



## Regional specialization and geographic concentration of Indian female labour: A post liberalization analysis

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### Abstract

The Indian economy has undergone significant structural and social changes in the decades following liberalization. The share of the primary sector has been gradually declining while the tertiary sector has emerged as the most dynamic sector of the economy. Moreover, due to the uneven growth of the different sectors, the performance of the Indian states too varied considerably. Liberalization had raised the hope of increased female work participation. But even with higher levels of education and awareness, there was not much change in the pattern of female employment. The present paper brings out the heterogeneity of the labor market both region wise and sector wise with the help of different indices like Herfindahl and Krugman and the Lilien index. Lastly the paper comes up with policy prescriptions to smoothen the regional and sectoral variation in female employment.

**Keywords:** female employment, sectoral break up, regional concentration, liberalization

### 1. Introduction

India as a country is home to diverse culture, language and religions. The states are distinct with different demographics and endowment of resources. Thus there exists considerable amount of inter-regional as well as intra regional variation. One of the main objectives of the planning process has been the reduction in regional inequality. However, despite several efforts, the planning exercise failed to eradicate regional inequality completely from the country. The convergence hypothesis of Barro explains that with economic progress the gap between the rich and the poor states will tend to diminish over time as the poorer states catch up with the richer states. However, evidence shows that the economic reforms of 1991 have only aggravated the regional inequality among the states. Thus we find that while better performing states like Maharashtra and Gujrat have shot ahead, poorer states like Rajasthan, Uttar Pradesh are languishing behind. However, it would be wrong to say that there has not been any improvement in the economic growth of these states in the post reform period. The fact is that the population growth in some of these states has outweighed the increase in their economic growth. Moreover, most of the backward states depended heavily on grants and loans from the centre. When the new wave of liberalization and privatization hit the economy, this size got considerably reduced. Public investment also shrank significantly. Thus while states like Gujrat and Maharashtra attracted most of the foreign investment due to their infrastructure, the less developed states failed to attract much of private investment. Geographically, most of the forward looking states are from the Western and the Southern region and are located by the coastal regions. Another crucial factor which has decided the fate of development of a state is the quality of governance. States like Maharashtra have been able to provide an environment conducive for investment while states like West Bengal

have lost out because of strikes, lock out and other internal problem which has tarnished the image of the state outside. It is only natural that the difference in the income of the states will affect their employment potential. Female employment unlike male employment depends on a host of factors apart from economic ones like social, cultural and the demography of a region. Historically, female employment is distributed skewedly across the different parts of the world. Female employment is found to be the highest in the Nordic countries and very low in the Middle Eastern and African countries. India has one of the lowest female labour participation among the South East Asian countries. The reforms of 1991 failed to raise the labour force participation of women. Liberalisation brought in several structural changes in the economy. The share of the primary sector to the overall GDP of the country declined. While the secondary sector kind of remained stagnant, the tertiary sector became the new engine of growth. However, the primary sector continued to absorb the maximum percentage of female labour. The recent downturn in agriculture has forced many rural women to seek employment outside agriculture. The tertiary sector is the preferred destination of the educated urban women with the introduction of new edge services like IT, ITES etc. However, despite the rise in services, the tertiary sector failed to absorb female labour primarily on account of two reasons. Firstly, many of the subsectors within the tertiary subsector are highly capital intensive sectors and hence labour requirement is inherently less there. Next, employment in the tertiary sector requires certain level of education and skill which most of the women in our country lack. Due to the lopsided pattern of growth, female employment varies significantly not only across the regions but also among the different sectors as well. The present paper tries to examine the heterogeneity in female employment across the different regions. Since the tertiary

sector has emerged as the most dominant sector of the economy, we have exclusively calculated the percentage of female main and marginal workers in that sector for the different states. Given the fact that the states enjoy much greater autonomy, state specific policies must be introduced to boost up female employment in every region of the country.

