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# Geography, Religion, Caste and Gendered Lives: Evidence from an Indian Time Use Survey

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# Geography, Religion, Caste and Gendered Lives: Evidence from an Indian Time Use Survey

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**Abstract**

Is female labour force participation a good proxy for gendered time use? How do geography and the social institutions of caste and religion interact with the gendered distribution of time within Indian households? In this study, we use gender distance metrics, inspired by distance measures between vectors, to measure the extent to which time allocation within households is gendered. We show that the relationship between gender distance and labour force participation is not monotonic and the linear relationship between the two is not statistically strong. The relationship of caste, religion and region with gendered time use metrics is distinct from their relationship with employment. Interestingly, in contrast to popular hypotheses which suggest North Indian, Muslim, and Upper Caste households are more gender unequal, we only find robust confirmation for the hypothesis related to Islam in our regression framework. To further estimate the *direct* contribution of caste and religion in explaining the gendered time use gap between groups (as distinct from the contribution of differential distribution of covariates between groups), we supplement our regression results with Oaxaca-Blinder (1973) decomposition and Dinardo-Fortin-Lemeieux (1996) decomposition. These analyses confirm that caste and religion have complex and unexpected heterogeneous effects on the intensity of gendered time use.

*Keywords*: Gender, Caste, Religion, Time Use, Employment, Domestic Work
**JEL Codes**: J16, J21, J22, Z12, Z13

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# 1 Introduction

In most developing countries, households and families are sites of gender inequality and differences, where social and religious norms dictate different responsibilities for men and women (Esplen, 2009; Medeiros et al., 2010; Burda et al., 2013; Canelas and Salazar, 2014; Campaña et al., 2018; Gimenez-Nadal and Molina, 2022). This implies that the daily lives of men and women in a household are often distinct. Such distinctness or distance between everyday lives has important socio-economic consequences (Antonopoulos and Hirway, 2009; Gimenez-Nadal and Molina, 2022; Alem et al., 2023; Cosaert et al., 2023). The economic literature on cultural distance, collective action and conflict amongst groups in a society (Montalvo and Reynal-Quero, 2005; Desmet et al., 2017) suggests that collective action (conflict) is inversely (directly) related to the 'cultural' distance between groups. Borrowing from this framework, it can be suggested that distinctness in lives between the two genders can inhibit cooperation and collective action and increase the potential of intra-household conflict. Besides low gender distance within households shapes aspirations and modifies notions of fairness amongst young individuals that influence their behaviour in the world beyond the household (Smith and Johnson, 2020).

While the data on gender disaggregated time use survey is rare there is an increasing body of work that studies the gender gap in time spent on market and non-market activities, albeit mostly from the developed part of the world. Interestingly, in contrast to the standard models of household production (Becker, 1973) which predicts a negative relationship between a wife's share of market income and her contribution to home production, (Bertrand et al., 2015) find gender-gap in non-market work is higher if the wife earns more than the husband using the American Time Use Survey. Using Danish time-use data Browning et al. (2021) find that with higher female wages childcare time increases for women but not for men. Cosaert et al. (2023) shows that time spent together by husband and wife in a household is an important input of household satisfaction. Gendered specialization of time use allocation might affect that adversely.

In a study that uses time use data from three South American countries, Campaña et al. (2018) divides work into four broad categories: paid work, unpaid work, child care and other care; and estimates the gender gap in each category. However such informa-

tion is not combined to create a measure of the overall gender gap that allows an ordinal ranking. Additionally, focus on broad categories like paid work and unpaid work obscures gender-based specialization within each of these broad categories. Li (2022) uses two rounds of cross-sectional time use data from six states of India to comment on the gender-specific changes in paid work, unpaid work and leisure. The paper looks beyond broadly defined categories to observe changes in specific activities like leisure, television viewing, participation in religious practices etc. However, this information is not combined to comment on the gendered nature of overall time use. We contribute to this scant but growing literature to study the gendered distance in time use and its relation to the gender gap in employment in the context of a developing country setting. Further, we check the relationship of such a measure of gender distance to test some of the popular hypotheses related to caste, religion and region in the context of India.

Social scientists, documenting the gendered nature of life within Indian households, have often just focused on the under-representation or over-representation of women in some broadly defined activities that they consider to be socially important. In the last decade, economists have majorly focused on the low and declining rate of female labour force participation in India (Afridi et al., 2017; Dubey et al., 2017; Mehrotra and Parida, 2017; Kapsos et al., 2014; Klasen and Pieters, 2015). As a response to this singular focus on time spent on 'economic work' (narrowly defined by the International Labour Organisation or the National Sample Survey Organisation of India), many economists have rightly called for a broadening of the definition of 'economic work' to include socially essential unpaid activities that are generally performed by women (Hirway and Jose, 2011; Hirway, 2012; Jain, 2008; Deshpande and Kabeer, 2019). While such definitional changes might reduce the quantitative gender gap in 'employment' and acknowledge the contribution of women in social reproduction, they are of limited help in understanding the differential contribution of men and women across heterogeneous activities, which as mentioned earlier, has important socio-economic implications.

In this paper, using various measures of distance between vectors, we construct indices that measure the gendered time use within a household. These gender distance indices are constructed without creating a hierarchy of activities in which some activities are

valued more over others. In a society that values all activities equally and aspires to a gender-equal society, a within-gender substitution between activities is not problematic as long as it reduces overall gender distance in time use. The construction of this index uses a classification of activities into 56 categories and thus allows us to distinguish between heterogeneous activities that go into the construction of broadly defined categories like unpaid household work or employment. We show that this measure of gender distance is not highly correlated to other measures used to suggest the existence of a gender-egalitarian society: female labour force participation rates or gender gap in labour force participation.

The rest of the paper is structured as follows: Section 2 discusses the literature that looks at the relationship between gender relations and caste, region & religion. Section 3 discusses the data and empirical strategy used in this paper. It discusses the construction of the measure of gendered time use. Section 4 reports the results of the empirical analysis and Section 5 concludes.

## 2 Background Literature

India is characterised by large gender gaps in various development indicators in education, health, political participation, income etc (World Economic Forum, 2022; Agarwal et al., 2021; Jain, 2016; Pal et al., 2020) While the gaps in many of these indicators have declined steadily in the last few decades (Bhattacharjee et al., 2015), it is often suggested that daily lives of Indians remain gendered and this is true in spite of the progress made in overall development indicators. In Indian households, social norms and preferences ensure a gendered division of 'labour' over various 'economic' and 'non-economic' activities necessary for the smooth functioning of households. Evans et al. (2021), a recent study based on Pew Research Center survey of social attitudes, report that 55% Indians support preferential treatment for men in the job market when jobs are in short supply.[1] In the same data, four out of ten Indians believe that marriage is more satisfying if men and women stick to their traditional gender roles.

Within India there exists great heterogeneity in gender norms and practices across religion, caste and geographical region. In the context of geographical differences, pa-

[1] Amongst all countries for which similar data is available, India stands second, next only to Tunisia.

pers examining the popular Dyson-Moore hypothesis state that gender relations are more 'progressive' in the South and North-East than they are in the Northern Gangetic plains (Karve, 1965; Dyson and Moore, 1983; Jejeebhoy and Sathar, 2001; Basu, 1992). However, some other works provide a slightly different understanding of the North-South divide in gender norms. For example, Rahman and Rao (2004) finds that North-Indian women face stronger restrictions on mobility, however, it is also the case that North Indian women have more authority over household expenditure decisions. According to Evans (2020), *'Southern and North Eastern women are more likely to survive infancy, be educated, marry later, choose their own husbands, interact more closely with their husbands, bear fewer children, own more assets, exercise more control over their dowry, socialise with friends, move more freely in their communities and work alongside men.'*. Estimates from a recent employment-unemployment round of National Sample Survey data show that FLFP rates are much higher in South and North-East India than in North India (refer to Figure 10 in the online appendix). In Singh et al. (2022)'s ranking of Indian states on the basis of their patriarchy index, seven of the ten highest states are from North India, while the remaining three are from West India. In the concluding discussion of the paper, Singh et al. (2022) relates patriarchy to the gendered division of 'labour' and not to the gendered division of time over heterogeneous activities. In this paper, we test if the North-South divide extends to the gendered use of time.

Unlike the Dyson-Moore hypothesis, there is less of a consensus regarding the impact of the religious identity of society on gender inequality. In India as well as the world at large, Muslim women have lower levels of labour force participation and educational attainment compared to counterparts in other major religions. The gender gaps in these two realms are also higher for Muslims. This has led to the perception that Islamic social norms are directly related to gender inequality, gender discrimination or lack of women's autonomy amongst Muslims (Alexander and Welzel, 2011; Fish, 2011; Moghissi, 1999). However it can also be argued that gender inequality in the Muslim world is symptomatic of economic backwardness, the legacy of (neo) colonialism and economic dependence on fossil fuels (Moghadam, 2004a,b; Offenhauer, 2005; Ross, 2012). Charrad (2001) notes the differences in gender inequality in three Muslim-majority countries in North Africa and contends that kinship structures explain the differences. However using cross-country

data, Fish (2011) claims that the high levels of gender inequality in Muslim-majority countries cannot be explained by economic factors alone. In the context of India, Evans et al. (2021) state that Muslims in India are most likely to hold 'traditional' attitudes towards gender roles. However, Jejeebhoy and Sathar (2001) argue that autonomy among Muslim women in South Asia are not different from other religion, once regional effects are controlled for. Rahman and Rao (2004) state that controlling for various cultural and economic factors, Muslim women have higher control over intra-household decision-making than Hindu women. However Muslim women face higher restrictions on mobility outside households. Dasgupta and Datta (2023) study the impact of the restrictions during the holy month of Ramadan on gender distance. It finds that Ramadan reduces gender inequality in time use patterns.

Caste, as a social institution that is unique to South Asia, influences the practice of gender equality amongst different communities in India. It is generally stated that the higher the rank of a caste (*jati*) in the caste hierarchy, the higher the social restrictions imposed on the lives of women. This is primarily because of the greater importance assigned to the 'purity of women' in upper caste communities (Chakravarti, 1993). Bidner and Eswaran (2015) develops a theoretical model to show the intensity of restrictions on women's autonomy (importantly the autonomy to choose husbands) that determined the ranking of a caste in the hierarchy. While Bidner and Eswaran (2015) treats differences in the intensity of restrictions as the cause of the purity-pollution scale, most of the other scholars treat the purity-pollution scale amongst caste as an exogenous feature that leads to stronger restrictions on women of upper castes (Liddle and Joshi, 1986; Chakravarti, 2003). Eswaran et al. (2013) shows that the relative participation of women in market work is inversely related to caste status and the negative marginal effect of education on such participation is much higher amongst the upper castes. However, Deshpande (2002) finds no evidence to show that spousal relationships amongst lower castes are more equal when compared to the upper castes. Using data on attitudes collected through a vignettes survey, Dasgupta and Datta (2022) studies the interaction of caste and class in determining social attitudes in the Indian states of Haryana and Uttar Pradesh. The paper does not find any evidence to claim that lower castes have more egalitarian gender attitudes. On the contrary, lower castes often reveal more conservative gender attitudes compared

to their upper caste counterparts.

In this paper, we construct a simple measure of how gendered lives are within households and check some of these popular hypotheses regarding the variation in gender relations across caste, religion and region, as described above in this section .

# 3 Data and Empirical Strategy

## 3.1 Data

We use information from the first nationally representative Time Use Survey conducted by the National Statistical Office, Ministry of Statistics and Programme Implementation, Government of India in 2019 (henceforth, TUS-2019). This time-use survey collected information on the time-use details, demographic details and some economic details of 445299 individuals from 138799 households, spread over 9946 villages or urban wards, 676 districts and 36 states or union territories. While villages and urban wards are anonymised for purposes of privacy, every household can be identified to belong to a particular sector (rural or urban) in a particular district within a particular state.[2]

For every sampled household, the survey collected information on time uses for each household member of age 6 years and above, with a reference period of 24 hours that extended from 4:00 on the day before the date of the interview to 4:00 on the day of the interview. For every 30-minute slot within this reference period, individuals were asked to report the activity they engaged in. Individuals had to choose an activity from an exhaustive list of 165 three-digit activities provided by the International Classification of Activities for Time Use Statistics 2016 (ICATUS-2016). These activities were grouped into 56 sets called Divisions, which were further grouped into 9 major divisions. In case more than one activity was performed during a 30-minute slot, individuals were asked to report one of the activities as the major activity and the rest as minor activities. If only

[2]For the construction of district-level heatmaps of time use statistics and empirical analysis involving district-level information from Census of India 2011, we map the TUS-2019 districts back to the 640 districts that existed during the Census of India in 2011.

the time used on major activities is considered, then for every individual the time spent on major activities adds up to 24 hours (1440 minutes). Since the data does not mention the relative importance of major and minor activities, unless otherwise mentioned, the analysis in this paper is based only on time spent on major activities. In addition to the time use details, the survey collects information on household demographics (age, sex, marital status), education status, and employment status of every household member and information on household-level variables like caste, religion, land owned, and consumption expenditure of every sampled household.

Using the data mentioned above and using the measures of distance between vectors in a $n$ dimensional Euclidean space, we construct a gender distance index that measures how different the distribution of time over activities is between men and women. A higher value for this index indicates that the daily lives of men and women are starkly different.[3]

Suppose all activities that are potentially performed by an individual are classified into $n$ activities. Let $x_{ij} = (x_{ij}^1, x_{ij}^2, \ldots, x_{ij}^n)$ be a vector that denotes the time spent by the $i^{th}$ individual of the $j^{th}$ household on the $n$ activities. Let $k_j$ denote the number of household members in household $j$ above the age of 6 years, $k_{mj}$ are male individuals. Without loss of generality let us assume that the first $k_{mj}$ members are male and the rest of the household members are female. Let $k_{fj} = k_j - k_{mj}$. Let $\overline{x_{mj}}$ ($\overline{x_{fj}}$) be a n-vector, the $l^{th}$ element of which measures the average time spent by the male (female) members of the household $j$ in activity $l$. Let $D_{ijg}$ be a dummy variable that takes the value 1 if the $i^{th}$ individual of $j^{th}$ household belongs to gender $g$, zero otherwise.

$$\overline{x_{gj}} = \frac{1}{k_{gj}} \sum_{i=1}^{k_j} D_{ijg} x_{ij} \ , \ g = m, f$$

Thus for every household $j$, we have two n-vectors $\overline{x_{mj}}$ and $\overline{x_{fj}}$, each denoting the average time used for the respective gender. The difference between these two vectors is a measure of how gendered life within the household is. We use the simplest and most intuitive vector

[3]This index can be constructed for only those households that have both male and female members greater than or equal to 6 years of age. Households that do not satisfy this criterion are excluded from the analysis.

distance measure: Euclidean distance measure ($E(\overline{x_{mj}}, \overline{x_{fj}})$).[4] Importantly, the gender distance measures are defined in such a way that it does not assign greater importance to differences in one kind of activity over the other.

As mentioned earlier, TUS-2019 collects demographic information of the sampled households, including information on the official caste category and religion. Households are classified into four mutually exclusive and collectively exhaustive official caste categories: Scheduled Tribes (ST), Scheduled castes (SC), Other Backward Classes (OBC) and *Others* (UC). The group titled *Others* consists of households that do not belong to any of the marginalized caste groups and hence will be referred to as *Upper Castes* (UC) in this paper.[5] Similarly, information is collected on the religious identity of the household. To understand the interaction between caste and religion, we combine these two variables to define a categorical variable called composite social group that classifies the population into seven groups: Scheduled Tribes (ST), Scheduled Castes (SC), Other Backward Classes & Hindu (OBC(H)), Upper Caste & Hindu (UC(H)), Other Backward Classes & Muslim (OBC(M)), Upper Caste & Muslim (UC(M)) and Others (OTH). The construction of these seven categories on the basis of caste and religion is explained in Table 2.

## 3.2 Empirical Strategy

### *3.2.1 Correlations, Transition Matrices and Factor Decomposition*

We show that the measures of gender distance, while highly correlated with each other, are not highly correlated with female employment or the male-female gender gap in em-

[4]We also construct Manhattan distance measure ($M(\overline{x_{mj}}, \overline{x_{fj}})$) and Chebyshev distance measure ($C(\overline{x_{mj}}, \overline{x_{fj}})$). Details about the construction of these measures can be found in the appendix titled Additional Appendix: Technical Notes. Each of the three measures can be constructed in two alternative ways either by using time use over 56 divisions or over 9 major divisions. The main text of the paper reports results using the Euclidean distance index created using time use over 56 divisions. The results of the empirical exercise involving other indices are not reported in the main text of the paper and are reported in the appendix titled Online Appendix: Additional Tables and Figures (Table 20 and Table 23 to Table 32).

[5]For details about the official caste classification of the Indian population, refer to Weisskoph (2004) (Pages 10-15).

ployment. Using transition matrices (bivariate distribution tables), we show that the ranking of households or districts or states based on gender index and female employment are not similar. Borrowing from the literature on factor decomposition of income inequality measures (Shorrocks, 1982; Lerman and Yitzhaki, 1985), we estimate the contribution of different time use components in the household variation in gender distance. This allows us to quantify the contribution of the gender gap in employment in the composite gender gap.

### *3.2.2 OLS Estimation:*

In order to identify the heterogeneity across region, caste and religion, we use three complementary empirical strategies. Firstly, we estimate the following model:

$$D_{ids} = G_s\delta + R_{ids}\gamma + C_{id}\beta + \theta_s + \pi_{ds} + X_{ids}\phi + \varepsilon_{ids} \tag{1}$$

where $D_{ids}$ is the Euclidean gender distance (or Manhattan distance or Chebychev distance) of the $i^{th}$ household in the $d^{th}$ district of state $s$. $G_s$ denotes a set of indicator variables for the four geographic regions into which the country is divided. Northern India is the omitted category. [6] $R_{ids}$ and $C_{id}$ are indicator variables for religion and caste. $\theta_s$ and $\pi_{ds}$ are state fixed effects and district fixed effects. $X_{ids}$ are a host of household-level controls. In order to identify the interaction between caste and religion, we estimate an alternate specification where the population is divided into the seven (composite) groups discussed earlier:

$$D_{ids} = G_s\delta + CG_{ids}\beta + \theta_s + \pi_{ds} + X_{ids}\phi + \varepsilon_{ids} \tag{2}$$

This specification allows us to understand the caste effects within a particular religion (the distinction between UC(M) and OBC(M)) and the religion effects between a particular caste (the distinction between OBC(H) and OBC(M)).

