

Gender Inequality in Indian States – Development of a Gender Discrimination Index

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Abstract

This paper examines the nature of the gender discrimination in various spheres of social and economic life across the states since 1981, entirely on the basis of the secondary data taken from various census reports. It also tries to find out the crucial correlates of inter state disparities in respect of gender discrimination in terms of a cross state regression analysis. We also made the convergence test of female-male ratio (FMR) across the states. Further we develop composite gender discrimination index. The cross-state and cross-time behaviour of most common parameter of gender discrimination i.e. FMR clearly reveal a falling trend. The convergence test also indicates a converging tendency of falling FMR across the states and over time. On the other hand, so far as the other parameters of gender discrimination are concerned we find overtly declining trend in sex ratios in literacy rate coupled with an increasing trend in IMR, employment etc. Surprisingly, while Kerala has been conspicuous in respect of increase in female literacy and FMR, the gender discrimination in respect of IMR and employment has been found to be highest in Kerala as compared to all other states. Our cross state regression results show that gender gap in employment and literacy are the statistically significant explanatory factors for the inter-state differentials in gender discrimination. On the whole the composite gender discrimination indices reveal that there has been tremendous increase in gender discrimination in almost all the states of India.

Key-words: Inter-state disparities; gender discrimination; FMR; gender discrimination index; correlates of gender discrimination; cross state regression.

1. Introduction

The inequity between men and women is ubiquitous in almost all the societies and it is basically conspicuous in our society also. Such type of inequality is found to be reflected in respect of natality, education, employment, social recognition etc. A common parameter, which is used to capture the degree of inequality between sexes i.e. the gender discrimination

is the female-male ratio (FMR). The cross time movement of the values of the FMR is used to generate idea about the dynamics of gender discrimination. However, it is quite obvious that a single parameter is completely inadequate to capture the nature and degrees of gender discrimination in various sphere of our social and economic life. So one has to have a composite Gender Discrimination Index (GDI) covering all the aspects. Actually gender discrimination may have varied dimensions not only across time but also across the regions of our country. It may take heterogeneous forms across the regions of our country depending upon the heterogeneity of socio-economic and cultural conditions and norms. In fact we know that in our male dominated society there are some societal prejudice, norms and rules which help the persistence of discrimination between men and women. Such gender discrimination is most vividly reflected in respect of natality through sex selective abortion, Infant Mortality Rate (IMR), health care, employment and education. It is surprising to think of the fact that even after 59 years of our independence, the majority of the married women of our society get almost totally detached from their natal family after marriage. Recently however, the patrilineal and matrilineal property rights are partly recognized. Astonishingly, it is difficult to conceive of the fact that even now, about 78% of the pregnant women of our country suffer from anemia, which indicates negligence to female health. Further the female literacy rate is still much lower than literacy rate for male (female literacy rate is 54% in India for 2001 and 76% for male in the same year) and this is also an indication of neglect of female in respect of provisions of education.

Of course there is a vast literature pertaining to the nature of gender discrimination in India (Agnihotri, 1999, 2001; Das, 1987; Dasgupta, 2000; Dreze & Sen, 2002; Dyson, & Moore, 1983; Repetto, 1972; Sen, 1986 etc.). Astonishingly in none of these studies neither a suitable gender discrimination index or gender gap has been formed nor there is any attempt to find out quantitatively the crucial determinants of gender discrimination which are responsible for the cross state differentials in the gender discrimination. Moreover, no attempt has been made to see whether there has been a tendency of convergence of falling dimensions of gender discrimination especially the FMR across the states over time. This is the fundamental motivation behind this study.

So our study is mainly concentrated on finding out the correlates of the inter-state disparity in FMR and also on the development of a suitable index of gender discrimination. Further it seems that the initial value of FMR has a remarkable impact on the behaviour of FMR across time. So in our study we try to estimate whether there is a converging tendency of the falling trend of FMR across the states by using conventional neo-classical tool of convergence test. This study is organized as follows. Section II highlights the data and methodology, section III presents an analysis of the nature of the inter state disparity in gender discrimination,

section IV presents the gender discrimination indices and its cross state variability, finally section V gives concluding remarks.