**2. Literature Review**

Regional concentration has been the subject of many studies worldwide. Moga and Constantin (2011) suggest in their paper that, regional specialization expresses the territorial perspective and emphasizes the distribution of the economic activities, while the geographic concentration of an economic activity reflects its geographic distribution. The scientific literature focused on the evolution of on location of economic activities and regional growth is not always congruent. It is possible that regional specialization and the geographical concentration do not evolve in the same direction. Goschin, *et al.* (2016) in their paper worked on Romanian regional specialization for four different time period over various sectors and time period to assess the occupational structural shift. The main indices used were Herfindahl, krugman and Lilien index of specialization as well as concentration. Palan (2010) <sup>[9]</sup> compares nine common specialization indices, discussing their properties, strengths and weaknesses. In order to unravel the differences between the indices they are applied to European employment structures in 2005, spanning 51 industries and 24 European countries. The resulting heterogeneity levels differ largely between relative and absolute specialization measures. Palan shows discusses the different properties that a good index must obey such as the Axiom of Anonymity, The Axiom of Decomposability, The Axiom of transfer etc and shows that among the absolute measures of concentration the Herfindahl index satisfies most of the criteria. Again among the relative measures of concentration, the Krugman’s index satisfies all the properties. There have not been many studies on regional disparity in employment in India. Most of the studies on regional disparity are based on the state GDP. In a notable study T Das (1999) identifies the indicators responsible for the diversity in development across the Indian states. Das builds up a composite index based on several indicators using principal component analysis and arranges the states according to the indices derived using four broadly accepted components: (a) economic production and economic condition or in other words level of economic development; (b) common minimum needs; (c) health and health-related services and (d) communication. The factors, which are

found out to be more important for the overall development process, relate to basic needs like education, availability of food, minimum purchasing power and facilities like safe drinking water, health care infrastructure, etc. The results clearly emphasize the role of well-functioning public actions in improving the overall living conditions of the people. In a separate study, Nair (2004) focused on a comparison between India’s regional experience in the pre and in the post reform periods. The study analyses the manner in which inter-state disparities in economic development, as indicated by per capita net state domestic product (NSDP), have changed over time in India. An attempt is then made to get an idea as to which of the different hypotheses regarding the pattern of inter-regional change in the process of national economic development is valid in the case of India in the last two decades. The study also tries to explain not only inter-state disparities in HDI and in per capita NSDP but also such disparities in per capita value added in manufacturing, disaggregating the sector even further into registered and unregistered manufacturing. Gaur (2010) also studies the inter-state disparity in total as well as per capita SDP for 20 major Indian states for the period 1980-2002 with the help of inequality indices like Herfindahl index etc. Inter-state inequality trend has also been examined through ‘convergence-hypothesis’. His analysis shows that inequality among the states has increased in the post reform period and the gap between the rich and the poor states have widened defying Barro’s hypothesis.

**3. Objective**

1. To study the geographical concentration and regional specialization of the main sectors of the economy in terms of female employment
2. To study how the positions of the different states have changed from 2001 to 2011 for female main and marginal workers employed in the tertiary sector.
3. To explore the concentration of the different subsectors of the tertiary sector for the year 2011-12 particularly for rural and urban areas.
4. To analyze the regional specialization of the different subsectors in tertiary sector and to study the speed of the change in female employment within the tertiary sector for two time period-1993/94 to 2004/05 and 2004/05 to 2011/12.

**4. Methodology**

The paper is mainly based on secondary data taken from NSSO and Census. We have divided the states into six geographical region, namely north, west, east, south, central and north-east.

**Table 1**

| Zone             | States  |
|------------------|---|
| North zone       | Jammu & Kashmir, Uttar Pradesh, Uttarakhand, Punjab, Haryana, Himachal Pradesh. |
| West zone        | Rajasthan, Gujarat, Maharashtra, goa.   |
| South zone       | Karnataka, Kerala, Tamil Nadu, Andhra Pradesh Telangana included)               |
| Central zone     | Madhya Pradesh, Chhattisgarh  |
| East zone        | West Bengal, Bihar, Jharkhand, Orissa   |
| North- east zone | Sikkim, Assam, Tripura, Nagaland, Manipur, Mizoram, Arunachal Pradesh           |