In both the regression specifications mentioned above, the caste and religion effect (or the social group effect) enters the model as an additive term. In other words, the specification forces the marginal returns to household covariates to be the same across all composite social groups and thus we do not allow the social-group effect to be manifested through differential marginal returns to covariates.

[6] Construction of the geographical regions is explained in Table 1.

### *3.2.3 Oaxaca Blinder (OB) Decomposition (Oaxaca, 1973; Blinder, 1973)*

In order to allow for a 'social group effect' that operates through marginal returns for covariates, we estimate the population model separately for each population sub-group and conduct an Oaxaca Blinder decomposition of the observed gaps in gender distance between sub-groups. The equation estimated for the composite group $c$ is as follows:

$$D_{ids(c)} = X_{ids}\beta_c + \varepsilon_{ids(c)} \tag{3}$$

where $X_{ids}$ includes household controls and district (state) fixed effects.
Assuming $E(\varepsilon_{ids(c)}|X_{ids}) = 0$, OB decomposition allows us to split the observed mean difference in gender distance between a marginalized group (say, ST) and UC(H) into two components: a covariate effect (part of the observed difference that is explained by the differences in covariates between the two groups) and the pure social group effects (part of the observed differences that is unexplained by the differences in covariates).

Let $D_{ST}$ and $D_{UC(H)}$ be indicator variables for $ST$ and $UC(H)$ respectively

$$\begin{aligned}
\triangle_O &= E(Y_{ST}|D_{ST}=1) - E(Y_{UC(H)}|D_{UC(H)}=1) \\
&= \underbrace{E(X_{ids}|D_{ST}=1)\,(\beta_{ST} - \beta_{UC(H)})}_{\textit{(Unexplained) Caste Effect}} + \\
&\qquad \underbrace{\left[E(X_{ids}|D_{ST}=1)\,E(X_{ids}|D_{UC(H)}=1)\right]\beta_{UC(H)}}_{\textit{Covariate Effect}}
\end{aligned}$$

Substituting equation 3 and replacing the population moments with sample moments, we get the estimated decomposition:

$$\widehat{\triangle_O} = \underbrace{\bar{X_{ST}}(\widehat{\beta_{ST}} - \widehat{\beta_{UC(H)}})}_{\textit{(Unexplained) Social Group Effect}} + \underbrace{(\bar{X_{ST}} - \bar{X_{UC(H)}})\widehat{\beta_{UC(H)}}}_{\textit{Covariate Effect}}$$

Similarly, we can decompose the observed SC-UC(H), OBC(H)-UC(H), OBC(M)-UC(H), and UC(M)-UC(H) gap into a social group effect and a covariate effect. The social group effect is our estimate of interest, as it indicates that part of the gap is not affected by the economic and demographic differences across groups, and can thus be considered to be a reflection of group-specific social gender norms and attitudes.

### *3.2.4 DiNardo-Fortin-Lemieux (DFL) Decomposition (DiNardo et al., 1996)*

While the Blinder Oaxaca decomposition is based on a parametric model, the DFL re-weighting decomposition proposed by DiNardo et al. (1996) is a non-parametric decomposition methodology. The non-parametric nature of the technique imposes restrictions on the number of variables we can control for a given sample size. Since there are differences between what can be considered reasonable controls for rural and urban sectors, we try to perform the decomposition separately for rural and urban sectors. However, the small size of the urban sample does not allow us to control for even the obvious explanatory variables. Thus the DFL decomposition exercise is restricted to the rural sample.

We control for four categorical variables: land owned (3 categories), a dummy variable for a large household, a female education level (3 categories), and geographic region (4 categories). Thus the entire population can be divided into $3 \times 2 \times 3 \times 4 = 72$ bins, where each bin is defined by the value of the vector $x$ in the four-dimensional space. Let $S$ denote the set of all 72 vectors. Let $f(x|g = G)$ denote the multivariate probability function of the vector $x$ for households in social group $G$. Suppose we want to decompose the gap in mean gender distance for ST and UC(H) households. We define a function $\Phi : S \longrightarrow \mathbb{R}$ as follows:

$$\Omega_{ST}(x) = \frac{f(x|g = UC(H))}{f(x|g = ST)}$$

Now by multiplying the sampling weight of every ST household in the sample by $\Omega(x)$ corresponding to the $x$ of that household, we artificially create a counterfactual ST population whose distribution of $x$ matches the actual distribution of $x$ for UC(H) population. The mean gender distance of this counterfactual ST population is:

$$\bar{D}^{C}_{ST} = \frac{\sum_{i \in ST} \Omega(x_i) w_i D_i}{\sum_{i \in ST} \Omega(x_i) w_i}$$

where $ST$ denotes the set of ST households in sample, $x_i$ is the covariate vector of the $i^{th}$ household. $D_i$ is the gender distance of household $i$ and $w_i$ is its sampling weight.

Since $\bar{D}^C_{ST}$ is the estimated mean distance for a counterfactual ST population whose covariate distribution matches the covariate distribution of UC(H) households, $(\bar{D}_{ST} - \bar{D}^C_{ST})$ is the unexplained part of the gap that can be attributed to the specificities of the social norms of STs. $(\bar{D}^C_{ST} - \bar{D}_{UC(H)})$ is the explained part of the overall gap or the covariate effect.

$$\underbrace{(\bar{D}_{ST} - \bar{D}_{UC(H)})}_{Overall\ Gap} = \underbrace{(\bar{D}^C_{ST} - \bar{D}_{UC(H)})}_{Unexplained\ Part} + \underbrace{(\bar{D}_{ST} - \bar{D}^C_{ST})}_{Covariate\ Effect}$$

Using a similar methodology, the overall gap between SC, OBC(H), OBC(M), UC(M) and UC(H) households can be decomposed into an explained part and an unexplained part.

# 4 Results

## 4.1 Relation between Gender Distance and Female Employment

Table 3 reports the summary statistics for major variables used in this paper.[7] Among the three gender distance metrics used, Chebyshev distance and Manhattan distance have the highest and lowest relative variance (coefficient of variation) respectively. The mean employment time spent by the average woman in the household is around an hour. Since around three-fourths of all adult women do not participate in labour force, the mean is much higher compared to the median employment time. The average gender gap in employment is close to four hours, indicating that in most households men spend more time in employment than women. The caste, religion and regional composition of the data is close to the demographic composition suggested by the Census of India 2011[8].

[7] Table 17 in the appendix titled *Online Appendix: Additional Tables and Figures* reports the summary statistics used as additional controls in the regression and decomposition analysis.

[8] The Census of India does not collect data on OBC membership and hence we cannot say if the OBC proportions are nationally representative.

Since papers on the economics of gender often attribute variation in female labour force participation or employment to variation in gender attitudes or norms, we check if the gender distance in time use is closely related to female employment. If the relation between these two variables is close, then the absence of female employment in households can be treated as a proxy for the intensity of gendered lives in households. Table 4 reports the ICATUS divisions for which households have the largest gender gaps. We see that for approximately 50% households ($9.02 + 20.88 + 15.01 + 2.90 \approx 50$), the largest gender gap is in a division that is related to employment. For approximately 30% households the largest gap is in the ICATUS-2016 division related to food preparation in the household. Figure 1 shows the proportion of households for which one of the nine major divisions of ICATUS-2016 is the major division with the largest gender gap in time use. We see that for an equal proportion of households (approximately 40%), employment and unpaid domestic services are the major divisions with the largest gender gaps in time use. This suggests that divisions and major divisions not related to employment play a significant role in determining the gender distance in a household.

In Table 5, using the methodology suggested by Shorrocks (1982), we calculate the contribution of each of the major divisions in explaining the relative dispersion/inequality (measured using the square of the coefficient of variation) of the gender distance variable. To use this factor decomposition method, the variables being decomposed need to be the sum of the constituent components. Thus the two distance measures we use are: the square of the Euclidean distance and the Manhattan distance. 65% of the variation in the first variable is explained by employment. However, the contribution drops to 41% when the second distance measure is used. Besides the contribution of employment is much higher for the urban sector as compared to the rural sector in both cases. Gender gaps in unpaid domestic work and self-care contribute substantially, especially in the rural sector.

In Table 6 we conduct a similar factor decomposition using the methodology suggested by Lerman and Yitzhaki (1985). Lerman and Yitzhaki (1985)'s methodology calculates the contribution of major divisions in the Gini coefficient of the two distance variables. The results from the two factor decomposition methodologies are qualitatively similar.

In Table 7 we find that the correlation between any of the gender distance metrics and female employment is negative (as expected), but the magnitude never exceeds 0.30.

Similarly, the correlation between the proportion of women employed (according to the usual principal status) and the gender distance measures never exceeds 0.30. Even when one considers the absolute gender gap in employment, its correlation with the different measures of gender distance varies from 0.57 to 0.72.

These results in Table 7 seem to suggest that though closely related, the ranking of households on the basis of gender distance is different from the ranking of households on the basis of the gender gap in female employment.

In Table 8 we find that only 37% of households belong to the diagonal cells of the bivariate distribution matrix, indicating a substantial mismatch in the rankings of households on the basis of the composite gender distance and the gender gap in employment. We also note that $\frac{10.74}{10.74+9.81} \times 100 =\approx 52$ percent of households in the lowest gender distance quintile are households where no female member spends any time on employment-related activities. In Table 9, we check if the ranking of districts on the basis of gender distance is similar to ranking based on the district average of household average of female time spent on employment. Only 39% of districts belong to the reverse diagonal (bottom to top diagonal) indicating that factors other than female employment play an important role in the construction of the gender distance metric.

In Table 10, we rank the 36 states and union territories of India on the basis of two variables. In the first column rank value increases as state average of gender distance increases and in the second column rank value increases as state average of household average of time spent on female employment falls. We see that while the three North Eastern states of Nagaland, Manipur and Meghalaya have the lowest gender distance, these states have ranks beyond 10 in the second column. Similarly, states like Telangana, Maharashtra and Tamil Nadu have highest levels of female employment rank beyond single digits ranks in gender distance ranking. States like Punjab and Bihar do not perform well in either of the two rankings. In light of the above evidence, one can confidently say that female employment is not a very good proxy for the intensity of gendered lives of households and hence gendered distance should be measured and studied in its own right.

## 4.2 Descriptive Results: Region, Religion and Caste

The district map of India in Figure 2 and 3 shows the regional distribution of gender distance and female employment. In panel (b) of Figure 2 (and Figure 3), it is apparent that districts in the highest quartile of distance gaps are concentrated in the states of West Bengal, Assam, Orissa, Bihar and some regions of Andhra Pradesh and Maharashtra. This map also shows that while it is true that some regions and states have higher gender distance on average, there exists a fair degree of variation within states. For example, in the state of Andhra Pradesh and Maharashtra, the coastal districts have much higher levels of gender distance than the inland districts. The map on the left panel of 2 and 3 shows the district's average female employment in two alternative ways. In both maps, the Gangetic plains appear to be the districts with the lowest levels of female employment. The North-South divide is much more starker in this map than it is in the map showing the geographical distribution of gender distance. The region-wise or state-wise summary of these district maps can be seen in Figure 4. The Northern region has the lowest average female employment while the Eastern & North-Eastern region has the highest gender distance. Among the states, West Bengal and Orissa have the highest gender distance while Bihar and Uttar Pradesh have the lowest female employment.

Figure 5 reports the average female employment and gender distance for caste, religion and composite social groups (defined using caste and religion (Table 2)). In panel (a), we find that Muslims have the lowest female employment rates and highest gender distance, followed by Sikhs and Hindus. Unlike in the case of regions, states or districts, the ranking of religions on the basis of gender distance and female employment is the same. In panel (b) we find that GEN households have the highest gender distance (and the lowest female employment) and ST households have the lowest gender distance (and the lowest female employment). SC households have higher gender distance than OBC households but have higher female employment than OBC households. In panel (c) we can see caste-based variation within Muslim households and religion-based variation within OBC households. OBC(M) households have significantly lower gender distance than UC(M) households, while the differences in average female employment are statistically insignificant. On the other hand, within OBC households, Muslims have lower female employment than Hindus, though their average gender distances are similar.

## 4.3 Regression Results

Table 11 documents the differences in gender distance and female employment across caste, religion and region using data from both rural and urban sectors. Columns (1) and (2) report results from a parsimonious model that includes region, religion, official caste categories and an urban sector indicator as the only explanatory variables. The outcome variable in the two columns is gender distance and a household average of female employment. Comparing the coefficients of the variables indicating religion in column (1), we can state that Muslims have significantly higher gender distance (0.1 times the standard deviation) compared to the omitted category of Hindus. Christian households and households from other religions have a significantly lower gender distance (0.10 and 0.18 times standard deviation respectively). Even though the specification in the first two columns does not include other socio-economic controls or fixed effects, the ranking of religion is not at odds with the descriptive results in Figure 4 and 5. In column (2) Muslim households have significantly lower female employment, but all other religions are not statistically different from each other at a 5% level of significance. This again shows that the impact of religion on gender distance and female employment is not similar.

Compared to UC households, ST households have significantly lower gender distance (0.10 times the standard deviation) but SC households have significantly higher (0.03 times the standard deviation). While the former is expected as ST households are generally believed to have more egalitarian gender norms, the later result comes as a surprise because it seems to be at odds with much of the sociological literature on caste status and intra-household gender relations. The difference between OBC and UC households is not economically or statistically significant. In column (2), as is expected, STs have much higher female employment levels than UC households. However, SC households, which have higher gender distance compared to UC households, have higher levels of female employment than UC households. This suggests once again that focusing on female employment to infer about gendered lives in households can be misleading.

In terms of geographical regions, Eastern & North-Eastern India have significantly

higher gender distance than Northern India (0.17 times the standard deviation). This is surprising since this region (especially North Eastern India) is generally considered to have the most egalitarian gender norms. In Table 10 we found that while many states from these regions are highly ranked in terms of low gender distance, many states like Mizoram, Assam and West Bengal have high state average gender distance. The regression results suggest that the poor performers of this region (like Assam and West Bengal) overshadow the performance of high-ranked states like Meghalaya, Nagaland and Manipur. Both Western & Central regions and Southern & Island regions have significantly lower gender distances than the Northern region. While the literature often focuses on a North-South divide in gender outcomes, a finer geographical division reveals a more complicated story where Western & Central India have the lowest gender distance and Eastern & North-Eastern India have the highest distance. Southern and Islands region of India has the highest female employment rates while North India has the least employment. The eastern region which has the highest gender distance on average, perform better than Northern India in terms of female employment.

In columns (3) and (4) of Table 11 we introduce state-fixed effects to control for the additive geographical effects at a level lower than geographic region. Most of the caste effects and religious effects remain qualitatively unchanged. However, once we control for state-fixed effects, the gender distance of Christian households is no longer different from the omitted category and the female labour force participation in Sikh households becomes substantially lower than the omitted category of Hindu households. The female employment of OBC households is now substantially lower than that of UC households.

In Figure 2 we have seen that there exists substantial variation in gender distance and female employment across districts within a state. In order to account for this, we introduce district-fixed effects in the next two columns of Table 11. In columns (5) and (6), even after controlling for district-fixed effects, the caste and religion effects remain largely unchanged. The addition of demographic, educational and economic controls in columns (7) and (8) do not change the estimated caste and religion effects qualitatively.

In Table 12 and Table 13 we estimate the same specifications (as in columns of Table 11) separately for rural and urban sectors respectively. The results for the rural sector ( Table 12 ) are qualitatively similar to the all-India results: Muslims have lower female employment and higher gender distance, STs have higher female employment and lower gender distance and SCs have higher female employment and higher gender distance (compared to the omitted category). The ranking of geographic regions in terms of gender distance and female employment also remains unchanged.

The results for the urban sector are markedly different from the results above. Muslims continue to have higher gender distance and lower employment than the omitted category in all specifications. In most specifications, Christian households have significantly lower gender distance. In most specifications, the caste effects on gender distance are statistically insignificant. However in the most detailed specification in column (7), the SC effect on gender distance is negative and significant. In this context, one should remember that the same effect was positive for the rural sector. In the urban sector, all three caste groups (ST, SC and OBC) have significantly higher employment rates than UC(H). In column (1) we also find that the regional effect is insignificant for the Southern region and Western region. However, the average gender distance is significantly higher for Eastern and North Eastern India.

In the regression specifications considered till now, we do not allow for interaction between religion indicators and caste indicators. In other words, we do not allow the caste effect to differ across religions or the religion effect to differ across castes. In order to account for this, we use the categorical variable called *composite social group* which classifies households into seven groups (defined earlier in section 3.1. *Composite social group* is included as a control in regression specifications of Table 14. Results of Table 14 reflect the importance of allowing for interaction between caste and religion. In Table 11 we found the OBC effect to be insignificant in the later specifications. In addition, the functional form forced this effect to be equal for all religions. In Table 14 we find that the OBC(H) effect on gender distance is negative and insignificant, while the OBC(M) effect on gender distance is positive and significant. Thus the gender distance of OBC(M) is statistically higher than UC(H), but OBC(H) are no different from UC(H). In Table 11

we found the Muslim effect to be positive and significant in all specifications, and the functional form forced this effect to be equal for OBC(M) and UC(M). In Table 14 we find that while OBC(M) effect and UC(M) effect on gender distance are both positive and statistically significant, the latter is much higher than the former.