2. Data and Methodology

This study is completely based on the secondary data collected from various census reports and also from SRS Bulletin, GOI. To find out the correlates of cross state differentials in FMR which is the most conventional parameter of gender discrimination we make a cross state inter-temporal regression analysis such that we regress FMR on FMR of literacy and FMR of employment and we estimate the relevant coefficients by using ordinary least squares method. For this purpose we fit a log-linear model to the data which is as follows:

$$\text{Log (FMR)}_t = a + b_1 \text{Log(Lit)}_t + b_2 \text{Log(Emp)}_t + e_t$$

Where FMR – Female-male Ratio i.e Sex-Ratio (SR); Lit – Literacy rate; Emp.- Employment and e- Error term, $i = 1, 2, \dots, 16$ states ; $t = \text{time}$

We also develop inter-temporal gender discrimination indices for each state by following the method of construction of human development index used by UNDP. The gender discrimination index for each state concentrates on discrimination in four essential dimensions viz. (i) Female Male Ratio, (ii) Literacy rate, (iii) IMR and (iv) Employment. We construct the gender discrimination index in the following manner:

Step-1: In constructing the gender discrimination index we first compute the gender gap by subtracting the female-male ratio of each of the four components of gender discrimination from unity and then we find out the dimension indices of gender gap for these components as follows:

$$I_{ij} = (X_{ij} - \text{Min } X_{ij}) / (\text{Max } X_{ij} - \text{min } X_{ij})$$

Where X_{ij} = Actual value of the variable; i = No. of variables and j = No. of states

Step- 2: Now taking the simple average of I_{ij} by paying equal weights to all the components we construct the index for the periods under consideration

3. An Analysis of the Nature of the Inter-State Disparity in Gender Discrimination

In this section we analyse the nature of the inter state disparities in the female-male ratio (FMR) and also the different socio-economic spheres where the gender discrimination persists across the states. **Table-1** gives an overview on the magnitude of the nature of gender discrimination across the states. The time profile of the values of the FMR clearly indicates a slight declining trend of the FMR at the national level from .934 in 1981 to .927

in 1991, which is followed by marginal increase to .933 in 2001. It is quite obvious from the table that there are some states especially the north-western states like Haryana, Punjab and also the states like Maharashtra, Madhya Pradesh, Himachal Pradesh, Gujarat and Bihar where there is a falling trend in FMR, while the other states have experienced a more or less rising trend in the same. It is also reflected that some states have experienced a rising trend in FMR between 1991 and 2001. Using the coefficients of variation (C.V) as a measure of inter-state disparity of FMR we see that it assumes small value across time albeit the time profile of the C.Vs reveal an increasing trend in FMR since 1981. However, the conventional perceptions regarding the behaviour of FMR across states has been the convergence of the falling trend of the same without being supported by any statistical proof (Dreze & Sen, 2002).

Table 1: Female-Male Ratio (FMR) and Child Sex-Ratio in major states of India during 1981-2001.

States	Sex-Ratio			Child Sex-Ratio	
	1981	1991	2001	1991	2001
A.P	.975	.972	.978	.975	.961
Assam	-	.923	.935	.975	.965
Bihar	.946	.907	.919	.953	.942
Gujarat	.942	.934	.920	.928	.883
Haryana	.870	.865	.861	.879	.819
H.P	.973	.976	.968	.951	.896
Karnataka	.963	.960	.965	.960	.946
Kerala	1.032	1.036	1.058	.958	.960
M.P	.941	.912	.919	.941	.932
Maharashtra	.937	.934	.922	.946	.913
Orissa	.981	.971	.972	.967	.953
Punjab	.879	.882	.876	.875	.798
Rajasthan	.919	.910	.921	.916	.909
Tamil Nadu	.977	.974	.987	.948	.942
Uttar Pradesh	.885	.876	.898	.927	.916
West Bengal	.911	.917	.934	.967	.960
India	.934	.927	.933	.945	.927
C.V	4.68	4.80	5.07	3.22	5.40

Source: Various census reports, GOI.