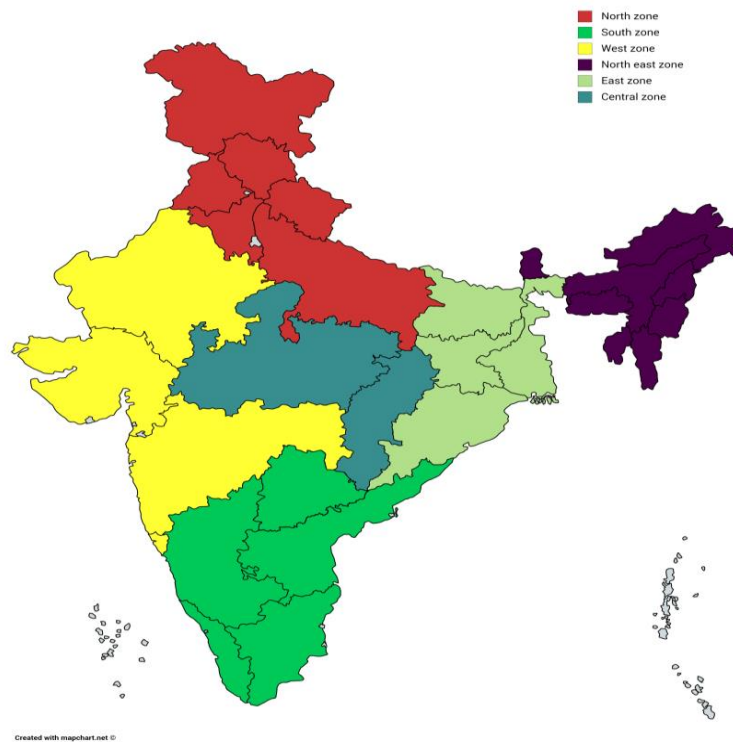


Fig 1.

We computed Herfindahl Hirschman occupational specialization/concentration index and Krugman's dissimilarity index to study the zone specific nature of female employment in three different sectors, primary, secondary and tertiary sector. We have divided the female workers into two categories -main and marginal. According to Census, a main worker is someone who has worked for more than six months of the year whereas a marginal worker is defined as someone who has worked less than six months in a year.

Formula used for Herfindahl Hirschman index:

$$H_j^c = \sum_{i=1}^n (g_{ij}^c)^2 \quad H_j^s = \sum_{i=1}^m (g_{ij}^s)^2 \quad g_{ij}^c = \frac{x_{ij}}{\sum_{i=1}^n x_{ij}} = \frac{x_{ij}}{x_j} \quad g_{ij}^s = \frac{x_{ij}}{\sum_{i=1}^m x_{ij}} = \frac{x_{ij}}{x_i} \quad (1)$$

- $H_j^c$  = HHI index for female labor concentration.
  - $g_{ij}^c$  = the share of region i' s  $j^{th}$  sector in the female labour employment of total female labour employment of sample in  $j^{th}$  sector.
  - $g_{ij}^s$  = the share of region i' s  $j^{th}$  sector in the female labour employment of region i.
  - $H_j^s$  = HHI index for female labour specialization in one region
  - $x_{ij}$  = female labour employment in region i in sector j.
  - $x_i$  = total female labour employment in region i.
  - $x_j$  = total female labour employment in sector j.
- Formula used for Krugman' s dissimilarity index:

$$K_j^c = \sum_{i=1}^n |g_{ij}^c - g_i| \quad K_j^s = \sum_{i=1}^m |g_{ij}^s - g_j| \quad g_i = \frac{x_i}{x} \quad g_j = \frac{x_j}{x} \quad (2)$$

- $g_i$  = the share of female labor employment of region i in total female labour employment of sample.
- $g_j$  = the share of female labour employment of sector j in total female labour employment of sample.

$X$  = total female labour employment of sample  
 Our third indicator, the Lilien Index captures the speed of the sectoral employment reallocation in the economy, as the main factor of differences in specialization (Lilien, 1982). The Lilien Index is calculated for each region i as:  
 The formula for Lilien index is:

$$L = \left[ \sum_{i=1}^n s_i \left\{ n \left( \frac{x_{irt}}{x_{irt-1}} \right) - \ln \left( \frac{x_{irt}}{x_{irt-1}} \right) \right\}^2 \right]^{1/2} \quad (3)$$

Where  
 $x_{irt}$  = employment in sector I in region r in time pd. t  
 $x_{rt}$  = Total employment in region r in time period t.  
 $s_{irt}$  = share of sector i in total employment in two particular time period t  
 Average share of sector i is  $s_i = [(s_{irt} + s_{irt-1})/2]$   
 To analyze performances of tertiary sector, it has been divided into four subsectors, namely- wholesale & retail trade etc., transport & storage etc., financial services etc. And public administration & community services etc. the respective employment shares of female labor in the subsectors has been found out and HHI index and Lilien index is calculated based on that to evaluate the performance of tertiary sector.  
 The Lilien Index is used to measure of the speed of structural changes. The higher the value of this indicator, the faster the structural changes and the bigger the reallocations of employment between branches.