Though we control for a rural/urban indicator in all specifications of Table 14, we only allow the regression function for the two sectors to be different up to an additive term. In Table 15 and 16, we estimate the regression function separately for the two sectors thus allowing the composite group effect (and effect of other controls) to be different for the two sectors. The ST effect on gender distance is negative and statistically significant in the rural sector, but insignificant in the urban sector. The SC effect is insignificant at conventional levels of significance for both sectors, especially so for the urban sector. As in Table 14, we find that there exists a difference between OBC(M) and OBC(H) in the rural sector. There is no significant OBC(H) effect, but there is a significant positive gap in the average gender distance of OBC(M) and the omitted category of UC(H). Similar differences exist in the rural sector for most specifications (with the exception of column (5)). The OBC(M) and UC(M) effect is statistically significant in the urban sector, while only the latter remains significant in the rural sector. In the specifications where regional fixed effects are included, UC(M) effect is higher than OBC(M) effect for both sectors. It is interesting to note that while the Hindu-Muslim gap in gender distance is large, statistically significant and persistent across specifications, the gap between OBC(M) and UC(H) is insignificant. This suggests an interesting interplay of caste, religion and region, that a singular focus on any one of these dimensions is most likely to ignore.

## 4.4 Decomposition Results

### *4.4.1 Oaxaca Blinder Decomposition*

In the specifications used in Table 14 to Table 16, we allow for the 'social group effect' to operate to the extent that it influences the intercept of the estimated model for various groups. However, the social group effect in reality can affect outcomes by influencing the marginal returns to the various covariates (parameters other than the intercept) that

determine the gender distance. Using a Oaxaca Blinder decomposition, we divide that gender distance gap between a marginalized group (ST or SC or OBC(H) or OBC(M) or UC(M)) and UC(H) into two parts: an explained part (the amount of gap that can be explained by differences in the distribution of covariates/characteristics across the two groups under comparison) and an unexplained part (the amount of gap that cannot be explained by differences in the distribution of covariates across the two groups under comparison and is due to the differences between groups in terms of returns to covariates). The unexplained part can be considered the 'social group effect'. For example, this exercise allows us to estimate what proportion of $ST - UC(H)$ gender distance gap is due to the fact that STs are poorer, less educated and located in remote geographical locations as compared to UC(H) households versus what proportion of it is due to the fact that poverty, education and geographic inaccessibility affect these two groups differentially.

Figure 6 reports the results of the Oaxaca Blinder decomposition exercise. The ST-UC(H) gap is completely explained by the differences in the covariate distribution of the two groups. Though there is no statistically significant gap between the SCs and UC(H)s, if UC-Hindus had the covariate distribution of SCs, then the average gender distance of UC(H) will be lower than that of SCs. This result seems to question the view that SCs have more gender-egalitarian time allocation. It seems to suggest that the reverse is true. The result is even stronger for OBC(H) where the observed OBC(H)-UC(H) gap is positive, while the unexplained gap that measures the 'caste effect' is positive. No significant part of the $OBC(M) - UC(H)$ and $UC(M) - UC(H)$ gap can be explained by the differences in the covariate distribution.

For the rural sector (Table 7, Panel (a)), the ST-UC(H) gap in gender distance is significantly negative, but this gap can be completely explained by differential covariate distribution. In fact, if UC(H) households had covariates similar to ST households, the ST-UC(H) gap will be positive and significant. Qualitatively similar results can be observed for OBC(H). If UC(H) had covariates similar to OBC(H)s, the OBC(H)-UC(H) gap will be positive and significant, though the observed difference is negative and significant. In the case of SCs, OBC-Muslims and UC-Muslims, the overall gap is statistically not different from the unexplained gap, indicating that the differential distribution of covariates

has no role to play in explaining the relevant caste gaps.

In the urban sector (Table 7, Panel (b)), the ST-UC(H), SC-UC(H), OBC(H)-UC(H) and OBC(M)-UC(H) gaps are not statistically significant. However, if UC(H) households had covariates similar to ST (or SC or OBC(H)) households, the gender distance gap will be negative and significant. This suggests while overall caste gaps are insignificant in the urban sector, the 'social group effect' (differences in social group-specific parameters) is more pronounced in the urban sector compared to the rural sector. For UC(M), the unexplained gap is statistically insignificant indicating that the $UC(M) - UC(H)$ gap can be explained entirely by differences in covariates.

### *4.4.2 DiNardo-Fortin-Lemieux (DFL) Decomposition (Rural Sector)*

OB decomposition is based on the regression approach that matches the means (of covariates) of two groups to construct a counterfactual and hence estimate the 'social group effect'. DFL decomposition is an improvement over OB decomposition as it matches the entire joint distribution of covariates for the two groups being compared. Hence it allows for any kind of interaction between the included covariates. However the 'curse of dimensionality' implies that this decomposition method can only be used for large datasets when a small number of variables are used as covariates. Hence we restrict this decomposition methodology to the rural sector and include only four categorical variables that divide the population into 72 bins.[9]

Figure 9 reports the results of DFL decomposition of the gender distance gap for the rural sector. Comparison of these results with the results of the panel (a) in Figure 7 shows that for the SC and OBC(M) households, the results of OB decomposition and DFL decomposition are similar. In both cases, overall gap remains entirely unexplained by the distribution of covariates. Unlike in the case of OB decomposition, only a fraction of the $ST - UC(H)$ gap is explained by the differences in covariates. Approximately 57% of the overall ST-UC(H) gap remains unexplained. This might be a reflection of the fact that we could not control for a large number of covariates in DFL decomposition. In the

[9]Details of the decomposition methodology have been discussed earlier in Section 3.2.4.

case of OBC(H), the overall gap is statistically indistinguishable from the unexplained gap. Unlike in the case of OB decomposition, the unexplained gap is not positive. In the case of UC(M) households, approximately 53% of the overall gap remains unexplained which is different from what was observed for OB decomposition. However as was seen in Figure 7, the social group effect remains significant for all marginalized groups except STs. For the STs, the results change qualitatively as we now observe a 'social group effect' that was not the case in OB decomposition.

## 5 Conclusion

This paper documents the gendered allocation of time with households and the heterogeneities in such gendered allocations across the divisions of geographical region, religion and caste. In doing so it contributes to the literature that studies the influence of social institutions and identity markers on gender relations.

We propose a simple measure of gendered household lives that accommodates all time-use activities and by assigning equal weights to gender gaps in every activity which refrains from creating a hierarchy of activities. We show that this measure of gendered lives is weakly associated with the more popular indicators of inequities in gender relations, like the magnitude of female employment or the gender gap in employment and household work. We show that the economic units that perform 'well' in terms of our metric do not necessarily perform well in terms of the traditional proxies of gender inequities in households and vice versa.

Using our gender distance metric we test for the validity of various hypotheses relating to the relationship between intra-household gender inequities and identity indicators like caste, religion and regional affiliation. We undertake a decomposition exercise to identify the group effect as distinct from group differences due to differences in covariates. Contrary to what can be expected from the literature on the impact of caste on gender relations, we find that controlling for other covariates, SC households do not have a lower gender distance than UC(H) on average. ST and OBC(H) have lower gender distances than UC(H), while OBC(M) and UC(M) have higher gender distances. The regression

and the decomposition exercises suggest that the 'social group effect' are substantially different between the rural and urban sector. They also provide evidence against some of the hypothesis that exists in the sociological and economic literature on community-specific gender relations.

This paper provides important directions for further research. Caste in everyday South Asian lives often operates at the level of locally defined categories called *jatis*. Conditional on geographical location, *jatis* can be mapped to officially defined caste and religious categories. Using data from the state of Bihar in India, Joshi et al. (2022) show that there exists heterogeneities within official caste categories across *jatis*. If and when nationally representative time use data with jati-level information is available, one should explore if differences in gender distance across official caste categories extend to differences across jatis within the same caste category. Since *jatis* are traditional occupation categories, the within official category across jati differences (if any) might be a reflection of the differences in gender complementarities in occupational groups, as suggested by Bidner and Eswaran (2015). In addition, it might be of policy relevance to study the role played by the gendered composition of household time use in determining welfare outcomes (like child health and maternal health) and in the construction of gender attitudes of children in such households.

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Table 1: Classification of States into Geographic Regions

| Region | States and Union Territories |
|---|---|
| Northern | Jammu and Kashmir, Punjab, Haryana, Himachal Pradesh, Chandigarh, Delhi, Uttarakhand, Uttar Pradesh, Bihar, Jharkhand |
| Western and Central | Rajasthan, Chattisgarh, Madhya Pradesh, Gujarat, Maharashtra, Daman and Diu, Dadra and Nagar Haveli, Goa |
| Eastern and North Eastern | Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, Assam, West Bengal, Orissa |
| Southern and Islands | Andhra Pradesh, Telangana, Karnataka, Kerala, Lakswadweep, Tamil Nadu, Andaman and Nicobar Islands |

Table 2: Construction of Composite Social Groups

| | | Religion | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hindu | Muslim | Christian | Sikh | Buddhist | Others |
| Caste | ST | ST | ST | ST | ST | ST | ST |
| | SC | SC | | | SC | SC | |
| | OBC | OBC (H) | OBC (M) | Others | Others | Others | Others |
| | Other Castes | UC (H) | UC (M) | Others | Others | Others | Others |

Notes: According to the Constitution of India, households from only three religions: Hinduism, Sikhism and Buddhism, can belong to the category of Scheduled Castes.

Table 3: Summary Statistics of Major Variables

| | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| **Gender Distance** | | | | | |
| Euclidian Distance (56) | 120788 | 444.26 | 145.440 | 0 | 1498 |
| Manhattan Distance (56) | 120788 | 1107.00 | 320.721 | 0 | 2640 |
| Chebyshev Distance (56) | 120788 | 318.68 | 133.679 | 0 | 1260 |
| Euclidian Distance (9) | 120788 | 505.56 | 177.687 | 0 | 1559 |
| Manhattan Distance (9) | 120788 | 950.52 | 322.143 | 0 | 2640 |
| Chebyshev Distance (9) | 120788 | 384.92 | 152.051 | 0 | 1320 |
| **Employment** | | | | | |
| Female Employment (in mins) | 120788 | 64.10 | 134.941 | 0 | 1290 |
| Proportion Women (16-65) Employed (UPS) | 118169 | 0.23 | 0.390 | 0 | 1 |
| Gender Gap (Male-Female) in Employment | 120788 | 235.93 | 246.548 | -870 | 1320 |
| Absolute Gender Gap in Employment | 120788 | 267.84 | 211.441 | 0 | 1320 |
| **Caste** | | | | | |
| Scheduled Tribe (ST) | 120788 | 0.10 | 0.299 | 0 | 1 |
| Scheduled Caste (SC) | 120788 | 0.20 | 0.397 | 0 | 1 |
| Other Backward Class (OBC) | 120788 | 0.42 | 0.494 | 0 | 1 |
| General Caste (GEN) | 120788 | 0.28 | 0.450 | 0 | 1 |
| **Religion** | | | | | |
| Hindu | 120788 | 0.82 | 0.385 | 0 | 1 |
| Muslim | 120788 | 0.13 | 0.331 | 0 | 1 |
| Christianity | 120788 | 0.03 | 0.164 | 0 | 1 |
| Sikh | 120788 | 0.02 | 0.127 | 0 | 1 |
| Other Religions | 120788 | 0.01 | 0.109 | 0 | 1 |
| **Geographic Region** | | | | | |
| Northern Region | 120788 | 0.33 | 0.471 | 0 | 1 |
| Western & Central Region | 120788 | 0.27 | 0.446 | 0 | 1 |
| Eastern & North-Eastern Region | 120788 | 0.17 | 0.377 | 0 | 1 |
| Southern & Islands Region | 120788 | 0.22 | 0.416 | 0 | 1 |
| **Rural or Urban** | | | | | |
| Urban Sector | 120788 | 0.29 | 0.457 | 0 | 1 |

Notes: This table is based on *mixed gender households*: households of the TUS-2019 data that have members in the age group above 6 years for both genders. The variable *Proportion of Women (16-65) employed* is based on mixed gender households which have female members in the age group 16-65 years. This variable is calculated using the usual principal status (UPS) of individuals. For details about UPS, refer to NSS Report No.554 (68/10/1). Summary statistics of additional variables used as controls in various regressions estimated in this paper are reported in Table 17 of appendix titled *Additional Tables*.

Table 4: Distribution of divisions with largest gender gap across households

| Code | Division Name | Percentage |
|---|---|---|
| 11 | Employment in corporations, government and non-profit institutions | 9.02 |
| 12 | Employment in household enterprises to produce goods | 20.88 |
| 13 | Employment in household enterprises to provide services | 15.01 |
| 14 | Ancillary activities and breaks related to employment | 2.90 |
| 21 | Agriculture, forestry, fishing and mining for own final use | 3.59 |
| 31 | Food and meals management and preparation | 29.31 |
| 61 | Formal education | 4.30 |
| 71 | Socializing and communication | 2.73 |
| 84 | Mass media use | 1.92 |
| 91 | Sleep and related activities | 2.13 |
| | Other Divisions | 8.21 |

Notes: Some households have more than one division with the largest gender gap across divisions. In these cases both the divisions are included as two separate observations while calculating this distribution table. In other words, the number of observation used in this table is greater than number of mixed sex households in the data.

Table 5: Factor Decomposition of Square of Coefficient of Variation

| | [Euclidean Distance (56)]$^2$ | | | Manhattan Distance (56) | | |
|---|---|---|---|---|---|---|
| | Total | Rural | Urban | Total | Rural | Urban |
| Employment | 0.65 | 0.60 | 0.73 | 0.41 | 0.37 | 0.46 |
| Goods Production for own final use | 0.02 | 0.03 | 0.00 | 0.02 | 0.03 | 0.01 |
| Unpaid Domestic Services | 0.16 | 0.19 | 0.11 | 0.19 | 0.21 | 0.17 |
| Unpaid Caregiving | 0.03 | 0.03 | 0.03 | 0.06 | 0.06 | 0.06 |
| Unpaid Volunteer and Care Work | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Learning | 0.02 | 0.02 | 0.02 | 0.09 | 0.09 | 0.09 |
| Socializing | 0.02 | 0.02 | 0.02 | 0.04 | 0.04 | 0.03 |
| Culture and Leisure | 0.03 | 0.03 | 0.03 | 0.07 | 0.07 | 0.07 |
| Self Care | 0.07 | 0.07 | 0.06 | 0.12 | 0.12 | 0.12 |

NOTE: The cells in every column report the (aggregate) proportionate contribution of the divisions included in the nine major divisions in inequality of the variable (measured by the square of the coefficient of variation) defining the column. The factor decomposition is based on Shorrocks (1982).

Table 6: Factor Decomposition of Gini Coefficient

| | ]Euclidean Distance (56)]$^2$ | | | Manhattan Distance (56) | | |
|---|---|---|---|---|---|---|
| | Total | Rural | Urban | Total | Rural | Urban |
| Employment | 0.62 | 0.56 | 0.71 | 0.42 | 0.38 | 0.48 |
| Goods Production for own final use | 0.02 | 0.03 | 0.00 | 0.01 | 0.02 | 0.00 |
| Unpaid Domestic Services | 0.19 | 0.22 | 0.13 | 0.19 | 0.20 | 0.16 |
| Unpaid Caregiving | 0.03 | 0.03 | 0.03 | 0.06 | 0.06 | 0.06 |
| Unpaid Volunteer and Care Work | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Learning | 0.03 | 0.03 | 0.02 | 0.08 | 0.09 | 0.08 |
| Socializing | 0.01 | 0.02 | 0.01 | 0.03 | 0.03 | 0.03 |
| Culture and Leisure | 0.03 | 0.03 | 0.03 | 0.07 | 0.07 | 0.07 |
| Self Care | 0.05 | 0.06 | 0.05 | 0.11 | 0.11 | 0.12 |

Note: The cells in every column report the aggregate (proportionate) contribution of the divisions included in the nine major divisions in inequality of the variable (measured by the square of the coefficient of variation) defining the column. The factor decomposition is based on Lerman and Yitzhaki (1985).

Table 7: Correlation Matrix of gender related variables (All India: Rural+Urban)

| | Euclidian Distance (9) | Manhattan Distance (9) | Chebyshev Distance (9) | Euclidian Distance (56) | Manhattan Distance (56) | Chebyshev Distance (56) | Female Employment (in mins.) | Working Age (16-65) Women Employed (%) | Gender Gap (Male-Female) in Employment | Absolute Gender Gap in Employment |
|---|---|---|---|---|---|---|---|---|---|---|
| Euclidian Distance (9) | 1 | | | | | | | | | |
| Manhattan Distance (9) | 0.951 | 1 | | | | | | | | |
| Chebyshev Distance (9) | 0.961 | 0.866 | 1 | | | | | | | |
| Euclidian Distance (56) | 0.879 | 0.834 | 0.849 | 1 | | | | | | |
| Manhattan Distance (56) | 0.840 | 0.880 | 0.766 | 0.895 | 1 | | | | | |
| Chebyshev Distance (56) | 0.808 | 0.722 | 0.836 | 0.938 | 0.740 | 1 | | | | |
| Female Employment (in mins) | -0.284 | -0.267 | -0.283 | -0.175 | -0.193 | -0.166 | 1 | | | |
| Working Age (16-65) Women Employed (%) | -0.287 | -0.265 | -0.285 | -0.207 | -0.207 | -0.199 | 0.670 | 1 | | |
| Gender Gap (Male-Female) in Employment | 0.577 | 0.499 | 0.615 | 0.536 | 0.437 | 0.583 | -0.460 | -0.386 | 1 | |
| Absolute Gender Gap in Employment | 0.702 | 0.639 | 0.715 | 0.663 | 0.567 | 0.690 | -0.159 | -0.210 | 0.832 | 1 |

Note: All the correlation coefficients are significant at a 5% level of significance. Similar correlation coefficient matrix calculated separately for rural and urban sector is reported in appendix titled Additional Tables (Table 18 and Table 19).

Table 8: Bivariate Distribution of Household Quintiles

| Quintiles of Gender Distance | Quintitles of Gender Gap (Male-Female) in Emp. Time | | | | | Positive Female Employment Time | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 0 | 1 |
| 1 | 8.02 | 6.42 | 5.32 | 0.30 | 0.00 | 10.74 | 9.81 |
| 2 | 6.71 | 3.41 | 6.80 | 2.99 | 0.07 | 12.76 | 7.40 |
| 3 | 5.20 | 2.35 | 5.63 | 6.03 | 0.79 | 14.91 | 5.18 |
| 4 | 3.75 | 1.42 | 3.10 | 7.07 | 4.78 | 15.98 | 3.90 |
| 5 | 2.53 | 0.70 | 0.95 | 2.92 | 12.73 | 15.76 | 3.56 |

Notes: The number in each cell reports the percentage of total households that belong to the quintiles that define the column and row of that cell.