But the convergence test (using neo-classical tool of convergence test) of our study through cross state regression analysis¹ reveals the converging trend of the falling FMR across the

¹ The regression equation is given by:

$$\log(\text{FMR}-01)-\log(\text{FMR}-61) = -.009669 - .3990 \log(\text{FMR}-61) + e$$

(.0074)
(.2035)
[.2225]
[.0757]

Adj. R² = .1915 F(1,11) = 3.842
 (.0165)

Figures in first brackets are standard errors and that of third brackets are p-values.

states. In fact what we find is that some states viz. Bihar, Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra & Orissa with higher initial FMR have experienced a declining trend in FMR, while some other states viz. Andhra Pradesh, Assam, Karnataka, Kerala, Rajasthan, Tamil Nadu, West Bengal etc. with lower initial value of FMR have experienced increasing trend in FMR. So on the whole we do not find any uniform pattern of cross time movement in FMR

Another proximate parameter measuring the gender discrimination might be the behaviour of child sex-ratios which seems to have some impact on the general FMR also. The data on the child sex-ratio (see table 1) reveal that in almost all the states excepting Punjab, Kerala and Himachal Pradesh the same has revealed a declining tendency between 1991 and 2001. The most crucial explanation to this may be the lowering of female childbirth or hidden female infanticides and the sex selective abortions. The census surveys do not provide any information on this aspect. What is surprising is that although the value of C.V is very low we find an increasing trend of the same, which obviously reflects the increasing tendency of inter-state disparities in this respect. Further, it is also noteworthy that child sex ratio has a bearing on the general FMR and in this respect the inter-temporal correlations between the FMR and child sex-ratio are not so high for 1991 and 2001 ($r_{91} = .64$, $r_{01} = .68$) albeit the correlation is positive. In fact the intermediary death of male and female at the age above 4 years may also affect the cross time FMR.

Now we consider the nature of the inequality between male and female in terms of gender-gap in some of the crucial socio-economic sphere of life of our society, viz. gender-gap in child labour, gender-gap in respect of education, gender-gap in respect of employment and gender-gap in respect of IMR. The data on the Sex Ratio (SR) on child labour which are (given in Table-2) clearly indicate that in about eight states out of fifteen states viz. Andhra Pradesh, Madhya Pradesh, Maharashtra, Rajasthan etc. the ratios are greater than unity which indicates the dominance female child labour relative to male thereby indicating prevalence of gender discrimination in case of use of child labour also. Since there is a lack of data on the sex-wise child labour across various censuses we are not able to provide any inter-temporal nature of sex-ratio on child labour. Another interesting feature relating to the sex ratios on child labour is that the degree of inter-state disparities is found to be very high (C.V= 43.84). Further the figure on the proportion of female working children in the age of 5-14 years is still very high at the all-India level (5.06%) such that some states like Andhra Pradesh, Madhya Pradesh, Himachal Pradesh, Maharashtra, Rajasthan and Karnataka have surmounted this figure, the figures being 10.5, 8.6, 5.6 6.6, 7.9 and 8.7 respectively. So, it is plausible to say that even in case of use of child labour the degree of exploitation of female children is

still higher in majority of the states excepting Kerala, Haryana, Uttar Pradesh, West Bengal and Punjab.

Table 2: Incidence of Child Labour in Major States of India in 1991.

States	Child Labour		Sex ratio of child labour
	Boys	Girls	
A.P	9.5	10.5	1.10
Assam	6.8	4.1	.602
Bihar	4.9	2.9	.591
Gujarat	5.1	5.5	1.07
Haryana	3.2	1.8	.562
H.P	3.6	5.6	1.55
Karnataka	8.9	8.7	.977
Kerala	0.6	0.5	.833
M.P	7.6	8.6	1.13
Maharashtra	4.9	6.6	1.34
Orissa	6.3	5.4	.857
Punjab	5.0	0.9	.18
Rajasthan	5.2	7.9	1.51
Tamil Nadu	4.6	5.1	1.10
Uttar Pradesh	5.0	2.5	.50
West Bengal	5.6	2.7	.48
India	5.66	5.06	.89
C.V	39.55	59.93	43.84

Note: C.L= Proportion of working children in the age group 5-14 years; Source: Same as Table-1.

