survey, we find that though the positive marginal strength of landownership decreased between 2004–2005 and 2009–2010, it increased between 2009–2010 and 2011–2012. In urban areas, however, the magnitude of the marginal effect of family enterprise has decreased over time.

With a rise in landownership, the likelihood of a father–son duo being in the same industry increases. This may happen at lower levels, as well as at higher levels, of landownership. Couple of explanations behind our empirical results have been discussed below. It may happen that the size of family enterprise and

land ownership are too small to ensure a sound financial status. Therefore, the sons with subsistence land ownership and family enterprise driven out of financial constraints are more likely to join family enterprise and father's occupation. Besides, we cannot rule out the possibility that the family enterprise and landownerships may be large and that the household-head's-bequest motive increases the probability that the son remains in the same occupation. That is with an increase in landownership, there is an incentive for the sons of a household to remain in their father's industry, perhaps in agriculture, avoiding the uncertain outcome originating from competition in the job market. The probable explanations discussed above indicate that family background (household wealth, family enterprise) may have disincentive in effective job search practices and results in unfair inequality persisting in the job market. This restricts the labour market from being a level playing field for all its participants. Poor farmers' sons with small landownerships continue to be farmers in the absence of a well-functioning capital market where they can borrow and invest in the skills and education of their sons. The occupation of a rich and well-established father is also transmitted easily to his son, lowering the son's incentive to actively search for a job.

Conclusion

Intergenerational occupational persistence, an outcome, as well as a source, of labour market inequality, is found to be alarming in Indian, with nearly 62 percent of Indians working in the same industry as their fathers in 2011–2012. We find that persistence is much higher in rural areas than in urban areas, indicating lower job opportunities in rural India. The analysis allows us to identify the age, social and religious groups that tend to show higher occupational persistence. The analysis of the occupational transitional matrix shows how intergenerational occupational persistence has varied across the industries during the last three rounds of the NSSO Employment Unemployment Survey. In rural areas, persistence is the highest (more than 75 percent) if the father is in agriculture. In urban areas, manufacture and wholesale and retail show very high levels of intergenerational persistence.

The analysis shows that education is one of the keys in breaking the vicious cycle of this inequality in the job market. In other words, only with higher education the son of a poor worker will be able to look for jobs in a large number of industries and have an occupation different from his father. The study also extensively focuses on the issue from interstate and intrastate perspectives. We consider all the states and UTs and find that persistence among the SCSs has gradually decreased and fallen below the GCS average (56 percent for the SCSs and 62 percent for the GCSs). The inter-regional analysis within states shows that persistence is relatively low and increasing in the capital regions of the GCSs such as Punjab, Haryana, Bihar, West Bengal, Chhattisgarh, Madhya Pradesh and Goa (with a few exceptions). The situation is not only alarming but also implies that employment opportunities are becoming scarce in the capital districts of the GCSs. The situation of the SCSs, with the fall in the persistence levels, on average,

may appear to be ushering in development. However, the increase in inter-regional disparity among most of the GCSs and SCSs is indicative of unequal economic opportunities resulting from regional disparity in economic growth. The results also indicate that in recent times, only education beyond the HS level significantly facilitates mobility across industries.

Considering their poor financial status and the inefficient financial markets, obtaining tertiary education is a difficult task for most rural households (as the sample is mostly dominated by rural-area observations). In the presence of the strong influence of family background in the form of family wealth and parental education, it is even more challenging to ensure equal opportunities in the job market. Against this backdrop, our entire analysis has great policy implications and is in favour of the promotion of higher education and equitable regional economic development in order to ensure equality of opportunities in the labour market.

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Note

1. We have not considered UTs here, because for Andaman and Nicobar and Daman and Diu, the district information is not separately available for the capital. Chandigarh has already been considered as the capital of Punjab and Haryana. For the remaining four UTs, we found that the number of observations is very low.

Reference

- Beller, E., & Hout, M. (2006). Intergenerational social mobility: The United States in comparative perspective. *The Future of Children, 16*, 19–36.
- Black, S. E., & Devereux, P. J. (2010). *Recent development in intergenerational mobility* (Working Paper 15889). National Bureau of Economic Research.
- Bowles, S., & Gintis, R. (2002). The inheritance of inequality. *Journal of Economic Perspective, 16*(3), 3–30.
- Coark, M., & Heisz, S. (1999). The intergenerational earnings and income mobility of Canadian men: Evidence from longitudinal income tax data. *Journal of Human Resources, 34*(3), 504–533.
- Emran, M. S., & Shilpi, F. (2011). Intergenerational occupational mobility in rural economy: Evidence from Nepal and Vietnam. *Journal of Human Resources, 46*(2), 427–457.
- Hnatkovska, V., Lahiri, A., & Paul, S. (2012). Castes and labor mobility. *American Economic Journal: Applied Economics, 4*(2), 274–307.
- Kumar, S., Heath, A., & Heath, O. (2002). Changing patterns of social mobility: Some trends over time. *Economic and Political Weekly, 37*, 4091–4096.

- Lambert, S., Ravallion, M., & Walle, D. (2011). Is what you inherited or what you learnt? (Intergenerational Linkage, and Interpersonal Inequality in Senegal Policy Research Working Paper No.: 5658) World Bank Development Research group and poverty Reduction and Economic Management Network Gender Group.
- Louw, M., van der Berg, S., & Yu, D. (2006). *Educational attainment and intergenerational social mobility in South Africa* (Stellenbosch Economic Working Papers Number 09/06). Department of Economics, Bureau for Economic Research, University of Stellenbosch.
- Majumder, R. (2010). Intergenerational mobility in educational and occupational attainment: A comparative study of social classes in India. *Margin: The Journal of Applied Economic Research*, 4(4), 463–494.
- Nandi, T. K. (2016). Intergenerational persistence of Industry in India. *The European Journal of Development Research*, 28(3), 495–511.