Table 9: Bivariate Distribution of District Level Quartiles

| Quartiles of Gender Distance | Quartiles of proportion of hhs with at least one employed women (16-65) | | | | Quartiles of hh female time (mins.) in employment | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| 1 | 2.07 | 2.96 | 6.51 | 13.46 | 2.07 | 2.96 | 6.51 | 13.46 |
| 2 | 6.51 | 6.07 | 6.80 | 5.62 | 6.51 | 6.07 | 6.80 | 5.62 |
| 3 | 5.77 | 8.28 | 6.66 | 4.29 | 5.77 | 8.28 | 6.66 | 4.29 |
| 4 | 10.65 | 7.69 | 5.03 | 1.63 | 10.65 | 7.69 | 5.03 | 1.63 |

Notes: The number in each cell reports the percentage of total districts that belong to the quintiles that define the column and row of that cell.

Table 10: Ranking of provinces on gender distance index and female employment (mins.)

| Rank | Gender Distance | Female Employment |
|---|---|---|
| 1 | Nagaland | Telangana |
| 2 | Manipur | Tamil Nadu |
| 3 | Meghalaya | Maharashtra |
| 4 | Arunachal Pradesh | Daman And Diu |
| 5 | Chattisgarh | Andhra Pradesh |
| 6 | Sikkim | Sikkim |
| 7 | Madhya Pradesh | Andaman And Nicobar Islands |
| 8 | Rajasthan | Chattisgarh |
| 9 | Haryana | Dadra And Nagar Haveli |
| 10 | Telangana | Goa |
| 11 | Maharashtra | Manipur |
| 12 | Karnataka | Karnataka |
| 13 | Jammu And Kashmir | Gujarat |
| 14 | Tamil Nadu | Pondicherry |
| 15 | Uttar Pradesh | Chandigarh |
| 16 | Gujarat | Mizoram |
| 17 | Goa | Madhya Pradesh |
| 18 | Kerala | Kerala |
| 19 | Andhra Pradesh | Meghalaya |
| 20 | Lakswadweep | Rajasthan |
| 21 | Mizoram | Tripura |
| 22 | Puducherry | West Bengal |
| 23 | Assam | Himachal Pradesh |
| 24 | Jharkhand | Delhi |
| 25 | Himachal Pradesh | Lakswadweep |
| 26 | Punjab | Arunachal Pradesh |
| 27 | Chandigarh | Nagaland |
| 28 | Uttarakhand | Punjab |
| 29 | Andaman And Nicobar Islands | Odisha |
| 30 | Bihar | Haryana |
| 31 | Odisha | Assam |
| 32 | Tripura | Jharkhand |
| 33 | Daman And Diu | Jammu And Kashmir |
| 34 | West Bengal | Uttarakhand |
| 35 | Delhi | Uttar Pradesh |
| 36 | Dadra And Nagar Haveli | Bihar |

Notes: In the left panel states are arranged in an descending order of gender distance, while in the right column they are arranged in an ascending order of female time spent in employment.

Table 11: Region, Caste and Religion: All India (Rural+Urban) Sample

| | (1) ED | (2) Fem. Emp. | (3) ED | (4) Fem. Emp. | (5) ED | (6) Fem. Emp. | (7) ED | (8) Fem. Emp. |
|---|---|---|---|---|---|---|---|---|
| Islam | 16.54*** | -23.33*** | 18.63*** | -22.26*** | 16.85*** | -21.27*** | 18.69*** | -22.39*** |
| | (5.75) | (-9.13) | (6.50) | (-9.78) | (6.96) | (-10.19) | (7.94) | (-11.53) |
| Christianity | -14.84*** | -4.25 | -1.02 | 0.66 | -3.82 | 1.48 | -4.52 | 2.65 |
| | (-2.75) | (-0.73) | (-0.24) | (0.10) | (-0.95) | (0.22) | (-1.24) | (0.43) |
| Sikhism | -2.42 | 6.79* | -6.94 | -14.25*** | -8.57 | -15.14*** | -3.52 | -14.40*** |
| | (-0.47) | (1.66) | (-1.27) | (-2.79) | (-1.51) | (-3.52) | (-0.71) | (-3.35) |
| Other Religion | -25.96*** | 12.01* | -17.81*** | 3.60 | -11.37** | 0.31 | -1.90 | 3.11 |
| | (-4.07) | (1.70) | (-3.30) | (0.58) | (-2.08) | (0.06) | (-0.37) | (0.54) |
| ST | -16.71*** | 24.56*** | -13.28*** | 28.75*** | -9.28*** | 28.45*** | -12.22*** | 20.15*** |
| | (-4.95) | (6.50) | (-4.02) | (8.01) | (-3.09) | (8.40) | (-4.33) | (6.20) |
| SC | 5.45** | 12.13*** | 4.74** | 14.51*** | 6.29*** | 14.72*** | 2.69 | 9.22*** |
| | (2.44) | (5.79) | (2.25) | (7.42) | (3.09) | (8.23) | (1.47) | (5.35) |
| OBC | -3.84* | 4.07* | -3.76* | 8.88*** | -0.27 | 6.65*** | -1.50 | 3.50** |
| | (-1.79) | (1.92) | (-1.88) | (4.44) | (-0.15) | (3.89) | (-0.94) | (2.18) |
| Western & Central region | -26.26*** | 59.85*** | | | | | | |
| | (-6.35) | (18.03) | | | | | | |
| Eastern & North Eastern region | 23.90*** | 19.06*** | | | | | | |
| | (5.42) | (5.66) | | | | | | |
| Southern & Islands region | -19.73*** | 83.76*** | | | | | | |
| | (-4.93) | (17.36) | | | | | | |
| Urban/Rural | YES | YES | YES | YES | YES | YES | YES | YES |
| State FE | - | - | YES | YES | - | - | - | - |
| District FE | - | - | NO | NO | YES | YES | YES | YES |
| Other Controls | NO | NO | NO | NO | NO | NO | YES | YES |
| Observations | 120788 | 120788 | 120788 | 120788 | 120788 | 120788 | 117798 | 117798 |

Notes: $ED$ and $Fem-Emp$ denotes Euclidian Distance (56 Divisions) and Average Household Female Employment (in mins.) respectively. Standard Errors are clustered at a district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include MPCE quintiles, LPG access and pucca house, household size, gender and age composition, male and female education level and their interaction, month and day fixed effects.

Table 12: Region, Caste and Religion: Rural Sample

| | (1) ED | (2) Fem. Emp. | (3) ED | (4) Fem. Emp. | (5) ED | (6) Fem. Emp. | (7) ED | (8) Fem. Emp. |
|---|---|---|---|---|---|---|---|---|
| Islam | 15.19*** | -17.50*** | 16.55*** | -16.35*** | 13.18*** | -16.21*** | 11.89*** | -18.58*** |
| | (3.93) | (-6.86) | (4.12) | (-7.53) | (3.95) | (-7.48) | (3.90) | (-8.19) |
| Christianity | -15.84** | -4.43 | 0.15 | 4.80 | 1.29 | 4.34 | -1.95 | 4.84 |
| | (-2.08) | (-0.53) | (0.02) | (0.50) | (0.22) | (0.42) | (-0.39) | (0.51) |
| Sikhism | -2.50 | 10.25** | -10.60 | -7.73 | -12.06 | -13.42** | -8.84 | -12.69** |
| | (-0.43) | (2.02) | (-1.32) | (-0.93) | (-1.49) | (-2.29) | (-1.21) | (-2.13) |
| Other Religion | -39.36*** | 21.50** | -23.73*** | 13.51 | -12.43 | 3.23 | -5.95 | 6.11 |
| | (-4.51) | (2.17) | (-3.21) | (1.48) | (-1.60) | (0.38) | (-0.78) | (0.71) |
| ST | -16.38*** | 26.77*** | -13.96*** | 29.21*** | -12.47*** | 29.57*** | -15.31*** | 21.49*** |
| | (-4.43) | (5.98) | (-3.78) | (7.13) | (-3.63) | (7.68) | (-4.74) | (5.70) |
| SC | 7.01*** | 13.48*** | 5.04** | 14.45*** | 5.17** | 14.75*** | -1.01 | 8.65*** |
| | (2.61) | (5.17) | (1.99) | (6.44) | (2.08) | (7.16) | (-0.44) | (4.13) |
| OBC | -5.03* | 7.03*** | -6.29** | 10.01*** | -3.78* | 7.27*** | -5.16*** | 3.66* |
| | (-1.91) | (2.74) | (-2.51) | (4.54) | (-1.70) | (3.82) | (-2.62) | (1.93) |
| Western & Central region | -37.98*** | 72.49*** | | | | | | |
| | (-9.76) | (16.85) | | | | | | |
| Eastern & North Eastern region | 24.36*** | 21.37*** | | | | | | |
| | (5.12) | (6.33) | | | | | | |
| Southern & Islands region | -23.47*** | 102.98*** | | | | | | |
| | (-5.03) | (15.96) | | | | | | |
| State FE | - | - | YES | YES | - | - | - | - |
| District FE | - | - | NO | NO | YES | YES | YES | YES |
| Other Controls | NO | NO | NO | NO | NO | NO | YES | YES |
| Observations | 74240.00 | 74240.00 | 74240.00 | 74240.00 | 74240.00 | 74240.00 | 72146.00 | 72146.00 |

Notes: $ED$ and $Fem - Emp$ denotes Euclidian Distance (56 Divisions) and Average Household Female Employment (in mins.) respectively. Standard Errors are clustered at a district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include land holding quintiles,access to clean cooking fuel (LPG) and pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 13: Region, Caste and Religion: Urban Sample

| | (1) ED | (2) Fem. Emp. | (3) ED | (4) Fem. Emp. | (5) ED | (6) Fem. Emp. | (7) ED | (8) Fem. Emp. |
|---|---|---|---|---|---|---|---|---|
| Islam | 15.31*** | -29.03*** | 17.25*** | -28.63*** | 18.29*** | -28.66*** | 17.36*** | -28.87*** |
| | (4.16) | (-7.15) | (5.29) | (-6.77) | (5.81) | (-7.61) | (6.10) | (-9.07) |
| Christianity | -18.20*** | 1.40 | -8.61 | 2.45 | -14.49*** | 2.73 | -12.35** | 3.83 |
| | (-3.37) | (0.23) | (-1.61) | (0.39) | (-3.12) | (0.46) | (-2.57) | (0.67) |
| Sikhism | -1.70 | -3.24 | -10.28 | -12.21** | -1.15 | -10.52* | 7.09 | -10.42** |
| | (-0.18) | (-0.55) | (-1.44) | (-2.23) | (-0.16) | (-1.92) | (1.06) | (-2.14) |
| Other Religion | -13.67* | 3.93 | -16.54** | -2.42 | -8.95 | -3.64 | 4.97 | -1.58 |
| | (-1.92) | (0.54) | (-2.17) | (-0.34) | (-1.10) | (-0.51) | (0.85) | (-0.22) |
| ST | -6.43 | 16.20*** | -1.16 | 20.08*** | 3.07 | 22.00*** | -8.50* | 14.93*** |
| | (-1.06) | (3.28) | (-0.19) | (3.88) | (0.52) | (4.38) | (-1.75) | (3.21) |
| SC | -0.95 | 15.01*** | 0.47 | 17.24*** | 1.79 | 18.89*** | -8.82*** | 13.25*** |
| | (-0.29) | (5.20) | (0.14) | (6.02) | (0.50) | (6.37) | (-3.05) | (4.60) |
| OBC | -0.87 | 3.55 | 3.23 | 7.39** | 7.30** | 8.45*** | 0.24 | 5.90** |
| | (-0.31) | (1.28) | (1.11) | (2.58) | (2.37) | (3.22) | (0.10) | (2.52) |
| Western & Central region | 0.23 | 26.27*** | | | | | | |
| | (0.04) | (8.00) | | | | | | |
| Eastern & North Eastern region | 20.68*** | 13.01** | | | | | | |
| | (3.64) | (2.28) | | | | | | |
| Southern & Islands region | -7.98 | 42.29*** | | | | | | |
| | (-1.47) | (9.96) | | | | | | |
| State FE | - | - | YES | YES | - | - | - | - |
| District FE | - | - | NO | NO | YES | YES | YES | YES |
| Other Controls | NO | NO | NO | NO | NO | NO | YES | YES |
| Observations | 46548.00 | 46548.00 | 46548.00 | 46548.00 | 46548.00 | 46548.00 | 45653.00 | 45653.00 |

Notes: $ED$ and $Fem-Emp$ denotes Euclidian Distance (56 Divisions) and Average Household Female Employment (in mins.) respectively. Standard Errors are clustered at a district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include education of household head, access to clean cooking fuel (LPG) and pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 14: Composite Social Groups and Region: All India (Rural+Urban) Sample

| | (1) ED | (2) Fem. Emp. | (3) ED | (4) Fem. Emp. | (5) ED | (6) Fem. Emp. | (7) ED | (8) Fem. Emp. |
|---|---|---|---|---|---|---|---|---|
| ST | -19.09*** | 24.58*** | -13.30*** | 28.50*** | -9.17*** | 27.41*** | -11.49*** | 18.95*** |
| | (-5.48) | (6.57) | (-3.95) | (7.93) | (-2.95) | (8.03) | (-3.86) | (5.79) |
| SC | 4.32* | 12.82*** | 4.39** | 14.96*** | 6.15*** | 14.39*** | 2.89 | 8.58*** |
| | (1.82) | (5.75) | (1.97) | (7.25) | (2.83) | (7.65) | (1.45) | (4.67) |
| OBC(H) | -4.08* | 4.97** | -3.43 | 9.20*** | 0.43 | 6.03*** | -0.56 | 2.51 |
| | (-1.74) | (2.23) | (-1.58) | (4.61) | (0.21) | (3.52) | (-0.31) | (1.50) |
| OBC(M) | 13.33*** | -20.61*** | 13.61*** | -12.92*** | 14.36*** | -13.68*** | 15.46*** | -17.63*** |
| | (3.40) | (-4.73) | (3.49) | (-3.54) | (4.25) | (-4.47) | (4.85) | (-6.40) |
| UC(M) | 16.39*** | -19.69*** | 20.95*** | -20.59*** | 20.72*** | -21.82*** | 22.53*** | -24.40*** |
| | (3.69) | (-7.00) | (5.09) | (-6.96) | (5.91) | (-7.22) | (6.09) | (-8.46) |
| Others | -7.91** | -1.74 | -6.70* | 0.48 | -9.89*** | -1.04 | -7.41** | -1.44 |
| | (-2.03) | (-0.37) | (-1.81) | (0.11) | (-2.72) | (-0.27) | (-2.18) | (-0.39) |
| Western & Central region | -26.51*** | 59.66*** | | | | | | |
| | (-6.50) | (17.89) | | | | | | |
| Eastern & North Eastern region | 23.16*** | 18.44*** | | | | | | |
| | (5.27) | (5.40) | | | | | | |
| Southern & Islands region | -20.28*** | 82.98*** | | | | | | |
| | (-5.16) | (17.53) | | | | | | |
| Urban/Rural | YES | YES | YES | YES | YES | YES | YES | YES |
| State FE | - | - | YES | YES | - | - | - | - |
| District FE | - | - | NO | NO | YES | YES | YES | YES |
| Other Controls | NO | NO | NO | NO | NO | NO | YES | YES |
| Observations | 120261.00 | 120261.00 | 120261.00 | 120261.00 | 120261.00 | 120261.00 | 117287.00 | 117287.00 |

Notes: $ED$ and $Fem - Emp$ denotes Euclidian Distance (56 Divisions) and Average Household Female Employment (in mins.) respectively. Standard Errors are clustered at a district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include MPCE quintiles, access to clean cooking fuel (LPG) and pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 15: Composite Social Groups and Region: Rural Sample

| | (1) ED | (2) Fem. Emp. | (3) ED | (4) Fem. Emp. | (5) ED | (6) Fem. Emp. | (7) ED | (8) Fem. Emp. |
|---|---|---|---|---|---|---|---|---|
| ST | -20.45*** | 27.99*** | -15.15*** | 30.81*** | -12.82*** | 29.51*** | -15.45*** | 20.92*** |
| | (-5.30) | (6.31) | (-4.04) | (7.36) | (-3.59) | (7.49) | (-4.52) | (5.41) |
| SC | 5.10* | 14.77*** | 3.88 | 16.30*** | 4.68* | 15.12*** | -1.45 | 8.37*** |
| | (1.77) | (5.18) | (1.44) | (6.62) | (1.76) | (6.86) | (-0.58) | (3.70) |
| OBC(H) | -6.94** | 8.65*** | -7.43*** | 11.50*** | -3.97* | 7.34*** | -5.01** | 2.93 |
| | (-2.42) | (2.96) | (-2.83) | (4.77) | (-1.65) | (3.53) | (-2.30) | (1.38) |
| OBC(M) | 14.18*** | -13.53*** | 10.87** | -6.71** | 8.70* | -8.59*** | 5.89 | -13.77*** |
| | (2.65) | (-3.22) | (2.00) | (-2.11) | (1.90) | (-2.90) | (1.45) | (-4.58) |
| UC(M) | 10.07* | -10.44*** | 15.26*** | -10.94*** | 14.58*** | -14.12*** | 13.50*** | -19.44*** |
| | (1.77) | (-2.98) | (2.72) | (-3.11) | (3.09) | (-4.12) | (2.88) | (-5.61) |
| Others | -4.63 | 0.46 | -7.75 | 10.24 | -9.58* | 4.09 | -10.76** | 4.01 |
| | (-0.77) | (0.06) | (-1.37) | (1.59) | (-1.73) | (0.65) | (-2.08) | (0.70) |
| Western & Central region | -37.64*** | 72.13*** | | | | | | |
| | (-9.72) | (16.68) | | | | | | |
| Eastern & North Eastern region | 24.04*** | 20.29*** | | | | | | |
| | (5.13) | (5.95) | | | | | | |
| Southern & Islands region | -23.79*** | 101.99*** | | | | | | |
| | (-5.19) | (16.11) | | | | | | |
| State FE | - | - | YES | YES | - | - | - | - |
| District FE | - | - | NO | NO | YES | YES | YES | YES |
| Other Controls | NO | NO | NO | NO | NO | NO | YES | YES |
| Observations | 73885.00 | 73885.00 | 73885.00 | 73885.00 | 73885.00 | 73885.00 | 71804.00 | 71804.00 |

