CHANGES IN MEN'S AND WOMEN'S ECONOMIC ROLES IN RURAL INDIAN HOUSEHOLDS, 2009-2014

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CHANGES IN MEN'S AND WOMEN'S ECONOMIC ROLES IN RURAL INDIAN HOUSEHOLDS, 2009-2014

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The purpose of my dissertation research is to examine the effect of men's non-farm employment on women's economic roles in rural India, as mediated by class, caste, and education. The main hypothesis of my dissertation is that changes in men's time-allocation towards wage and non-wage work drives changes in women's time allocation towards wage and non-wage work in rural India. Formative to this project was my pre-dissertation field research experience for three months in the two villages of Maharashtra. My exposure to the field setting made me aware of the micro-level contradictions with respect to women's participation in the labor market. For example, while men in these villages have moved towards non-farm employment, women's economic roles are ambiguous with respect to their participation in the wage labor market.

This inter-disciplinary project uses panel-level household data from the International Crops Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad. Using cross-sectional data from six villages in central India, I initially examine the socio-economic determinants of occupational status in rural India in 2014. For this analysis, in addition to wage and non-wage work, I also account for multiple job holding by men and women in rural India.

Further, using the techniques of simultaneous equation modelling that account for

simultaneity and endogeneity of time use, I examine how changes in men's occupational time-use affect changes in women's occupational time-use in the household. The reason for using data on individual time-use is to capture the *non-wage* work performed by both men and women in rural India. Here, the unit of analysis was the married couple (householder and their spouse) both of whom were present in the household between 2009-2014. I also control for the number of other working members in the household besides the couple. With respect to the ICRISAT sampled population, my research shows no statistically significant relationship between changes in men's occupational time-use and changes in women's occupational time use. Hence, other factors not considered in this research account for changes in women's allocation of time to work during 2009-2014. My dissertation project has implications for understanding the complexity of livelihood changes in rural India, and women's relative empowerment within the household.

BIOGRAPHICAL SKETCH

Amit Anshumali graduated with a B.Sc. (Tech.) in Chemical Technology from the Institute of Chemical Technology, Mumbai and a B.Sc. in Mathematics from the Holkar Science College, Indore, India. Thereafter, Amit was working as a production supervisor in a chemical manufacturing firm in Greater Mumbai. Subsequently, he graduated with a dual MS in Environmental Sciences, and Agricultural, Environmental and Development Economics from The Ohio State University. Prior to writing his dissertation, Amit obtained an MS in Development Sociology from Cornell.

Dedicated to my aunt, Late Shakuntala Varma, PhD

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Perspectives and Strategies For Examining Recent Changes in India's Rural Economy Using Village Survey Data

Introduction and the Research Question

The overall purpose of my dissertation research is to examine the effect of changes in men's access to off-farm employment on women's changing economic roles in rural Indian households, as mediated by household labor supply, class, caste, education, and patriarchy. In this chapter I provide a brief overview of employment changes in the Indian rural labor market. Second, I develop a conceptualization of the employment structure in rural Indian households and explore the role of household members who participate in both farm and off-farm work. Further, I provide a distinction between migration and labor mobility in light of the current employment scenario in rural India in which significant household labor is conducted away from home. Third, since my research focuses on economic roles played by males and females in rural Indian households, I discuss the currently contested debates on feminization and de-feminization of the labor market in rural India. Fourth, I discuss the broader implications of my project on women's relative autonomy and socio-economic changes in rural India. Finally, I provide a brief introduction to the empirical database that I use throughout the dissertation.