On the other hand, Table-3 presents the data on FMR and gender gap in respect of literacy rates. It's a matter of buoyancy that in almost all the states the FMRs in literacy rate (i.e. ratio of female literacy rate to male literacy rate) have been found to have a increasing trend over the period 1981-2001. so, the gender gap in respect of literacy are found to decline steadily both across the states and time since 1981. Further, we also find that the inter state disparity in respect of gender gap in literacy has fallen over time one of the explanations behind it seems to be the various public action programmes viz. Sarba Sikhsha Abhijan etc. undertaken by the GOI from time to time.

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Table-3: Ratio of female-male literacy rate and gender gap in literacy rate

States	Ratio of Female-male Literacy Rate			Gender Gap in literacy rate		
	1981	1991	2001	1981	1991	2001
A.P	.519	.60	.719	.481	.40	.281
Assam	-	.693	.777	-	.307	.223
Bihar	.356	.442	.566	.644	.558	.434
Gujarat	.593	.671	.728	.407	.329	.272
Haryana	.462	.599	.708	.537	.401	.292
H.P	.592	.693	.790	.408	.307	.21
Karnataka	.567	.656	.75	.433	.344	.25
Kerala	.872	.914	.936	.128	.086	.064
M.P	.392	.50	.649	.608	.50	.357
Maharashtra	.591	.675	.790	.409	.325	.21
Orissa	.447	.555	.671	.553	.445	.329
Punjab	.713	.757	.842	.287	.245	.158
Rajasthan	.195	.363	.578	.805	.637	.422
T.N	.902	.689	.792	.098	.311	.207
U. Pradesh	.276	.446	.614	.724	.554	.386
W.B		.691	.769	-	.304	.231
India	.528	.603	.710	.472	.391	.290
C.V	38.08	22.07	13.41	43.71	36.05	36.40

Source: Various census reports, GOI.

Now so far as the employment is concerned we find a very high degree of discrimination against the female workforce as is revealed by the sex ratios on employment (i.e. % of female workers to the % of male worker in various sector) [see Table-4]. It follows from the table that the ratio assumes a very small value at the national average level ranging from .35 in 1981 to .40 in 1991 and further to .46 in 2001. The table reveals that while for 7 states these ratios are found to be higher than the national average ratio in 1981, the same for 11 states are found to be higher than the national figure in 2001. Now, if we judge the persistence of inequality between female and male pertaining to employment in terms of gender gap then we find that the same do not reveal a uniform trend neither across time nor across the states. While in some states we find it to increase between 1981 and 1991, in some other states we find a declining trend in the same during the same period. However, we find

the values of gender gap to experience a declining trend over the period between 1981 and 2001 in almost all the states excepting Maharashtra and Kerala. It is surprising to note that while in terms of education, general parameter of gender discrimination i.e. FMR, Kerala perform the leading role against the gender inequality, in respect of gender discrimination in employment the state of Kerala is deplorable. Now so far as the interstate disparity in the sex wise inequality in employment is concerned the time profile of C.V. reveals a marginal declining trend from 45.33% in 1981 to 40.89% in 2001, albeit the degree of inter state disparity is formed to be very high.