Notes: $ED$ and $Fem - Emp$ denotes Euclidian Distance (56 Divisions) and Average Household Female Employment (in mins.) respectively. Standard Errors are clustered at a district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include land holding quintiles,access to clean cooking fuel (LPG) and pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 16: Composite Social Groups aand Region: Urban Sample

| | (1) ED | (2) Fem. Emp. | (3) ED | (4) Fem. Emp. | (5) ED | (6) Fem. Emp. | (7) ED | (8) Fem. Emp. |
|---|---|---|---|---|---|---|---|---|
| ST | -7.88 | 15.30*** | -0.98 | 18.42*** | 3.57 | 20.10*** | -7.19 | 13.36*** |
| | (-1.27) | (3.00) | (-0.16) | (3.47) | (0.60) | (3.87) | (-1.41) | (2.83) |
| SC | -1.96 | 16.16*** | -0.39 | 17.73*** | 1.42 | 19.16*** | -8.56*** | 13.70*** |
| | (-0.58) | (5.10) | (-0.11) | (5.62) | (0.38) | (5.81) | (-2.82) | (4.42) |
| OBC(H) | 1.68 | 4.06 | 5.55* | 7.18** | 9.98*** | 8.13*** | 2.49 | 6.04** |
| | (0.55) | (1.40) | (1.70) | (2.48) | (2.96) | (2.76) | (0.88) | (2.31) |
| OBC(M) | 9.58** | -25.32*** | 16.03*** | -20.40*** | 20.42*** | -19.84*** | 14.92*** | -23.48*** |
| | (2.10) | (-3.86) | (3.61) | (-3.09) | (4.44) | (-4.02) | (3.68) | (-5.38) |
| UC(M) | 22.80*** | -28.07*** | 23.95*** | -29.30*** | 26.41*** | -29.04*** | 22.16*** | -28.15*** |
| | (3.88) | (-7.36) | (4.57) | (-7.33) | (5.03) | (-6.84) | (4.94) | (-7.90) |
| Others | -12.87*** | -0.41 | -9.99** | -0.71 | -9.67** | -0.98 | -5.82 | -2.15 |
| | (-2.66) | (-0.09) | (-2.09) | (-0.15) | (-2.21) | (-0.22) | (-1.34) | (-0.51) |
| Western & Central region | -0.95 | 26.49*** | | | | | | |
| | (-0.15) | (8.09) | | | | | | |
| Eastern & North Eastern region | 19.32*** | 13.25** | | | | | | |
| | (3.39) | (2.31) | | | | | | |
| Southern & Islands region | -9.48* | 42.66*** | | | | | | |
| | (-1.76) | (10.14) | | | | | | |
| State FE | - | - | YES | YES | - | - | - | - |
| District FE | - | - | NO | NO | YES | YES | YES | YES |
| Other Controls | NO | NO | NO | NO | NO | NO | YES | YES |
| Observations | 46376.00 | 46376.00 | 46376.00 | 46376.00 | 46376.00 | 46376.00 | 45484.00 | 45484.00 |

Notes: $ED$ and $Fem - Emp$ denotes Euclidian Distance (56 Divisions) and Average Household Female Employment (in mins.) respectively. Standard Errors are clustered at a district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include education of household head, access to clean cooking fuel (LPG) and pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

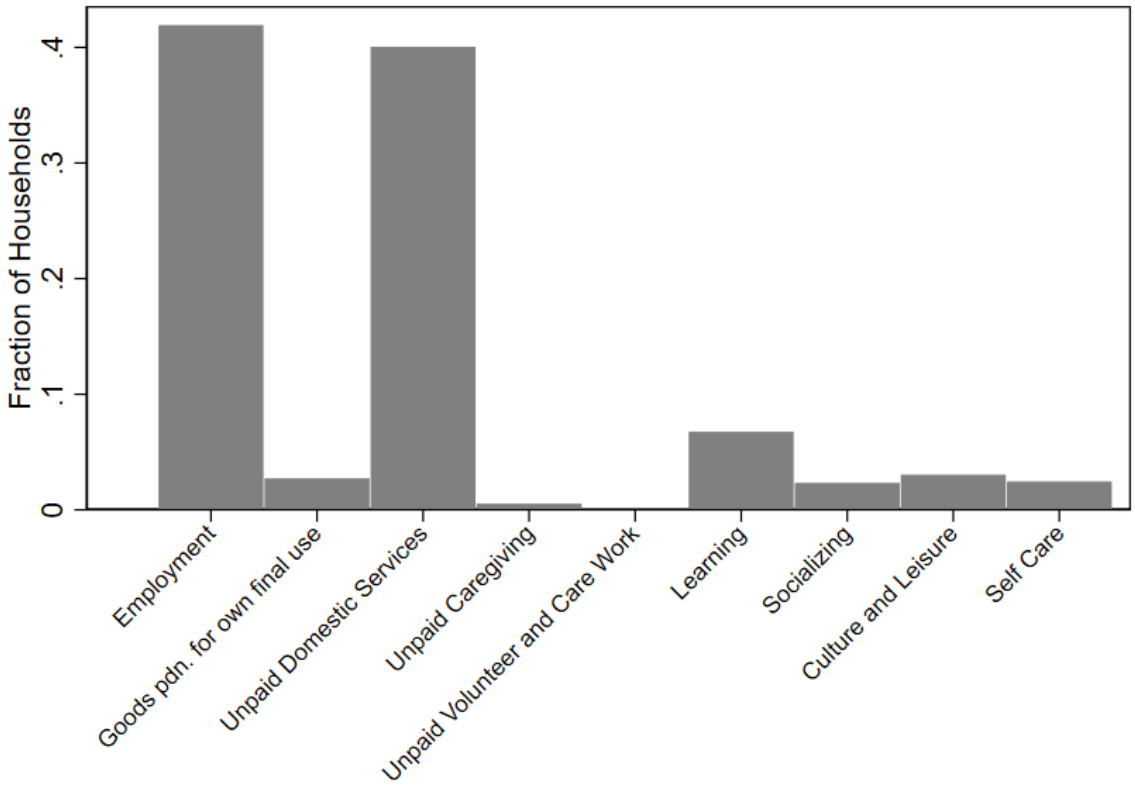
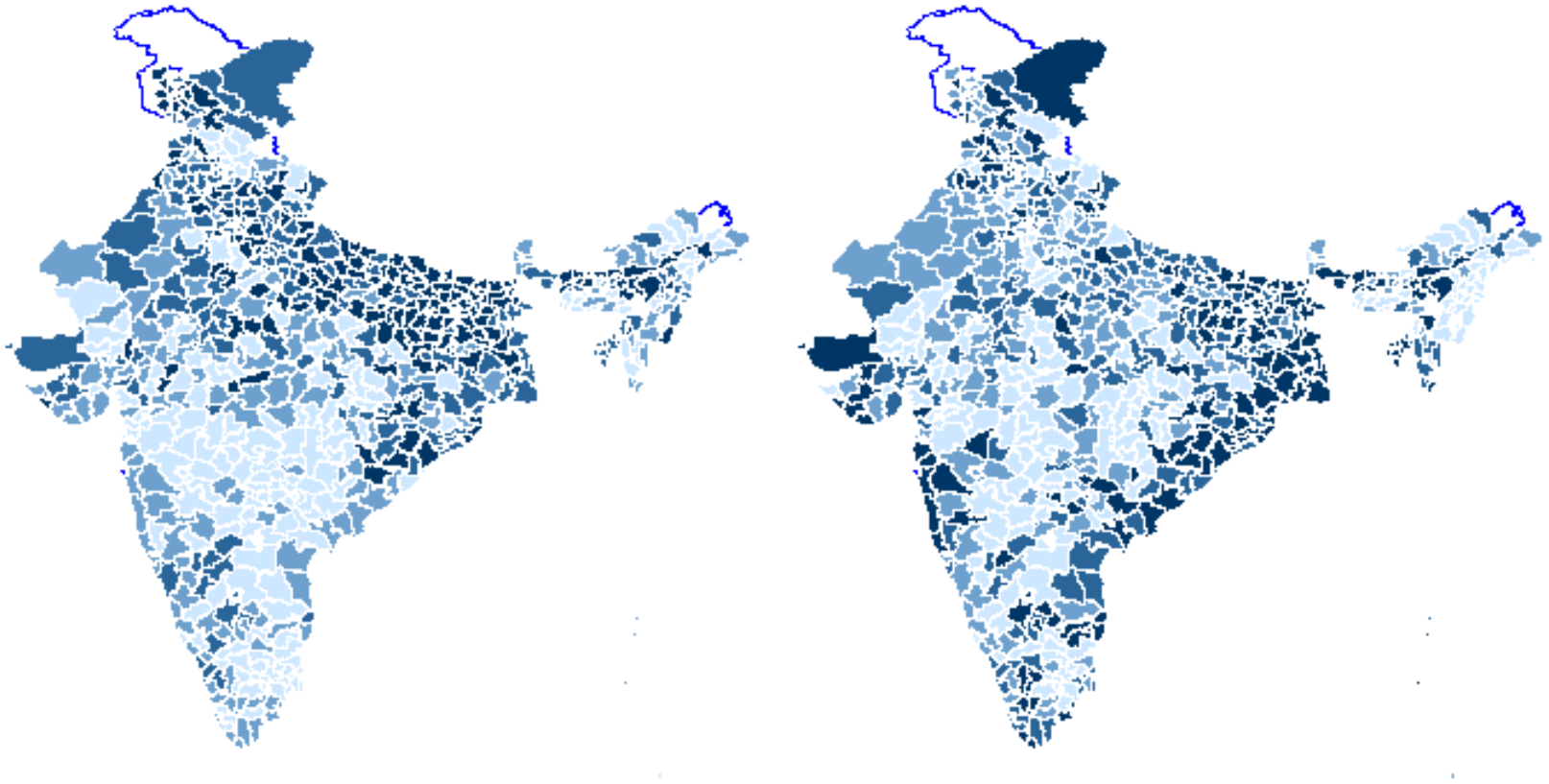



Figure 1: Distribution of Major Divisions with largest gender gaps

Notes: Some households have more than one major division with the largest gender gap across divisions. In these cases both the major divisions are included as two separate observations while calculating this distribution table. In other words, the number of observations used in this distribution is greater than number of mixed sex households in the data.

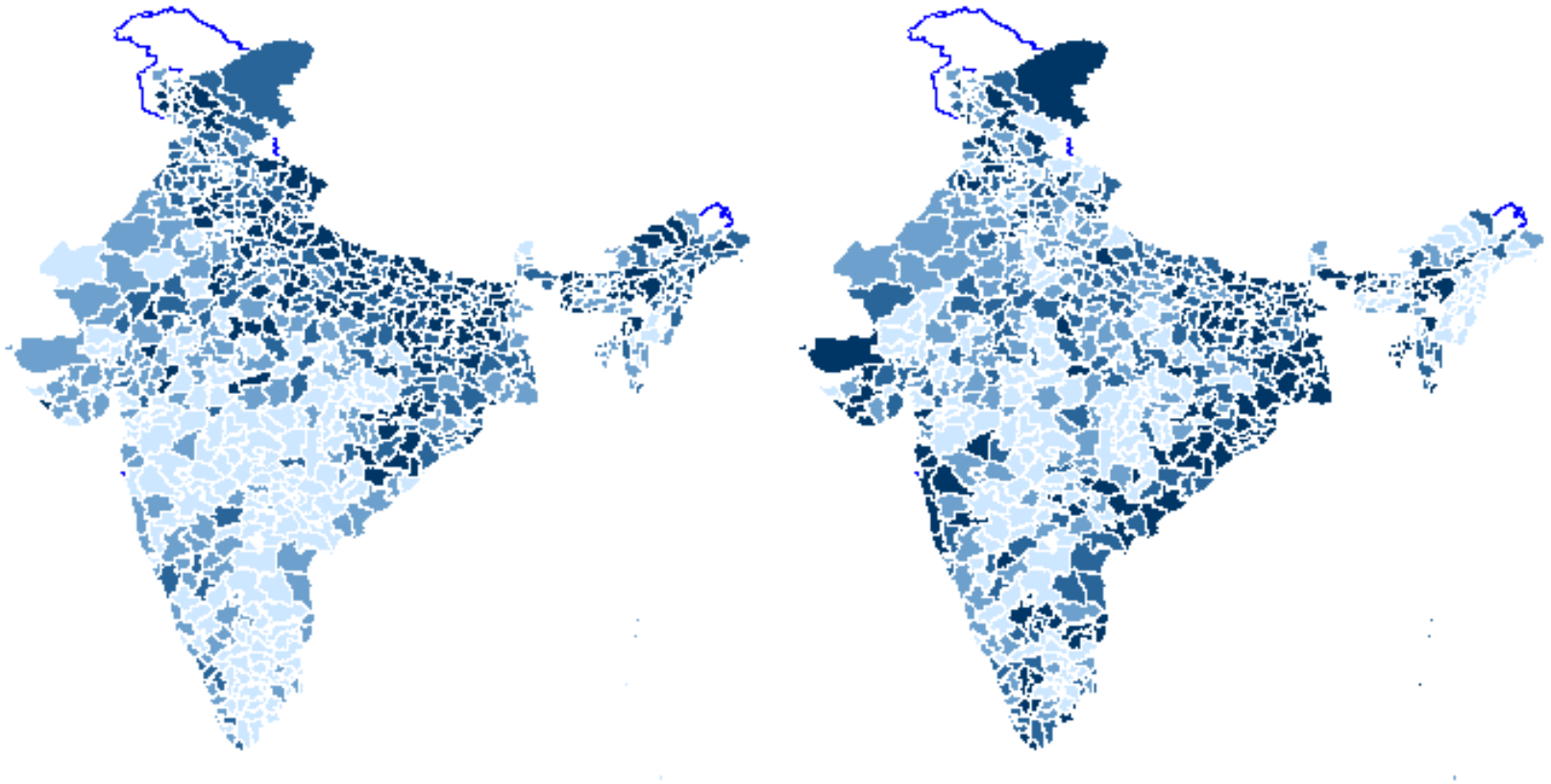


(a) Quartiles of proportion of households with no employed women

(b) Quartiles of Quartiles of Euclidian Distance of Gendered Time Use

Figure 2: Comparision of district female employment and Euclidean distance of gendered time use

Notes: Darker shades of blue denote higher quartiles.

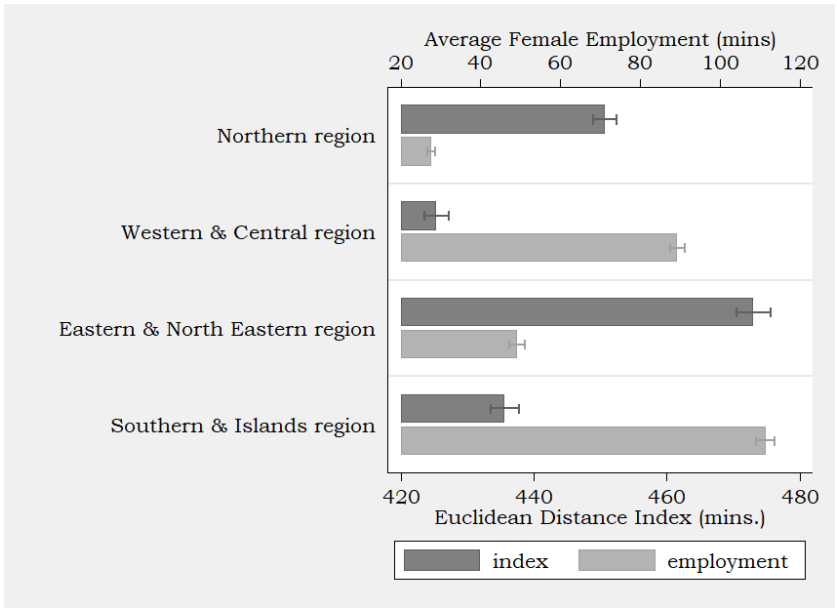


(a) Quartiles of household average time spent by women in employment

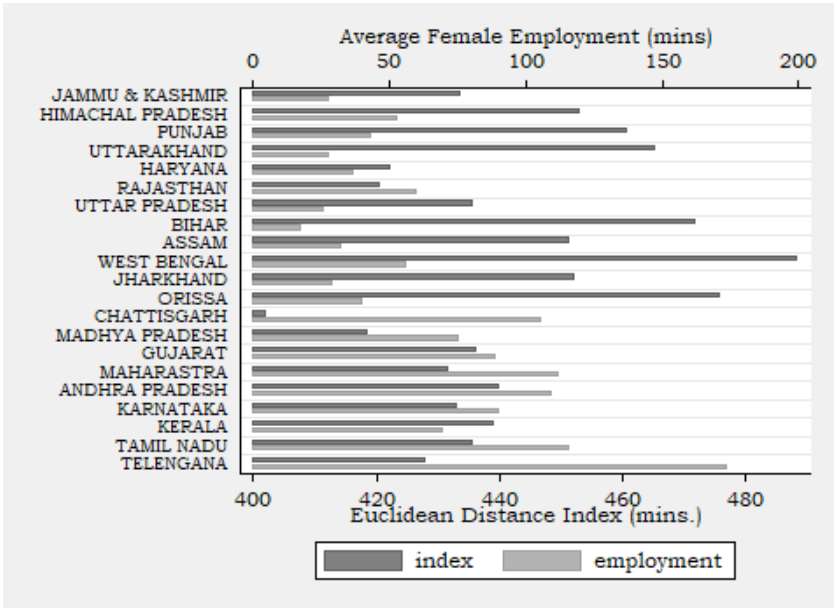
(b) Quartiles of Euclidian Distance of Gendered Time Use

Figure 3: Comparision of female employment time and Euclidean distance of gendered time use

Note: In the left panel (Panel (a)) darker shades of blue denote lower quartiles, while in the right panel (panel (b)) darker shades of blue denotes higher quartiles.