Overview of Demographic Trends and Employment in Rural India

Chandrasekhar and Padmaja (2013) provide a succinct overview of the major demographic trends in India. As per the Census of India 2011, the total population of

India is 1210.2 million (or 1.21 billion). Of this, the rural population accounts for 833.1 million and the urban population 377.1 million. The level of urbanization increased from 27.81% in 2001 to 31.16% in 2011 whereas the proportion of rural population declined from 72.19% in 2001 to 68.84% in 2011 (Chandrasekhar and Padmaja, 2013:158-159). In absolute numbers, the rural population has increased by 90.47 million and the urban population by 91 million over the last decade (i.e. Census of India 2001). For the first time since India gained independence in 1947, the absolute increase in population is more in urban areas than in rural areas. In percentage terms, the rural population formed 68.84% of the total population with the urban population constituting 31.16% (an increase of 3.35%). While the state of Himachal Pradesh has the largest proportion of rural population (89.96%), Delhi has the highest proportion of the urban population (97.5%).

Given my focus on gender, it is important to understand the sex ratio of India's population and changes therein. The sex ratio is defined as the number of females per thousand males. As per Census 2011, India's sex ratio is 943. In rural areas, there are 949 females to 1000 men, while in urban area there are 929 females to 1000 males. Census 2011 marks a considerable fall in the child sex ratio in the age group of 0-6 years and has reached an all-time low of 914 since 1961. This is especially important because it permits one to project the nation's future sex ratio. It has declined by 13 points from 927 in 2001. In rural areas the fall is significant (-15 points) from 934 in 2001 to 919 in 2011. In urban areas, the decline is limited to 4 points from 906 in 2001 to 902 in 2011. In other words, the fall in child sex ratio in rural areas is around four times that in urban areas (Chandrashekhar and Padmaja, 2013:161).

The majority of Indians are dependent on the rural economy with 60% of them living off agriculture as landowners and/or farm laborers (World Development Report 2007). India is an agrarian society where 63% of the producers own land holdings of less than one hectare, a little over 5% own more than three hectares and just over 0.5% own more than ten hectares (Shah and Harriss-White, 2011). However, agriculture is now losing its relative importance with respect to its share of overall employment. Ghosh (2012) attributes this decline to the reduction in size of landholding per household due to increased fragmentation of land holdings. This process has not only made it difficult for many landholding households to survive on agriculture, but also has reduced the number of jobs in agriculture. In fact, the overall employment in agriculture declined by 0.02% a year between 1993-94 and 2009-10 (see Table 1).

With the increasing boom in the construction sector, the creation of factory jobs in rural towns, commercialization of agriculture, and the consolidation of rural infrastructure, villages are being incorporated within the off-farm economy. More employment opportunities have opened up increasing the demand for off-farm labor, particularly in rural areas. In fact, from 2000 onwards, the majority of non-agricultural jobs in India were generated in the rural areas (about 36 million jobs). This compares with 28 million jobs in the urban areas. Almost half of all off-farm jobs generated in the entire country were in rural construction (Thomas, 2014). Between 1993-94 and 2009-10, while employment in rural construction witnessed an average annual growth rate of more than 9%, the manufacturing sector, which many view as an engine of socio-economic transformation, grew just above 1% (see Table 1.1).

Rural males have always been in an advantageous position over rural females in terms of accessing off-farm employment opportunities in India. As Binswanger (2013) and Eswaran (2009) observe, it is primarily males in the age group of 18-26 years old who have some education that are moving out of agriculture into off-farm jobs. In contrast, women are more slowly transitioning into the off-farm wage employment sector. In growth terms, the number of rural men working off-farm doubled between 1983 and 2004-05, while for women the increase was 73% (Binswanger, 2013). The above scenario of rural labor deployment in India challenges the classical thesis of agrarian i.e. movement of the workforce from the rural farming sector to the urban industrial sector as the final destination.