**5. Empirical Findings**

The Herfindahl Hirschman (HHI) index shows that almost all the six different zones are specialized in primary sector in rural India. The value of specialization is specially high for north and central zone. This is easily verified from the fact that the northern states are rich in agricultural activities. the two states from central zone also depend on primary

sector and there is lack of industries and poor development of the tertiary sector. For the urban region, we find that almost all the six zones are specialized in tertiary activities which point out that tertiarization has an urban biasness. The difference between rural and urban areas also clearly gets highlighted from here.

The krugman’s dissimilarity index points out that both and urban the rural areas of southern zone follows a different employment pattern compared to others. The east and north eastern zone is indicating a more equilibrated pattern of employment. The sector wise female labour participation is also different for rural and urban areas. In the context of rural areas of the country, primary sector has least geographical concentration. The variation of female labour participation is higher across the regions in case of secondary and tertiary sector. However there is no huge gap between the HHI Values and krugman index values for primary, secondary and tertiary sector. In case of urban female employment, as indicated by both HHI and krugman's index, secondary sector shows least geographical concentration or variation between regions. But, especially from the values of krugman index we can infer higher level of dissimilarity in primary or tertiary sector employment. For urban areas, the tertiary sector activities for women are highest in East and North-eastern zone and lowest for Central Zone. The North eastern and Central zone have comparatively high share of female employment in primary sector. In case of rural areas, the secondary sector has notable share of female employment in South, East and North east zone. The South, west and North east also show high level of concentration in tertiary activities for rural female labour. (Table 1-2)

In order to capture the pattern of employment within the tertiary sector, which itself is a very heterogeneous sector, we calculated the Herfindahl’s index for the subsectors of the tertiary sector individually for the year 2011-12. In the rural area, we find the subsectors L, M and N to be heavily concentrated while for the urban areas, more or less all the subsectors are evenly concentrated except the subsector S which is heavily concentrated. (Table 3)

To analyse the performance of the tertiary sector in different zones, we examined the NSSO survey data published on 2012. The north zone is the most specialized zone while the West zone is least specialized. The specialization is higher for urban area for all other zones except South zone and North east zone. (Table 6)

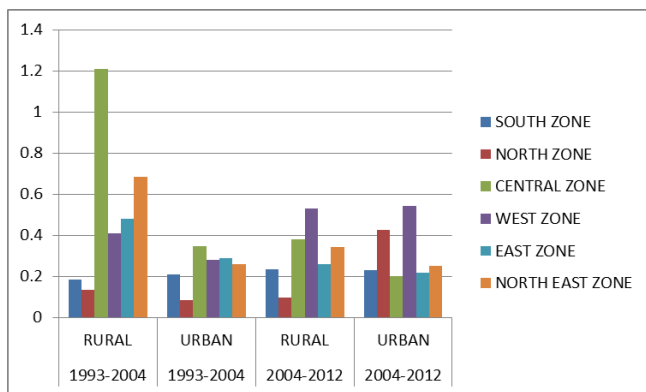


Fig 2. Lilien Index From 1993-2004 to 2004-2012

A clearer picture we get when we calculate the Lilien index which shows the “speed” of this structural diversification of female participation. For rural female labour

participation, the index value increased over time in South, north and west zone only indicating higher employment share in different tertiary subsectors, rather than the increasing importance of any one specific sector. In central, east and north east zone the value decreased which shows though initially female participation was more diversified, the pace of this diversification was not maintained. However, we can see that the index value for urban female labour has increased over time in all zones except east zone indicating that the pace of the sectorial shift of female employment is smoother in urban areas. In case of east zone also, the level of decrease in the Lilien index value is lower in urban female employment than that of in rural female employment. (Table 7)

Table 2: HHI Index and Krugman Index of Regeonal Specialization Based on Female Employment

| Zones           | Herfindahl-Hirschman Specialization Index |       | Krugman Dissimilarity Index on Specialization |       |
|-----------------|---|-------|---|-------|
|                 | Rural                                     | Urban | Rural   | Urban |
| North zone      | 0.41                                      | 0.72  | 0.076   | 0.26  |
| Central zone    | 0.38                                      | 0.73  | 0.17  | 0.16  |
| West zone       | 0.44                                      | 0.48  | 0.14  | 0.15  |
| South zone      | 0.43                                      | 0.47  | 0.14  | 0.16  |
| East zone       | 0.43                                      | 0.52  | 0.03  | 0.09  |
| North east zone | 0.52                                      | 0.50  | 0.23  | 0.08  |