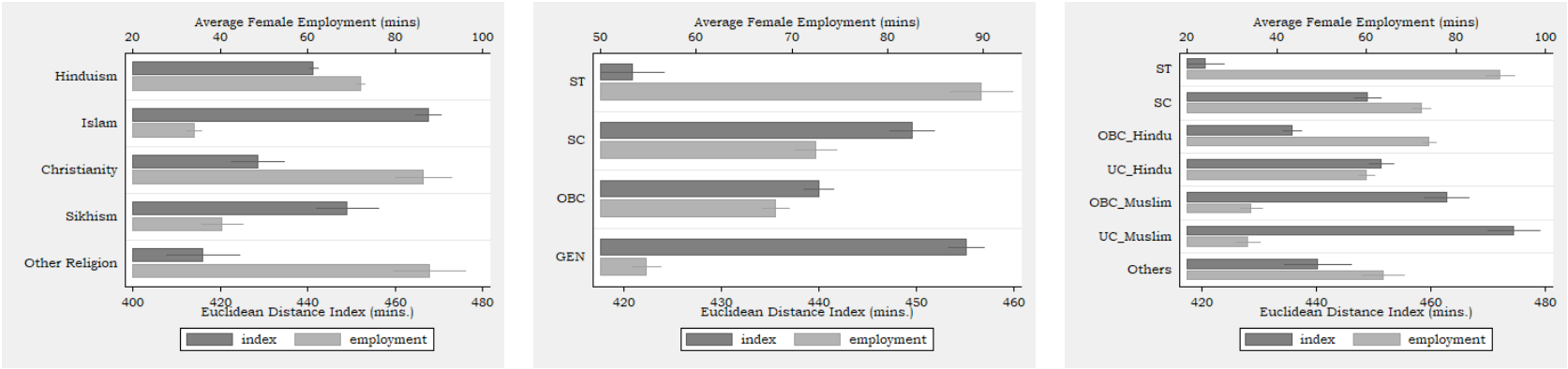

(a) Region Averages




(b) State Averages

Figure 4: Region and State Averages of Gender Distance Index and Female Employment (mins.)

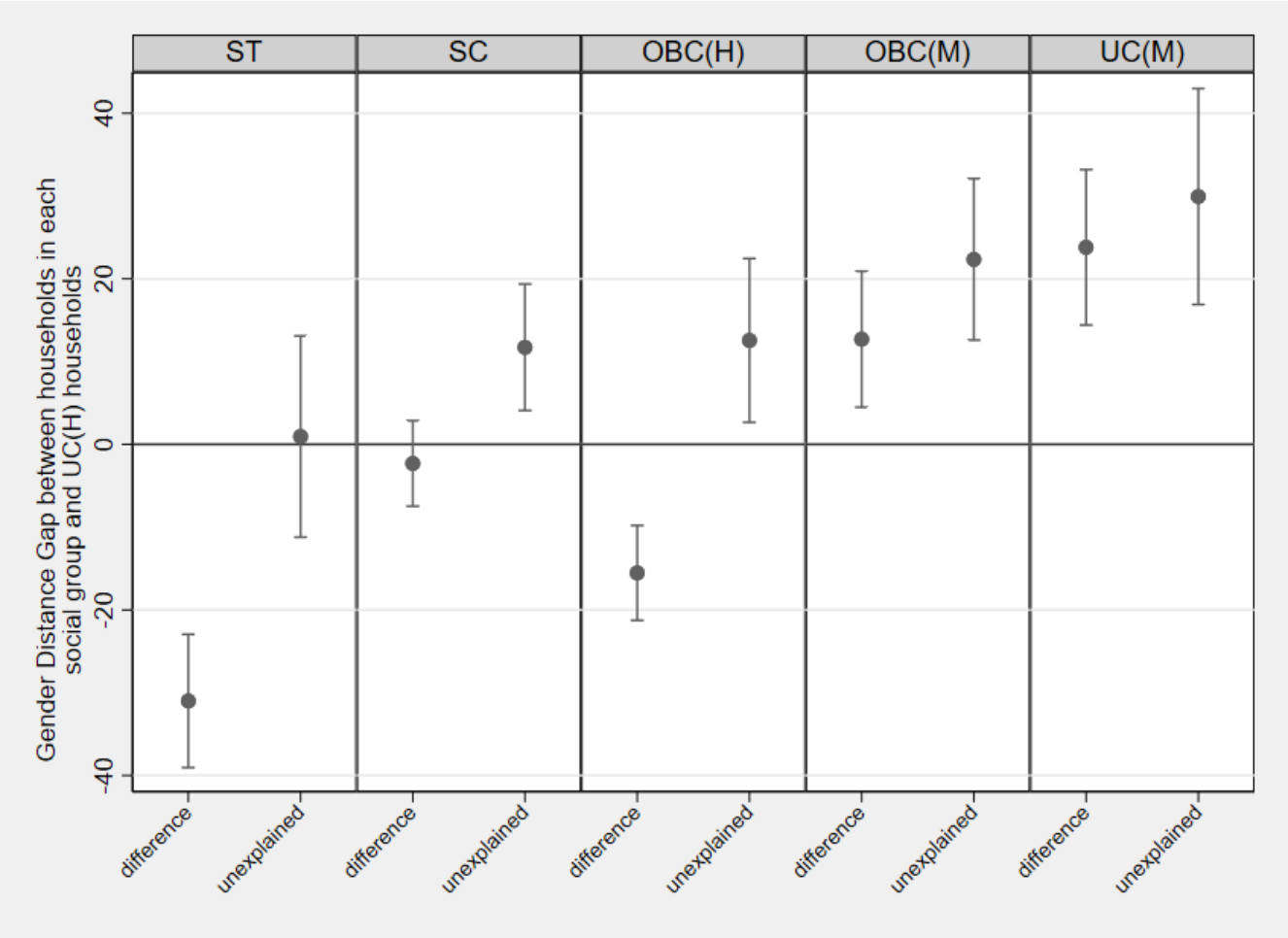
Note: The correlation of state averages of gender distance index and the female employment is a statistically insignificant $-0.09$ (p-value=0.572). Panel (b) does not report the averages for smaller states and union territories.



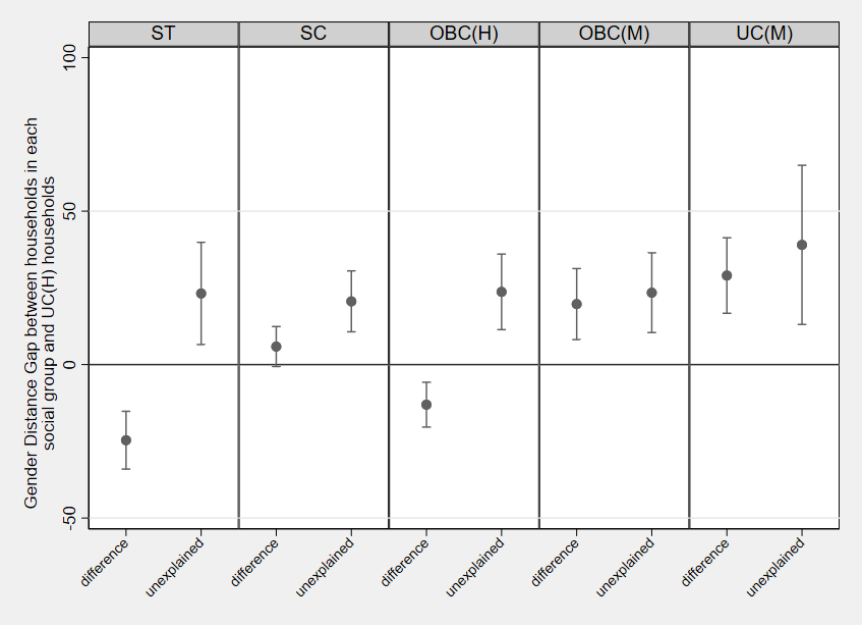

(a) Religion (b) Caste (c) Composite Social Group

Figure 5: Religion and Caste level Averages of Gender Distance Index and Female Employment (mins.)

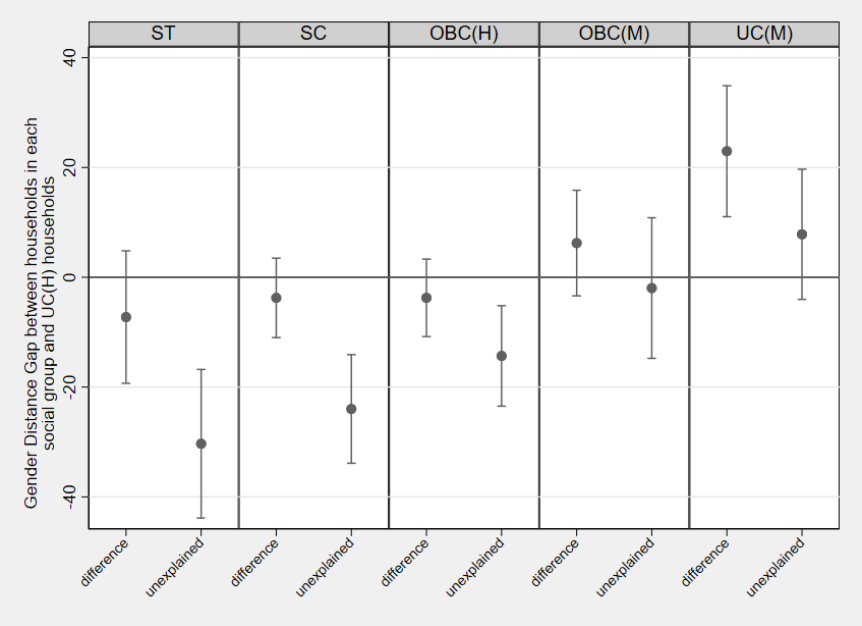
Figure 6: Estimates from traditional Blinder-Oaxaca Decomposition using entire sample




Notes: The differences refer to the difference from the averages of UC-Hindus. The regression function used controls for LPG ownership, quality of house, per capita consumption quintiles, sector, household size, age and gender composition of household, average education of male and female adults and their interaction, district fixed effects, day of week fixed effects and month fixed effects. Coefficients of UC-Hindus are used as reference coefficients for construction of counterfactual.




(a) Rural

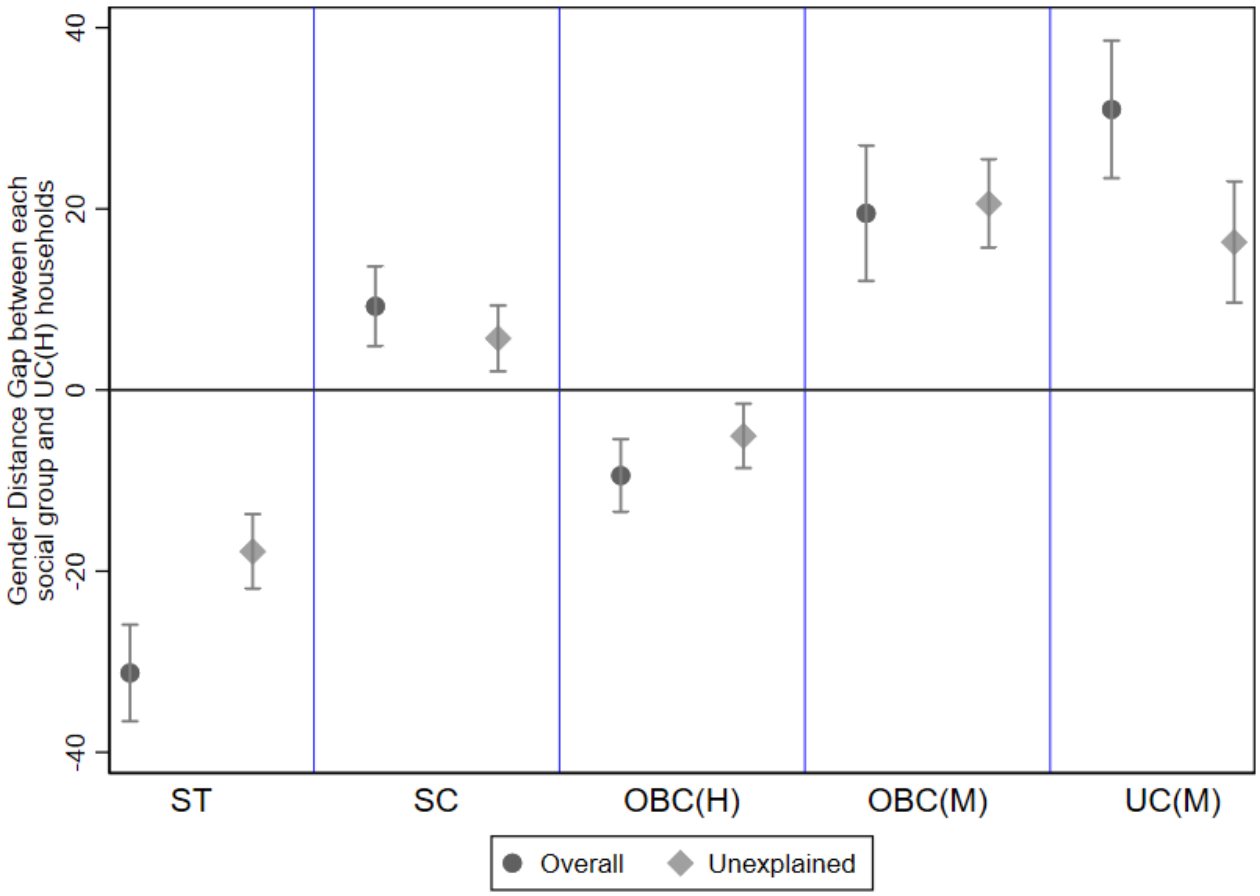



(b) Urban

Figure 7: Estimates from traditional Blinder-Oaxaca Decomposition for rural and urban sample separately

Notes: The differences refer to the difference from the averages of UC-Hindus. The regression function used for the rural sector controls for land and LPG ownership, quality of house, household size, age and gender composition of household, average education of male and female adults and their interaction, district fixed effects, day of week fixed effects and month fixed effects. The regression function used for the urban sector controls for education of household head, quality of house, household size, age and gender composition of household, average education of male and female adults and their interaction, district fixed effects, day of week fixed effects and month fixed effects. In both cases, coefficients of UC-Hindus are used as reference coefficients for construction of counterfactual.

Figure 9: Estimates from Dinardo-Fortin-Lemieux Decomposition using rural sample




Notes: The differences refer to the difference from the averages of UC-Hindus. We control for four categorical variables: land owned (3 categories), dummy variable for large household, female education level (3 categories) and geographic region (4 categories).

# Online Appendix: Additional Tables and Figures

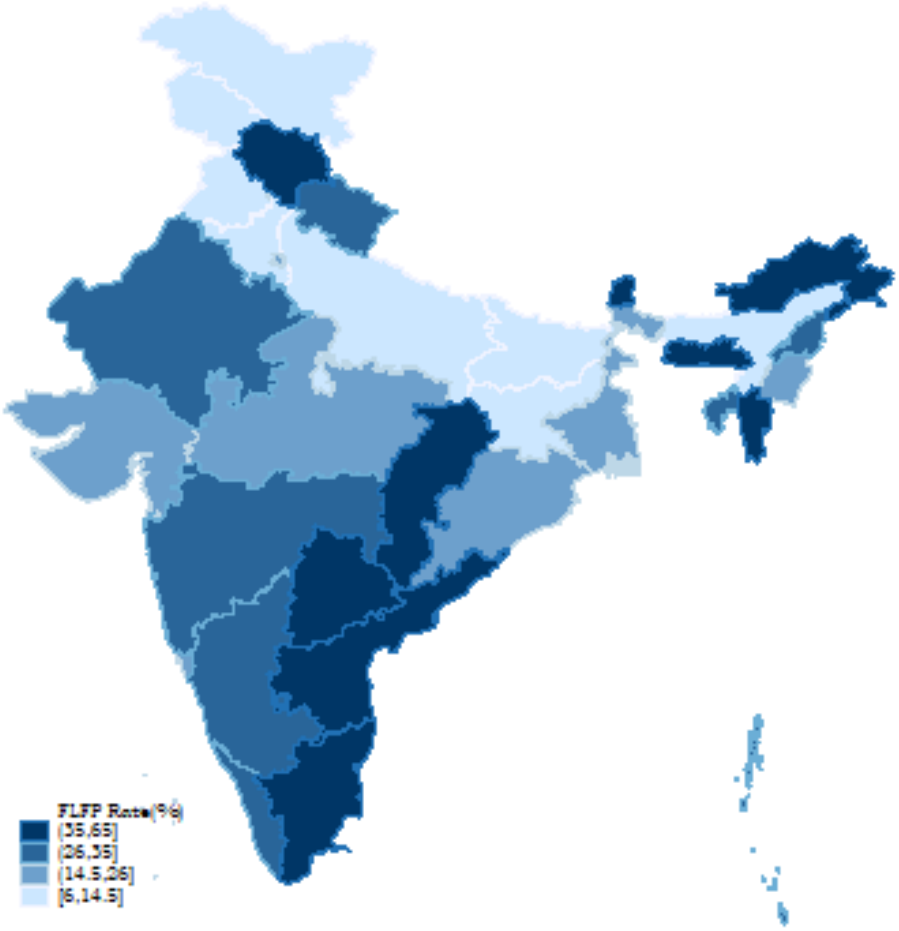



Figure 10: Female Labour Participation Rate in Indian States

(National Sample Survey: 68th Round Data (2011-12) Schedule-10 )

Table 17: Summary Statistics of Additional Control Variables

| | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| **Household Demographics** | | | | | |
| Household Size | 120788 | 4.06 | 1.613 | 2 | 23 |
| Proportion of Household members: | | | | | |
| - below age 6 years | 120788 | 0.12 | 0.175 | 0 | 1 |
| - male and between age 6 years and 15 years | 120788 | 0.07 | 0.130 | 0 | 1 |
| - female and between age 6 years and 15 years | 120788 | 0.05 | 0.112 | 0 | 1 |
| - above 65 years | 120788 | 0.05 | 0.154 | 0 | 1 |
| - male and between 16 years and 65 years | 120788 | 0.36 | 0.177 | 0 | 1 |
| - female and between 16 years and 65 years | 120788 | 0.35 | 0.143 | 0 | 1 |
| **Household Education** | | | | | |
| Years of Schooling of Household Head | 120788 | 6.29 | 5.144 | 0 | 17 |
| Avg. Years of Schooling (Male and age $\geq$ 16 years) | 118787 | 7.46 | 4.668 | 0 | 17 |
| Avg. Years of Schooling (Female and age $\geq$ 16 years) | 120561 | 5.74 | 4.738 | 0 | 17 |
| **Economic Status** | | | | | |
| Land Owned (in hectares): | | | | | |
| - $<$ 0.005 | 120788 | 0.36 | 0.479 | 0 | 1 |
| - $\geq$ 0.005 and $\leq$ 0.21 | 120788 | 0.36 | 0.480 | 0 | 1 |
| - $\geq$ 0.21 | 120788 | 0.28 | 0.450 | 0 | 1 |
| Electricity as main lighting fuel | 120788 | 0.96 | 0.205 | 0 | 1 |
| LPG as primary cooking fuel | 120788 | 0.64 | 0.481 | 0 | 1 |
| Monthly Per Capita Expenditure (Rs.) | 120786 | 2625.98 | 2256.680 | 3 | 143334 |

Notes: This table is based on *mixed gender households*: households of the TUS-2019 data that have members in the age group above 6 years for both genders. In TUS-2019 data, individual education is a categorical variables with 11 categories. That information has been converted to a continuous interval variable using reasonable assumptions.