Table 1.1: Employment Scenario in Rural India (Persons in millions)

Sector	1993-94	2009-10	CAGR[1]
Agriculture	229.4	228.7	-0.02
Industry	20.5	24.1	1.02
Construction	6.9	31.6	9.94
Services	33.5	49.5	2.47

Source: Chand and Srivastava (2014)
CAGR[1] stands for Compound Annual Growth Rate

1 Compound Annual Growth Rate (%) of employment is the mean annual growth of employment over a specific period of time longer than one year. It is essentially a number that describes the rate at which employment would have grown if it had grown at a steady rate. It measures the average rate of employment growth over a period of time. CAGR= [{Final Value/Initial Value} ^ (1/number of years) – 1] * 100. Example, for the first case we have CAGR = [{228.7/229.4} ^ (1/16)-1] * 100 = **-0.02**.

Shah and Harris-White (2011) comprehensively assess that the prototypical image of *farm workers moving to the urban factory* is inadequate in explaining the recent labor market changes with respect to India because so much non-farm employment has occurred in rural areas. In other words, the close connection between industrialization and urbanization characteristic of develop trajectories in many other [especially global North] nations is not present in today's India. These structural changes in the rural economy have affected the kinds of work rural youth can expect to do over their life courses. Currently, rural youth do not have stable employment, and have to pursue a variety of strategies, either simultaneously or over the life course to survive in rural India. They can either commute to nearby rural areas, or stay in their home villages, or migrate to urban areas either temporarily or permanently, in search of farm or off-farm jobs. In the current scenario, access to jobs is greatly facilitated by the availability of modern modes of transportation and mobile communication in rural areas. Mobile connectivity provides the rural youth an opportunity to develop and maintain social networks that are key sources of employment information. These transformations are directly relevant to my research because I am exploring how these new opportunities have been allocated between men and women within rural households.

Using village-level data from rural India, Walker & Ryan (1990) were the first to document that off-farm labor market opportunities lead to increasing mean rural household income and reduce the high variability in rural household income. Recently, Jatav and Sen (2013) used macro-level data to show that higher income continues to be the most important reason for farm workers to seek off-farm employment opportunities

in India (see Table 2). However, I also believe that farm workers are motivated towards off-farm opportunities, including those located outside of their residential communities for social reasons. One primary reason is to build social networks that improve their socio-economic position by providing them the opportunities to build human and social capital. To emphasize this point further, let me cite the case study by Dutta (2012). The author documents that farm-turned-factory workers from three villages in the state of Uttar Pradesh have made contacts with other workers from neighboring villages to develop a political agenda that that challenges the legitimacy of the existing caste and class hierarchies in their respective villages. This arrangement has made farm workers more aware of their rights by interacting with other workers of similar social status. Despite the arduous nature of factory or construction work, access to these jobs has opened up greater avenues for farm workers and helps them to "escape" the exploitative labor arrangements in agriculture that are enforced by their upper-caste, village employers. In fact, Dutta (2012) observes that such considerations motivate workers to daily commute from their villages even if *there is no improvement in their economic condition.*