Table 3: The HHI Index and Krugman Index for Concentration Based on Female Employment

| Sectors   | Herfindahl-Hirschman Concentration Index |       | Krugman Dissimilarity Index on Concentration |       |
|-----------|--|-------|--|-------|
|           | Rural                                    | Urban | Rural  | Urban |
| Primary   | 0.21                                     | 0.19  | 0.36   | 0.14  |
| Secondary | 0.17                                     | 0.21  | 0.19   | 0.34  |
| Tertiary  | 0.20                                     | 0.20  | 0.34   | 0.24  |

Table 4: HHI Index of Concentration Based on Tertiary Sector Activities

| Sectors | Herfindahl Index of Geographical Concentration |       |
|---------|--|-------|
|         | Rural  | Urban |
| G       | .232   | .351  |
| H       | .336   | .235  |
| I       | .367   | .208  |
| J       | .434   | .325  |
| K       | .621   | .230  |
| L       | .823   | .459  |
| M       | .691   | .370  |
| N       | .681   | .261  |
| O       | .356   | .447  |
| P       | .210   | .211  |
| Q       | .229   | .369  |
| R       | .367   | .206  |
| S       | .286   | .781  |
| T       | .250   | .202  |

Note- G: Wholesale and retail trade, H: Transportation and storage, I: Accommodation and Food service activities, K: Financial and insurance activities J: Information and communication L: Real estate activities, M: Professional, scientific and technical activities, N: Administrative and support service activities, O: Public administration and defence; compulsory social security, P: Education, Q:

Human health and social work activities, R: Arts, entertainment and recreation, S: Other service activities, T: Activities of households as employers; undifferentiated goods and services producing activities of households for own use, U: Activities of extraterritorial organizations and bodies

**Table 5:** HHI Index for Regional Specialization Based on Female Labor Participation in Tertiary Sector

| Zone            | 2012  |       |
|-----------------|-------|-------|
|                 | Rural | Urban |
| South Zone      | 0.454 | 0.425 |
| North Zone      | 0.637 | 0.659 |
| Central Zone    | 0.519 | 0.559 |
| West Zone       | 0.362 | 0.397 |
| East Zone       | 0.510 | 0.511 |
| North East Zone | 0.489 | 0.471 |

**Table 6:** Lilien Index for Female Labor Participation in Tertiary Sector

| ZONE            | 1993-2004 |       | 2004-2012 |       |
|-----------------|-----------|-------|-----------|-------|
|                 | Rural     | Urban | Rural     | Urban |
| South Zone      | 0.186     | 0.231 | 0.211     | 0.235 |
| North Zone      | 0.132     | 0.425 | 0.083     | 0.096 |
| Central Zone    | 1.210     | 0.199 | 0.345     | 0.381 |
| West Zone       | 0.410     | 0.543 | 0.281     | 0.529 |
| East Zone       | 0.481     | 0.219 | 0.290     | 0.261 |
| North East Zone | 0.682     | 0.249 | 0.258     | 0.341 |

**6. Conclusion and policy prescription**

Our analysis reveals that the primary sector still continues to absorb the maximum share of women. The secondary sector has failed to attract or absorb women. The tertiary sector with its huge range of activities does have plenty of opportunities for women. However, owing to the lopsided nature of the growth, there are wide variations within this sector. Moreover, being a diverse country with multi culture and religion, the states have grown at very different pace. Thus it is only natural that women employment will be unevenly dispersed across different states and regions. The government needs to target both region specific and industry specific policies if it needs to increase the workforce participation of women in near future. Some of the policies given below are prescribed for the following purpose.

1. Since the agricultural sector employs a large percentage of women, it needs to increase its productive capacity. Women in the rural sector also need to update themselves since modern agriculture requires the use of new technology.
2. The secondary sector needs to overhaul its policies. Quotas can be used as an initial step to employ women. Firms that employ more women can be given special incentives like tax rebate.
3. The tertiary sector too needs to penetrate into all the regions of the country. Sectors like banking, IT and BPO are still very much urban based and are therefore concentrated in states where the tertiary sector is very developed.
4. Lastly, women should be provided with marketable skills and training that help them to join the labour market.

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