Table 18: Correlation Matrix of gender related variables (Rural Sector)

| | Euclidian Distance (9) | Manhattan Distance (9) | Chebyshev Distance (9) | Euclidian Distance (56) | Manhattan Distance (56) | Chebyshev Distance (56) | Female Employment (in mins.) | Working Age (16-65) Women Employed (%) | Gender Gap (Male-Female) in Employment | Absolute Gender Gap in Employment |
|---|---|---|---|---|---|---|---|---|---|---|
| Euclidian Distance (9) | 1 | | | | | | | | | |
| Manhattan Distance (9) | 0.949 | 1 | | | | | | | | |
| Chebyshev Distance (9) | 0.959 | 0.860 | 1 | | | | | | | |
| Euclidian Distance (56) | 0.878 | 0.833 | 0.843 | 1 | | | | | | |
| Manhattan Distance (56) | 0.837 | 0.879 | 0.759 | 0.895 | 1 | | | | | |
| Chebyshev Distance (56) | 0.806 | 0.717 | 0.830 | 0.935 | 0.736 | 1 | | | | |
| Female Employment (in mins) | -0.283 | -0.266 | -0.283 | -0.192 | -0.207 | -0.181 | 1 | | | |
| Working Age (16-65) Women Employed (%) | -0.279 | -0.256 | -0.276 | -0.217 | -0.213 | -0.207 | 0.639 | 1 | | |
| Gender Gap (Male-Female) in Employment | 0.541 | 0.461 | 0.575 | 0.500 | 0.404 | 0.546 | -0.447 | -0.364 | 1 | |
| Absolute Gender Gap in Employment | 0.662 | 0.599 | 0.667 | 0.622 | 0.531 | 0.646 | -0.144 | -0.192 | 0.829 | 1 |

Notes: All the correlation coefficients are significant at a 5% level of significance.

Table 19: Correlation Matrix of gender related variables (Urban Sector)

| | Euclidian Distance (9) | Manhattan Distance (9) | Chebyshev Distance (9) | Euclidian Distance (56) | Manhattan Distance (56) | Chebyshev Distance (56) | Female Employment (in mins.) | Working Age (16-65) Women Employed (%) | Gender Gap (Male-Female) in Employment | Absolute Gender Gap in Employment |
|---|---|---|---|---|---|---|---|---|---|---|
| Euclidian Distance (9) | 1 | | | | | | | | | |
| Manhattan Distance (9) | 0.957 | 1 | | | | | | | | |
| Chebyshev Distance (9) | 0.964 | 0.879 | 1 | | | | | | | |
| Euclidian Distance (56) | 0.876 | 0.834 | 0.856 | 1 | | | | | | |
| Manhattan Distance (56) | 0.844 | 0.880 | 0.774 | 0.894 | 1 | | | | | |
| Chebyshev Distance (56) | 0.809 | 0.730 | 0.843 | 0.943 | 0.744 | 1 | | | | |
| Female Employment (in mins) | -0.287 | -0.269 | -0.288 | -0.141 | -0.161 | -0.140 | 1 | | | |
| Working Age (16-65) Women Employed (%) | -0.297 | -0.279 | -0.295 | -0.171 | -0.179 | -0.167 | 0.757 | 1 | | |
| Gender Gap (Male-Female) in Employment | 0.634 | 0.563 | 0.676 | 0.588 | 0.487 | 0.632 | -0.497 | -0.428 | 1 | |
| Absolute Gender Gap in Employment | 0.773 | 0.715 | 0.794 | 0.731 | 0.628 | 0.757 | -0.193 | -0.230 | 0.830 | 1 |

scriptsize Note: All the correlation coefficients are significant at a 5% level of significance.

Table 20: Factor Decomposition of Square of Coefficient of Variation

| | [Euclidean Distance(9)]$^2$ | | | Manhattan Distance (9) | | |
|---|---|---|---|---|---|---|
| | Total | Rural | Urban | Total | Rural | Urban |
| Employment | 57.353 | 52.403 | 64.363 | 41.942 | 38.606 | 47.342 |
| Goods Production for own final use | 0.899 | 1.682 | 0.199 | 1.892 | 3.105 | 0.569 |
| Unpaid Domestic Services | 26.36 | 30.065 | 20.979 | 22.47 | 24.027 | 19.788 |
| Unpaid Caregiving | 2.122 | 2.138 | 2.126 | 6.397 | 6.593 | 6.084 |
| Unpaid Volunteer and Care Work | 0.164 | 0.163 | 0.157 | 0.385 | 0.399 | 0.349 |
| Learning | 4.816 | 5.205 | 4.201 | 9.395 | 9.7 | 8.833 |
| Socializing | 1.554 | 1.877 | 1.086 | 3.318 | 3.645 | 2.804 |
| Culture and Leisure | 2.864 | 2.509 | 3.208 | 6.458 | 6.096 | 6.755 |
| Self Care | 3.868 | 3.958 | 3.681 | 7.743 | 7.829 | 7.476 |

The cells in every column report the contribution of each of the nine major divisions in inequality of the variable (measured by the square of the coefficient of variation) defining the column. The factor decomposition is based on Shorrocks (1982).

Table 21: Marginal Effects from Tobit Regression of Female Employment on Caste, Religion and Region

| | Household Average of Female Employment (minutes) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Islam | -8.55*** | -8.60*** | -11.33*** | -15.46*** | -17.43*** | -14.96*** | -15.26*** | -24.59*** |
| | (-7.36) | (-7.69) | (-9.17) | (-6.67) | (-6.38) | (-5.65) | (-7.18) | (-7.60) |
| Christianity | 0.13 | 2.51 | 2.44 | 3.05 | 1.90 | 1.40 | 1.89 | 3.61 |
| | (0.05) | (0.66) | (0.46) | (0.50) | (0.56) | (0.44) | (0.61) | (0.81) |
| Sikhism | 15.87*** | 0.91 | -2.80 | -3.73 | 2.21 | -8.49*** | -7.58*** | -11.66*** |
| | (2.96) | (0.19) | (-0.69) | (-0.75) | (0.41) | (-2.86) | (-2.68) | (-2.93) |
| Other Religion | 12.17** | 8.63** | 3.47 | 5.49 | 2.80 | -0.70 | -1.31 | -1.30 |
| | (2.57) | (2.12) | (0.82) | (0.99) | (0.58) | (-0.18) | (-0.35) | (-0.23) |
| ST | 10.08*** | 12.56*** | 17.47*** | 14.91*** | 11.24*** | 12.83*** | 12.85*** | 11.92*** |
| | (4.90) | (5.73) | (6.45) | (4.52) | (3.12) | (3.68) | (3.94) | (2.88) |
| SC | 4.60*** | 5.81*** | 8.60*** | 6.56*** | 13.70*** | 13.86*** | 14.78*** | 14.57*** |
| | (3.53) | (4.57) | (5.63) | (3.64) | (6.22) | (6.85) | (7.29) | (4.62) |
| OBC | 2.79** | 4.98*** | 4.87*** | 3.26** | 4.27** | 6.28*** | 6.32*** | 6.78*** |
| | (2.27) | (4.30) | (3.72) | (2.11) | (2.09) | (3.35) | (3.97) | (2.94) |
| Western & Central region | 66.49*** | | | | 26.12*** | | | |
| | (14.33) | | | | (8.35) | | | |
| Eastern & North Eastern region | 15.63*** | | | | 12.08** | | | |
| | (5.47) | | | | (2.29) | | | |
| Southern & Islands region | 89.57*** | | | | 36.58*** | | | |
| | (13.08) | | | | (9.10) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 74240 | 74240 | 74240 | 72146 | 46548 | 46548 | 46548 | 45654 |

NOTE: Marginal Effects on observed variable calculated at base levels for factor variables and at means for interval variables. Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include education of household head (urban), land ownership (rural), LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 22: Marginal Effects from Tobit Regression of Female Employment on Caste, Religion and Region

| | Household Average of Female Employment (minutes) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| ST | 11.22*** | 13.49*** | 17.68*** | 15.02*** | 10.52*** | 11.37*** | 11.40*** | 10.10** |
| | (5.26) | (5.96) | (6.33) | (4.39) | (2.82) | (3.24) | (3.42) | (2.41) |
| SC | 5.69*** | 7.02*** | 9.31*** | 7.25*** | 14.73*** | 14.20*** | 14.98*** | 14.91*** |
| | (4.02) | (5.15) | (5.75) | (3.73) | (6.03) | (6.46) | (6.65) | (4.46) |
| OBC(H) | 3.54*** | 5.81*** | 5.14*** | 3.25* | 3.89** | 5.53*** | 5.73*** | 6.38** |
| | (2.64) | (4.74) | (3.71) | (1.95) | (1.97) | (3.15) | (3.22) | (2.53) |
| OBC(M) | -7.96*** | -5.57*** | -8.02*** | -12.94*** | -14.03*** | -10.24** | -11.16*** | -20.77*** |
| | (-4.46) | (-3.36) | (-3.95) | (-4.46) | (-3.27) | (-2.48) | (-3.79) | (-5.24) |
| UC(M) | -6.38*** | -6.28*** | -9.96*** | -14.84*** | -18.30*** | -16.13*** | -16.01*** | -25.04*** |
| | (-3.38) | (-3.77) | (-5.20) | (-5.30) | (-7.29) | (-6.51) | (-6.92) | (-7.50) |
| Others | 6.20 | 7.97** | 6.03 | 7.56 | 2.92 | 0.72 | 0.56 | -0.65 |
| | (1.43) | (2.15) | (1.53) | (1.64) | (0.95) | (0.27) | (0.22) | (-0.18) |
| Western & Central region | 65.11*** | | | | 26.27*** | | | |
| | (13.78) | | | | (8.42) | | | |
| Eastern & North Eastern region | 14.59*** | | | | 12.20** | | | |
| | (5.14) | | | | (2.29) | | | |
| Southern & Islands region | 87.04*** | | | | 37.00*** | | | |
| | (12.65) | | | | (9.39) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 73885.00 | 73885.00 | 73885.00 | 71804.00 | 46376.00 | 46376.00 | 46376.00 | 45485.00 |