Table 1.2: Reasons for Change from Farm to Non-Farm Sector in 2009-10

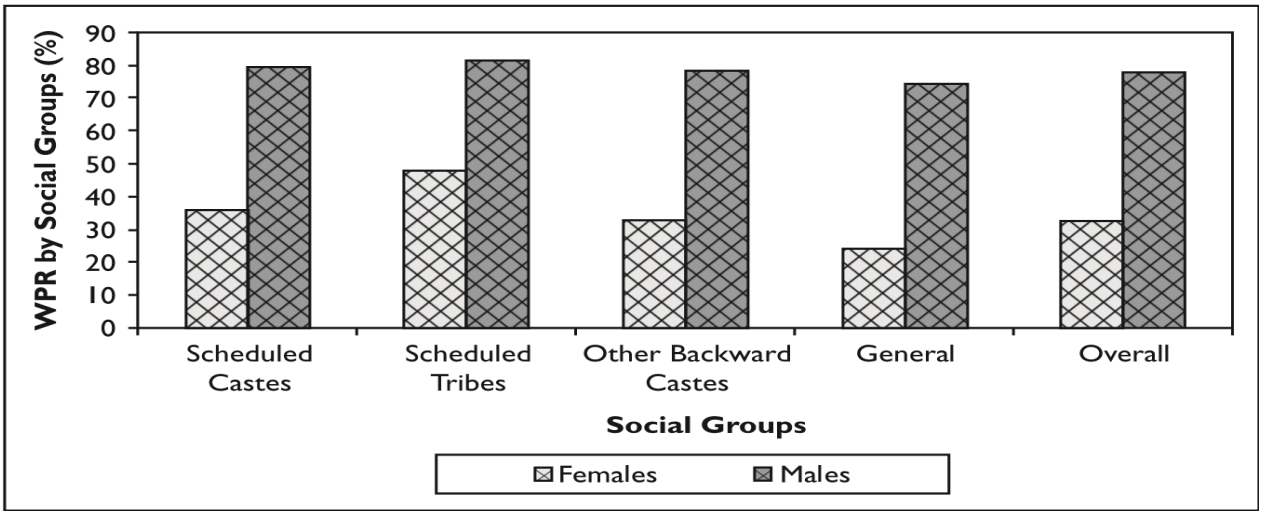
Reason for Change	Percentage of RNF Workers Who Changed Their Industry Recently and Came from Farm Sector
1	2
Loss of earlier job due to retrenchment/lay-off	2.8
Loss of earlier job due to closure of unit	0.3
For better income/remuneration	67.6
No job satisfaction	4.7
Lack of work in the enterprise (for self-employed)	4.1
Lack of job security	1.5
Work place too far	1.2
Promotion/transfer	0.0
Others	17.7

Source: Jatav and Sen (2013)
RNF stands for Rural Non-Farm Employment

To understand the role of social groups in the occupational structure of rural India, Bhattacharya and Goyal (2017) observe that the female work participation rate (WPR) is highest for the Scheduled Tribes (ST) at 48% followed by Scheduled Castes (SC) at 35.5% and Other Backward Castes (OBC) at 32.4%. It is lowest for the general (*read* forward) category of women at 24.2 per cent. SCs and STs are the most marginalized and impoverished sections of society. Women from these groups have higher WPR because extreme poverty drives them to work and also they do not face the

social taboos that prevent them or disapprove of them working. The converse is true for women from general (*read* forward) castes (see Figure 1).

Figure 1.1 Rural Workforce Participation Rate by Social Group and Sex in 2011–12 (%)



Source: NSS Employment–Unemployment Survey 2011–12 cited in Bhattacharya and Goyal (2017).

One of my basic expectations is that these structural changes in India's rural economy affect the kinds of economic activities conducted by both couple (the householder[2] and their spouse) living in rural households. I am particularly interested in determining if changes in householders' economic activities result in changes in their spouses' employment, or vice versa. In other words, I am interested to examine the interdependency of change in economic activities between the couples living in rural Indian households.

2 Householder is commonly referred to as the household head in most surveys. I am adopting the nomenclature used by the US Census for my analysis.

ICRISAT Village Levels Studies in the Rural Indian Context

For my dissertation, I will use the database compiled by the Village Levels Studies (VLS) Unit at ICRISAT in Hyderabad, India. This dataset can be used to examine changes in employment for men and women over time. This is one of the few village-level databases in the country that has kept track of the employment patterns of individuals across households in various geographical locations over a long duration of time. Essentially, ICRISAT data are available between 1975 and 2015 (with gaps of few years in between). This overlaps well with the period during which major transformations have occurred in Indian rural labor markets. For purposes of my research, I will be using secondary data from the sampled households in six Indian villages. The sampled households have been tracked since the inception of the program in 1975. The villages surveyed are Aurepalle and Dokur in the Mahbubnagar district of Andhra Pradesh, Shirapur and Kalman in the Solapur district of Maharashtra, and Kanzara and Kinkhed in the Akola district of Maharashtra (see map 1). These villages were selected on the basis of varied cropping patterns, land use, irrigation, etc. For example, Aurepalle is a predominantly rainfed region as compared to Dokur, which has a high percentage of irrigated area. First, the variations in agricultural characteristics translates into diverse employment patterns across the villages. The households sampled by ICRISAT researchers represent four class categories in the rural economy: landless labor, small farmers, medium farmers, and large farmers. I have adopted this classification based on the manual compiled by ICRISAT researchers where farmers are classified based on the size of their own operational land holding (to be defined in later chapters).