Table-4: Ratio of female-male employment and gender gap in employment

States	Ratio of Female-male Employment			Gender Gap in Employment		
	1981	1991	2001	1981	1991	2001
A.P	.567	.601	.610	.433	.399	.390
Assam	-	.403	.921	-	.597	.079
Bihar	.254	.282	.365	.746	.718	.635
Gujarat	.367	.452	.468	.633	.548	.532
Haryana	.184	.191	.465	.816	.809	.535
H.P	.589	.670	.596	.411	.330	.404
Karnataka	.446	.521	.544	.554	.479	.456
Kerala	.381	.345	.018	.619	.655	.982
M.P	.529	.582	.592	.471	.418	.407
Maharashtra	.534	.592	.533	.466	.408	.467
Orissa	.348	.375	.456	.652	.625	.544
Punjab	.100	.071	.311	.900	.929	.689
Rajasthan	.380	.505	.617	.62	.495	.383
T.N	.457	.516	.540	.543	.484	.460
U. Pradesh	.140	.218	.317	.860	.782	.683
W.B	.146	.200	.316	.854	.800	.684
India	.350	.400	.462	.650	.600	.538
C.V	45.33	43.26	40.89	25.66	29.78	37.65

Source: Various census reports, GOI.

On the other hand, so far as the gender discrimination in respect of IMR (see Table-5) is concerned we find the ratios to assume a value greater than one not only at the all India

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level but also for a few states viz. Uttar Pradesh, Maharashtra, Madhya Pradesh, Gujarat, Bihar etc. in 1981 and for other states excepting West Bengal, Punjab, the same was found to be low ranging from .65 to .68 in 1981 and for rest of the states however, these ratio assume value very close to one. But it is surprising to note that in respect of sex ratio on IMR, Kerala assumes a value 13.33 in 2001, which is followed by Haryana(1.37), Punjab(1.73), Bihar (1.17), Gujarat (1.2), Madhya Pradesh (1.08), Rajasthan (1.08), Uttar Pradesh (1.1) & Assam (1.10). So what follows is that the female child mortality rate has increased and it is conspicuous in respect of Kerala. It seems that the sex selective abortion, hidden female infanticides, neglect of female child in respect of health care are the prominent reasons behind such discrimination. As we do not have any data pertaining to it, it is very difficult to establish this hypothesis quantitatively. Moreover what is surprising is that the degrees of inter state disparity as revealed by the time profile of C.V. has been decreased since 1981.

Table-5: Ratio of female-male IMR and gender gap in IMR

States	Female-male Ratio of IMR		Gender gap in IMR	
	1981	2001	1981	2001
A.P	.761	.937	.239	.063
Assam	.906	1.01	.094	-.01
Bihar	1.43	1.17	-.43	-.17
Gujarat	1.10	1.20	-.10	-.2
Haryana	.947	1.35	.053	-.35
H.P	-	-	-	-
Karnataka	.972	.946	.028	.059
Kerala	.911	13.33	.089	-12.33
M.P	1.03	1.08	-.03	-.08
Maharashtra	1.05	.875	-.05	.125
Orissa	.860	.831	0.14	.169
Punjab	.654	1.73	.346	-0.73
Rajasthan	.840	1.06	.16	-.06
T.N	.927	.934	.073	.066
U.Pradesh	1.06	1.10	-.06	-0.1
W.B	.68	.849	.32	.151
India	1.06	1.04	-.06	-.04
C.V	20.25	21.95	325.51	-355.04

Source: Various SRS Bulletin, GOI.

4. Gender Discrimination Indices and its Cross State Variability

In this section we present the gender discrimination indices (GDI) across states as well as time that we develop and also analyse the nature of the inter-state disparity in respect of gender inequality on the basis of these indices. Further we also find out the important correlates of the inter-state disparity in gender discrimination. The inter temporal cross state regression results (see Table-6) clearly reveal that for the year 1981 the employment has been the statistically significant explanatory factor for the inter state variability of gender discrimination (FMR). However, for the year 1991, we find both the literacy rate and employment as a crucial vis-à-vis statistically significant determinant of the inter-state disparity in FMR. However, for the year 2001 none of these factors are found to be statistically significant and the value of adj. R^2 is also found to be poor. So on the whole we can say that female employment may be the crucial determinant for the reduction in gender discrimination as the economic freedom helps engendering both the social and political freedom of women in the society.