NOTE: Marginal Effects on observed variable calculated at base levels for factor variables and at means for interval variables. Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include education of household head (urban), land ownership (rural), LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 23: Regression of Manhattan and Chebyshev Distance on Caste, Religion and Region (Rural and Urban Sector)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Manhattan Distance (56) | | | | Chebyshev Distance (56) | | | |
| Islam | 39.59*** | 39.57*** | 36.70*** | 37.39*** | 15.37*** | 17.11*** | 15.57*** | 16.31*** |
| | (6.44) | (6.55) | (7.16) | (6.97) | (6.06) | (6.84) | (7.12) | (7.64) |
| Christianity | -21.13* | -7.90 | -10.49 | -11.38 | -14.96*** | -0.69 | -3.93 | -4.76 |
| | (-1.89) | (-0.79) | (-0.98) | (-1.13) | (-3.18) | (-0.18) | (-1.10) | (-1.42) |
| Sikhism | 14.96 | -15.69 | -19.83 | -8.62 | -2.54 | -4.47 | -5.63 | -1.86 |
| | (1.46) | (-1.26) | (-1.49) | (-0.68) | (-0.55) | (-0.83) | (-1.04) | (-0.37) |
| Other Religion | -37.50*** | -26.57** | -19.78 | -2.99 | -22.51*** | -14.79*** | -9.00** | -1.04 |
| | (-2.72) | (-2.06) | (-1.52) | (-0.25) | (-3.73) | (-3.10) | (-2.01) | (-0.24) |
| ST | -52.73*** | -41.21*** | -31.02*** | -30.15*** | -12.93*** | -10.16*** | -6.95*** | -10.60*** |
| | (-7.08) | (-5.34) | (-4.38) | (-4.47) | (-4.54) | (-3.69) | (-2.68) | (-4.35) |
| SC | 2.23 | 5.25 | 9.21** | 5.45 | 5.78*** | 4.97** | 6.26*** | 2.25 |
| | (0.48) | (1.18) | (2.21) | (1.39) | (2.82) | (2.56) | (3.30) | (1.31) |
| OBC | -12.53*** | -8.40** | 0.48 | -2.48 | -2.92 | -2.90 | -0.22 | -1.57 |
| | (-2.89) | (-2.03) | (0.13) | (-0.72) | (-1.49) | (-1.56) | (-0.13) | (-1.06) |
| Western & Central region | -46.25*** | | | | -21.29*** | | | |
| | (-5.36) | | | | (-5.96) | | | |
| Eastern & North Eastern region | 65.66*** | | | | 17.35*** | | | |
| | (7.27) | | | | (4.67) | | | |
| Southern & Islands region | -39.61*** | | | | -14.58*** | | | |
| | (-4.49) | | | | (-4.26) | | | |
| Rural/Urban | YES | YES | YES | YES | YES | YES | YES | YES |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 120788 | 120788 | 120788 | 117798 | 120788 | 120788 | 120788 | 117798 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include MPCE quintiles, LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 24: Regression of Manhattan and Chebyshev Distance on Caste, Religion and Region (Rural Sector)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Manhattan Distance (56) | | | | Chebyshev Distance (56) | | | |
| Islam | 38.44*** | 36.69*** | 31.39*** | 27.48*** | 13.39*** | 14.17*** | 11.14*** | 9.08*** |
| | (4.46) | (4.23) | (4.35) | (3.88) | (4.06) | (4.11) | (3.81) | (3.43) |
| Christianity | -21.64 | -3.39 | -0.20 | -6.73 | -15.67** | -0.30 | 0.07 | -2.70 |
| | (-1.39) | (-0.24) | (-0.01) | (-0.47) | (-2.47) | (-0.06) | (0.01) | (-0.62) |
| Sikhism | 14.80 | -27.26 | -26.29 | -13.79 | -2.69 | -7.77 | -9.60 | -8.49 |
| | (1.15) | (-1.29) | (-1.28) | (-0.68) | (-0.53) | (-1.08) | (-1.32) | (-1.22) |
| Other Religion | -55.08*** | -28.50 | -19.98 | -9.40 | -37.04*** | -23.42*** | -13.21** | -8.10 |
| | (-2.70) | (-1.54) | (-1.08) | (-0.50) | (-4.99) | (-3.97) | (-2.16) | (-1.34) |
| ST | -56.12*** | -44.93*** | -37.78*** | -37.31*** | -11.78*** | -10.07*** | -9.01*** | -12.44*** |
| | (-6.81) | (-5.17) | (-4.69) | (-4.78) | (-3.86) | (-3.27) | (-3.02) | (-4.46) |
| SC | -0.10 | 1.94 | 4.97 | -2.95 | 8.19*** | 6.15*** | 5.91*** | -0.44 |
| | (-0.02) | (0.36) | (0.96) | (-0.58) | (3.42) | (2.69) | (2.62) | (-0.21) |
| OBC | -19.00*** | -15.48*** | -5.85 | -9.17** | -3.19 | -4.61** | -3.31 | -4.70*** |
| | (-3.49) | (-2.85) | (-1.22) | (-2.02) | (-1.38) | (-2.05) | (-1.63) | (-2.63) |
| Western & Central region | -72.36*** | | | | -31.19*** | | | |
| | (-8.29) | | | | (-9.45) | | | |
| Eastern & North Eastern region | 65.47*** | | | | 18.28*** | | | |
| | (6.63) | | | | (4.61) | | | |
| Southern & Islands region | -49.04*** | | | | -17.00*** | | | |
| | (-4.62) | | | | (-4.28) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 74240.00 | 74240.00 | 74240.00 | 72146.00 | 74240.00 | 74240.00 | 74240.00 | 72146.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include land holding quintiles , LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 25: Regression of Manhattan and Chebyshev Distance on Caste, Religion and Region (Rural Sector)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Manhattan Distance (56) | | | | Chebyshev Distance (56) | | | |
| Islam | 31.92*** | 34.25*** | 36.63*** | 30.98*** | 16.13*** | 17.68*** | 18.71*** | 16.66*** |
| | (4.48) | (5.01) | (5.65) | (4.96) | (4.59) | (5.78) | (6.33) | (6.19) |
| Christianity | -31.31*** | -24.97** | -32.19*** | -24.74** | -18.09*** | -6.53 | -13.06*** | -12.30** |
| | (-2.59) | (-1.99) | (-3.05) | (-2.34) | (-3.29) | (-1.19) | (-2.68) | (-2.54) |
| Sikhism | 15.22 | -17.55 | -0.17 | 15.06 | -1.56 | -7.15 | 1.09 | 9.08 |
| | (0.84) | (-1.33) | (-0.01) | (1.31) | (-0.18) | (-1.02) | (0.15) | (1.35) |
| Other Religion | -30.04* | -38.10** | -24.43 | 3.38 | -7.03 | -8.85 | -2.25 | 9.60 |
| | (-1.81) | (-2.35) | (-1.38) | (0.27) | (-1.02) | (-1.26) | (-0.31) | (1.63) |
| ST | -22.25 | -8.92 | -0.79 | -18.64* | -6.21 | -1.73 | 2.14 | -9.03** |
| | (-1.60) | (-0.65) | (-0.06) | (-1.70) | (-1.17) | (-0.33) | (0.41) | (-2.02) |
| SC | 0.95 | 6.37 | 8.03 | -12.21** | -2.14 | -0.99 | 0.68 | -9.55*** |
| | (0.14) | (0.93) | (1.16) | (-2.14) | (-0.67) | (-0.31) | (0.20) | (-3.31) |
| OBC | -0.01 | 8.76 | 14.06** | -0.56 | -1.43 | 2.62 | 6.89** | 0.31 |
| | (-0.00) | (1.56) | (2.43) | (-0.12) | (-0.53) | (0.92) | (2.28) | (0.13) |
| Western & Central region | 14.00 | | | | 0.53 | | | |
| | (1.09) | | | | (0.09) | | | |
| Eastern & North Eastern region | 59.93*** | | | | 13.47*** | | | |
| | (4.75) | | | | (2.67) | | | |
| Southern & Islands region | -12.08 | | | | -6.06 | | | |
| | (-1.09) | | | | (-1.21) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 46548.00 | 46548.00 | 46548.00 | 45653.00 | 46548.00 | 46548.00 | 46548.00 | 45653.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include education of household head, LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 26: Regression of Manhattan and Chebyshev Distance on Composite Social Groups and Region (Rural and Urban Sector)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Manhattan Distance (56) | | | | Chebyshev Distance (56) | | | |
| ST | -56.82*** | -43.22*** | -32.46*** | -30.35*** | -14.76*** | -9.70*** | -6.42** | -9.69*** |
| | (-7.35) | (-5.46) | (-4.40) | (-4.26) | (-5.11) | (-3.51) | (-2.41) | (-3.79) |
| SC | -0.11 | 2.64 | 7.33 | 4.54 | 5.08** | 5.02** | 6.47*** | 2.63 |
| | (-0.02) | (0.56) | (1.63) | (1.08) | (2.38) | (2.48) | (3.24) | (1.43) |
| OBC(H) | -14.84*** | -10.29** | -0.32 | -2.58 | -2.47 | -2.06 | 0.91 | -0.33 |
| | (-2.98) | (-2.17) | (-0.07) | (-0.64) | (-1.19) | (-1.04) | (0.48) | (-0.20) |
| OBC(M) | 29.11*** | 29.57*** | 34.11*** | 32.80*** | 12.18*** | 12.77*** | 12.96*** | 12.81*** |
| | (3.62) | (3.78) | (4.97) | (4.78) | (3.45) | (3.67) | (4.18) | (4.34) |
| UC(M) | 35.32*** | 39.10*** | 39.61*** | 40.60*** | 17.03*** | 20.20*** | 20.10*** | 20.45*** |
| | (3.78) | (4.28) | (5.10) | (4.77) | (4.28) | (5.48) | (6.16) | (5.81) |
| Others | -11.67 | -29.36*** | -31.09*** | -23.83*** | -6.28* | -2.38 | -5.75* | -4.42 |
| | (-1.28) | (-3.43) | (-3.45) | (-2.98) | (-1.70) | (-0.65) | (-1.68) | (-1.34) |
| Western & Central region | -47.37*** | | | | -21.53*** | | | |
| | (-5.56) | | | | (-6.11) | | | |
| Eastern & North Eastern region | 63.95*** | | | | 16.51*** | | | |
| | (7.15) | | | | (4.46) | | | |
| Southern & Islands region | -41.32*** | | | | -15.21*** | | | |
| | (-4.76) | | | | (-4.51) | | | |
| Rural/Urban | YES | YES | YES | YES | YES | YES | YES | YES |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 120261.00 | 120261.00 | 120261.00 | 117287.00 | 120261.00 | 120261.00 | 120261.00 | 117287.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include MPCE quintiles, LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 27: Regression of Manhattan and Chebyshev Distance on Composite Social Groups and Region (Rural Sector)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Manhattan Distance (56) | | | | Chebyshev Distance (56) | | | |
| ST | -62.46*** | -48.72*** | -40.23*** | -39.08*** | -15.23*** | -10.91*** | -8.97*** | -12.39*** |
| | (-7.25) | (-5.42) | (-4.67) | (-4.64) | (-4.80) | (-3.54) | (-2.93) | (-4.29) |
| SC | -3.26 | -2.02 | 2.39 | -4.99 | 6.69*** | 5.25** | 5.74** | -0.72 |
| | (-0.54) | (-0.35) | (0.42) | (-0.88) | (2.61) | (2.20) | (2.43) | (-0.33) |
| OBC(H) | -23.86*** | -20.06*** | -8.60 | -10.86** | -4.18* | -5.15** | -2.86 | -4.11** |
| | (-3.85) | (-3.30) | (-1.55) | (-2.03) | (-1.66) | (-2.18) | (-1.31) | (-2.14) |
| OBC(M) | 27.62** | 23.18** | 25.33*** | 17.82* | 12.78*** | 9.78** | 6.67* | 3.07 |
| | (2.45) | (2.06) | (2.67) | (1.95) | (2.79) | (2.10) | (1.67) | (0.86) |
| UC(M) | 26.30** | 29.72** | 29.54*** | 26.95** | 10.73** | 13.81*** | 13.80*** | 11.53*** |
| | (2.09) | (2.31) | (2.71) | (2.40) | (2.12) | (2.73) | (3.17) | (2.68) |
| Others | -1.32 | -33.78*** | -32.87** | -32.30*** | -3.70 | -3.64 | -5.20 | -7.26 |
| | (-0.10) | (-2.65) | (-2.46) | (-2.59) | (-0.69) | (-0.69) | (-1.04) | (-1.55) |
| Western & Central region | -72.44*** | | | | -30.92*** | | | |
| | (-8.38) | | | | (-9.41) | | | |
| Eastern & North Eastern region | 64.67*** | | | | 17.79*** | | | |
| | (6.66) | | | | (4.55) | | | |
| Southern & Islands region | -50.45*** | | | | -17.39*** | | | |
| | (-4.84) | | | | (-4.45) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 73885.00 | 73885.00 | 73885.00 | 71804.00 | 73885.00 | 73885.00 | 73885.00 | 71804.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include land holding quintiles, LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 28: Regression of Manhattan and Chebyshev Distance on Composite Social Groups and Region (Urban Sector)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Manhattan Distance (56) | | | | Chebyshev Distance (56) | | | |
| ST | -26.19* | -11.30 | -1.31 | -17.57 | -7.01 | -0.65 | 3.11 | -7.49 |
| | (-1.86) | (-0.80) | (-0.10) | (-1.54) | (-1.31) | (-0.12) | (0.59) | (-1.61) |
| SC | -2.54 | 2.13 | 5.64 | -13.45** | -2.33 | -0.87 | 0.90 | -8.78*** |
| | (-0.35) | (0.29) | (0.77) | (-2.20) | (-0.73) | (-0.26) | (0.25) | (-3.01) |
| OBC(H) | 1.62 | 10.21 | 17.49*** | 2.17 | 1.41 | 5.32* | 9.43*** | 2.52 |
| | (0.24) | (1.55) | (2.66) | (0.38) | (0.52) | (1.74) | (2.95) | (0.95) |
| OBC(M) | 25.47*** | 36.08*** | 42.68*** | 26.97*** | 9.59** | 15.77*** | 20.68*** | 14.39*** |
| | (2.79) | (3.97) | (4.78) | (3.26) | (2.13) | (3.69) | (4.57) | (3.67) |
| UC(M) | 37.76*** | 40.96*** | 47.84*** | 35.44*** | 24.65*** | 25.18*** | 26.31*** | 21.15*** |
| | (3.26) | (3.79) | (4.52) | (3.82) | (4.57) | (5.24) | (5.49) | (5.05) |
| Others | -25.90** | -33.04*** | -26.95** | -17.58* | -10.25** | -4.92 | -6.07 | -3.22 |
| | (-2.20) | (-2.81) | (-2.47) | (-1.91) | (-2.13) | (-1.03) | (-1.43) | (-0.72) |
| Western & Central region | 10.99 | | | | -0.42 | | | |
| | (0.86) | | | | (-0.07) | | | |
| Eastern & North Eastern region | 56.66*** | | | | 12.13** | | | |
| | (4.44) | | | | (2.42) | | | |
| Southern & Islands region | -15.23 | | | | -7.58 | | | |
| | (-1.38) | | | | (-1.53) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 46376.00 | 46376.00 | 46376.00 | 45484.00 | 46376.00 | 46376.00 | 46376.00 | 45484.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include education of household head, LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 29: Regression of Euclidean Distance (9) on Caste and Religion

(All India: Rural and Urban)

| Dependent Variable: Euclidian Distance over 9 major divisions | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Islam | 24.74*** | 26.08*** | 23.42*** | 25.17*** |
| | (6.62) | (7.03) | (7.74) | (8.55) |
| Christianity | -16.40*** | -1.81 | -5.74 | -5.76 |
| | (-2.67) | (-0.31) | (-1.05) | (-1.11) |
| Sikhism | 11.09* | -0.73 | -6.19 | 0.08 |
| | (1.79) | (-0.13) | (-0.96) | (0.01) |
| Other Religion | -28.93*** | -23.90*** | -16.37** | -5.32 |
| | (-3.96) | (-3.28) | (-2.00) | (-0.72) |
| ST | -27.84*** | -21.51*** | -17.03*** | -20.14*** |
| | (-7.00) | (-5.29) | (-4.48) | (-5.44) |
| SC | 2.87 | 4.08 | 5.24** | 1.36 |
| | (1.04) | (1.54) | (2.14) | (0.60) |
| OBC | -6.38** | -3.89 | 0.40 | -1.37 |
| | (-2.46) | (-1.57) | (0.18) | (-0.69) |
| Western & Central region | -25.61*** | | | |
| | (-5.23) | | | |
| Eastern & North Eastern region | 18.90*** | | | |
| | (3.37) | | | |
| Southern & Islands region | -26.91*** | | | |
| | (-5.61) | | | |
| Rural/Urban | YES | YES | YES | YES |
| State FE | - | YES | - | - |
| District FE | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Observations | 120788.00 | 120788.00 | 120788.00 | 117798.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include MPCE quintiles, LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 30: Regression of Euclidean Distance (9) on Caste and Religion (Rural and Urban Sector)

| | Dependent Variable: Euclidean Distance over 9 Major Divisions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Islam | 23.78*** | 23.83*** | 19.16*** | 17.00*** | 20.70*** | 22.60*** | 23.94*** | 23.61*** |
| | (4.70) | (4.63) | (4.54) | (4.16) | (4.62) | (5.49) | (6.29) | (6.71) |
| Christianity | -16.89** | -0.23 | -0.32 | -3.16 | -22.53*** | -12.05* | -19.06*** | -15.41** |
| | (-1.98) | (-0.03) | (-0.04) | (-0.47) | (-3.44) | (-1.69) | (-2.81) | (-2.32) |
| Sikhism | 17.08** | -2.56 | -9.20 | -3.65 | -2.98 | -14.05* | -5.52 | 3.46 |
| | (2.42) | (-0.25) | (-0.84) | (-0.35) | (-0.31) | (-1.75) | (-0.66) | (0.44) |
| Other Religion | -38.41*** | -24.41** | -10.30 | -2.16 | -25.83** | -31.08*** | -22.53* | -6.57 |
| | (-3.69) | (-2.54) | (-0.98) | (-0.20) | (-2.52) | (-2.99) | (-1.88) | (-0.79) |
| ST | -28.12*** | -22.52*** | -20.91*** | -24.26*** | -12.74* | -6.69 | -2.82 | -14.83** |
| | (-6.42) | (-4.93) | (-4.77) | (-5.62) | (-1.77) | (-0.94) | (-0.41) | (-2.49) |
| SC | 4.34 | 4.25 | 4.27 | -2.53 | -3.75 | -0.83 | -1.42 | -12.47*** |
| | (1.28) | (1.30) | (1.37) | (-0.87) | (-0.97) | (-0.21) | (-0.36) | (-3.63) |
| OBC | -7.84** | -6.77** | -3.18 | -5.03* | -3.00 | 3.50 | 7.29** | -0.63 |
| | (-2.43) | (-2.15) | (-1.17) | (-1.95) | (-0.90) | (1.00) | (1.98) | (-0.21) |
| Western & Central region | -40.41*** | | | | 7.94 | | | |
| | (-8.47) | | | | (1.07) | | | |
| Eastern & North Eastern region | 21.16*** | | | | 8.08 | | | |
| | (3.52) | | | | (1.10) | | | |
| Southern & Islands region | -32.33*** | | | | -11.42* | | | |
| | (-5.79) | | | | (-1.76) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 74240.00 | 74240.00 | 74240.00 | 72146.00 | 46548.00 | 46548.00 | 46548.00 | 45653.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include land holding quintiles( for rural sector), education of household head (for urban sector), LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 31: Regression of Euclidean Distance (9) on Composite Social Group

(All India: Rural and Urban)

| Dependent Variable: Euclidian Distance over 9 major divisions | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| ST | -30.56*** | -21.63*** | -16.87*** | -19.26*** |
| | (-7.25) | (-5.12) | (-4.25) | (-4.91) |
| SC | 1.76 | 3.67 | 5.31** | 1.87 |
| | (0.60) | (1.31) | (2.01) | (0.75) |
| OBC(H) | -7.24** | -3.77 | 1.11 | -0.48 |
| | (-2.56) | (-1.43) | (0.47) | (-0.22) |
| OBC(M) | 19.17*** | 20.89*** | 20.98*** | 21.67*** |
| | (3.72) | (3.98) | (4.95) | (5.23) |
| UC(M) | 23.45*** | 28.16*** | 28.43*** | 29.86*** |
| | (4.00) | (5.35) | (6.48) | (6.52) |
| Others | -7.11 | -8.35 | -12.16** | -8.24 |
| | (-1.27) | (-1.53) | (-2.17) | (-1.60) |
| Western & Central region | -26.42*** | | | |
| | (-5.47) | | | |
| Eastern & North Eastern region | 17.56*** | | | |
| | (3.14) | | | |
| Southern & Islands region | -28.07*** | | | |
| | (-5.98) | | | |
| Rural/Urban | YES | YES | YES | YES |
| State FE | - | YES | - | - |
| District FE | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Observations | 120261.00 | 120261.00 | 120261.00 | 117287.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include MPCE quintiles, LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

Table 32: Regression of Euclidean Distance (9) on Composite Social Group (Rural and Urban Sector)

| | Dependent Variable: Euclidean Distance over 9 Major Divisions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Rural | | | | Urban | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| ST | -32.34*** | -23.65*** | -20.96*** | -24.00*** | -15.47** | -7.43 | -3.01 | -14.07** |
| | (-6.98) | (-4.98) | (-4.53) | (-5.20) | (-2.09) | (-1.00) | (-0.42) | (-2.23) |
| SC | 2.57 | 3.03 | 4.11 | -2.50 | -5.41 | -2.26 | -2.27 | -12.65*** |
| | (0.71) | (0.87) | (1.20) | (-0.77) | (-1.33) | (-0.55) | (-0.54) | (-3.43) |
| OBC(H) | -10.44*** | -8.08** | -3.25 | -4.79* | -1.32 | 5.23 | 9.59** | 1.01 |
| | (-3.01) | (-2.46) | (-1.08) | (-1.66) | (-0.35) | (1.32) | (2.32) | (0.28) |
| OBC(M) | 20.22*** | 17.46** | 14.37** | 10.52* | 13.52** | 22.12*** | 26.59*** | 21.10*** |
| | (2.97) | (2.46) | (2.53) | (1.94) | (2.23) | (3.63) | (4.82) | (4.20) |
| UC(M) | 17.15** | 22.20*** | 22.00*** | 19.72*** | 26.77*** | 28.61*** | 31.89*** | 27.64*** |
| | (2.16) | (3.02) | (3.46) | (2.98) | (4.08) | (4.88) | (5.52) | (5.46) |
| Others | 0.75 | -9.72 | -12.39* | -11.65 | -18.49** | -14.32* | -14.15* | -9.07 |
| | (0.10) | (-1.35) | (-1.71) | (-1.62) | (-2.53) | (-1.79) | (-1.77) | (-1.43) |
| Western & Central region | -40.74*** | | | | 6.50 | | | |
| | (-8.61) | | | | (0.89) | | | |
| Eastern & North Eastern region | 20.17*** | | | | 6.54 | | | |
| | (3.42) | | | | (0.90) | | | |
| Southern & Islands region | -33.62*** | | | | -12.68** | | | |
| | (-6.16) | | | | (-1.98) | | | |
| State FE | - | YES | - | - | - | YES | - | - |
| District FE | - | NO | YES | YES | - | NO | YES | YES |
| Other Controls | NO | NO | NO | YES | NO | NO | NO | YES |
| Observations | 73885.00 | 73885.00 | 73885.00 | 71804.00 | 46376.00 | 46376.00 | 46376.00 | 45484.00 |

NOTE: Standard Errors clustered at district level. $t$ statistics reported in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Other controls include land holding quintiles( for rural sector), education of household head (for urban sector), LPG access, pucca house, household size, proportion of children, boys, girls and old people in household, male and female education level and their interaction, month and day fixed effects.

# Online Appendix: Technical Notes:

## Definition of Distance Measures

Let $x = (x_1, x_2, \ldots, x_n)$ and $y = (y_1, y_2, \ldots, y_n)$ betwo vectors in the $n$ dimensional Euclidean space. The Euclidian distance between $x$ and $y$, $E(x, y)$, is defined as:

$$E(x, y) = \sqrt{\sum_{i=1}^{n} (x_i - y_i)^2}$$

The Manhattan distance between $x$ and $y$, $E(x, y)$, is defined as:

$$M(x, y) = \sum_{i=1}^{n} |(x_i - y_i)|$$

The Chebyshev distance between $x$ and $y$, $E(x, y)$, is defined as:

$$C(x, y) = \max_i(|x_i - y_i|)$$