MAP 1: Six ICRISAT Villages

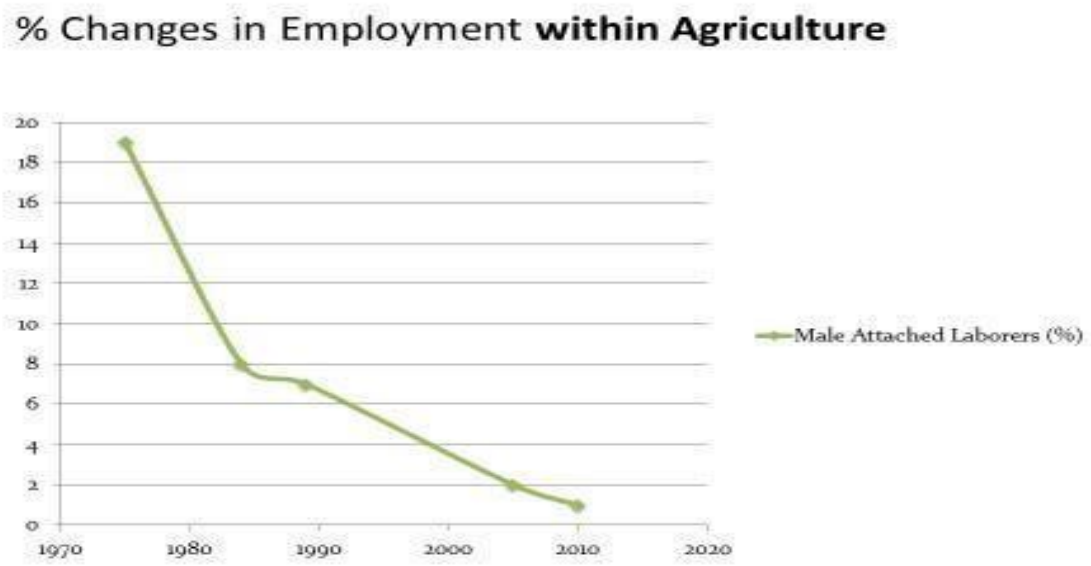
The time period of my interest is 2009-2014. The reason for choosing this time duration is due to the consistency in data collection, the sampling design and the incorporation of the gender module starting 2009. This dataset contains detailed information about employment for each household member such as different kinds of off-farm jobs that could involve temporary travel, how many months of stay at a location, daily commuting, the number of days for which a person commutes daily in a year, hours worked. This information can be disaggregated by gender. For example, detailed information about women's participation on the farm & type of work like weeding, threshing etc. along with the total number of hours worked throughout the year (including time spent on household work i.e. time-use statistics) is available. Please refer to the ICRISAT employment schedule questionnaire with the type of job categories known as Village Dynamics in South Asia (VDSA) at the end of the chapter. Information is also available on household characteristics and the details of household expenditures.

Using ICRISAT data from the six villages, Reddy (2013) observes that for men, the share of agricultural work reduced from 64% in 1975 to 32% in 2010, while their share in non- agricultural work increased from 10% to 47% for the same duration. At the same time, the dependence of these households on female family members for farm work has increased. Further, within agriculture there is a decline in the share of bonded[3]