Table 6: Cross State Inter Temporal Regression Results for Gender Discrimination

Dependent Variable	No. of Observ.	Constant	Log(lit)	Log(Emp.)	Adj. R^2	F(2,12)
Log(SR-81)	14	3.013 (.009) [.0000]	.0381 (.0209) [.0955]	.581* (.0161) [.0041]	.566 (.013)	9.48
Log(SR-91)	16	3.01 (.010) [.0000]	.116* (.034) [.004]	.050* (.013) [.002]	.588 (.013)	11.72
Log(SR-01)	15	2.97 (.018) [.0000]	.080 (.099) [.436]	-.023 (.015) [.149]	.194 (.019)	2.69

Note: SR= Sex-Ratio, Lit.= Literacy, Emp.=Employment.

* = Significant at 1% level.

Figures in first brackets are standard errors and that of third brackets are p-values.

Now, Table-7 presents the composite GDIs both across time and states. It is discernable from the table that at the national level the value of the GDI has increased tremendously from .37 in 1981 to .53 in 1991 and further to .74 in 2001. Moreover, almost all the states

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have experienced a tremendous increase in the values of GDIs over the period between 1981 and 2001. While in 1981 the value of GDI ranges from the lowest figure of .13% in Kerala to the highest figure of .77 in Punjab, in 2001 the same ranges from the lowest value of .45 for Kerala to .87 for Bihar. Further most of the states assume value of these indices greater than .6 in 2001. So it is plausible to say that the degree of gender discrimination in its different spheres excepting literacy rate has increased tremendously over the period. However, it is a matter of solace that the inter state disparities in the gender discrimination (as is revealed by the time profile of C.Vs of GDI) has declined over the period.

Table 7: State wise Gender Discrimination Index in India during 1981-2001.

States	Gender Development Index		
	1981	1991	2001
A.P	.366	.360	.69
Assam	.34	.49	.58
Bihar	.25	.73	.87
Gujarat	.30	.46	.73
Haryana	.67	.76	.76
H.P	.19	.26	.53
Karnataka	.31	.39	.69
Kerala	.13	.19	.45
M.P	.34	.53	.75
Maharashtra	.25	.39	.68
Orissa	.44	.50	.76
Punjab	.77	.69	.71
Rajasthan	.64	.65	.79
Tamil Nadu	.17	.51	.66
Uttar Pradesh	.67	.82	.86
West Bengal	.57	.60	.75
India	.37	.53	.74
C.V	50.27	34.41	15.58

Source: Computed from various census data.

5. Concluding Remarks

This paper examines the nature and dimensions of gender discrimination in Indian states. The analysis of census data leads us to draw the following conclusions. First, the use of conventional parameter of gender discrimination i.e. the FMR reveal that it is falling over time in almost all the states excepting Kerala. This clearly indicates an increasing tendency of gender inequality. Secondly, the cross state regression on the falling trend in FMR clearly

indicates a converging tendency across the states. Thirdly, we find that in almost all the states excepting Punjab, Kerala and Himachal Pradesh, the child sex ratio reveals a declining trend. What is surprising is that the inter-state disparities in this respect are also increasing. We also find a positive correlation between FMR and child sex ratio. The hidden female infanticides, sex selective abortion etc. seem to be the explanation behind this falling trend of child sex-ratio. Fourthly, the gender gap in the literacy rate is found to reveal a tremendous falling tendency across the states. Fifthly, the degree of gender discrimination in respect of employment has been found to be very high in almost all the states. Surprisingly, it reveals a slight declining tendency between 1991 and 2001 in almost all the states excepting Kerala & Maharashtra. It is really surprising that gender inequality in respect of employment and EMR is highest in Kerala albeit, the same for literacy, FMR is low there. Sixthly, our cross state regression results reveal that gender gap in employment and literacy rate are the statistically significant explanatory factors behind the inter-state disparity in gender inequality. Finally, the gender discrimination indices clearly reveal a tremendous increasing tendency over time in almost all the states. However, the cross-state disparity in this respect reveals a declining tendency. Our study therefore engenders an interesting policy implication, which suggests that massive public action programmes for the increase in female literacy, and employment opportunities are the quint essentials for tackling with the problem of burgeoning gender inequality amongst the Indian states.

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