[3] In the Indian context, traditionally bonded labor in agriculture is a vestige of traditional social relations based on caste (Srivastava, 2005). Traditional social relations have sanctioned a caste-based division of labor in which servile castes are expected to perform low status functions in exchange for a guarantee of subsistence. Currently, the uneven pace of modernization of agriculture has created new demands for a stable and servile labor force, which, in some cases, is obtained through credit bondage and elements of force, deceit and compulsion. For example, migrant labor situations seem to create a higher propensity for bondage. In the areas of origin, from where males are on the move, women or children may find

laborers among the rural male workforce between 1975 and 2010 as shown in Figure 1.2. This decline in the share of bonded laborers reflects a reduced dependency of rural labor on feudal or patron-client relationships. This was mentioned earlier as one of the prime reasons for men moving out of farm employment. It is only possible with a database like ICRISAT to capture such long-term socio-economic changes.

Figure 1.2:



Source: Reddy (2013)

Further, as shown in figure 1.3, one can observe that there is an increasing share of female cultivators from 28 to 45% between 1975 and 2010 in rural India. These trends from ICRISAT data are representative of the broad, macro-economic changes in Indian rural labor markets mentioned earlier in the chapter.

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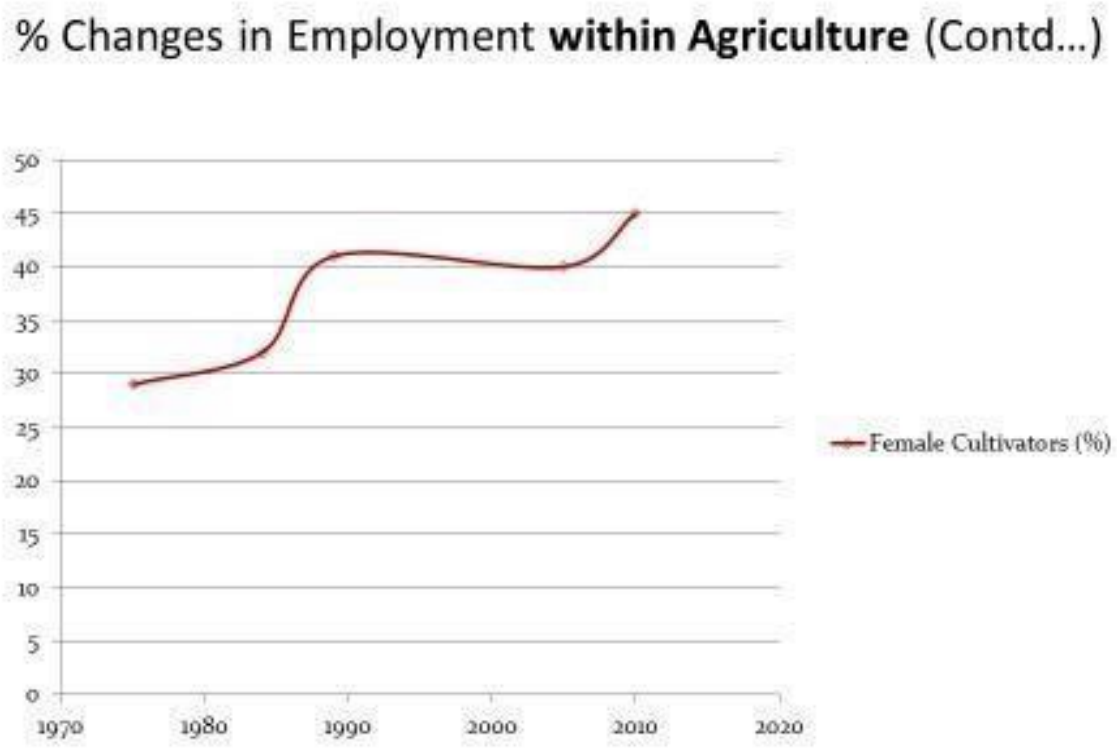
themselves in bondage. In destination areas, migrant labor may end up in bondage. For further details, consult the ILO report on Bonded Labor in India by Srivastava (2005).

Figure 1.3:



Source: Reddy (2013)

Conceptualization of Employment and Labor Mobility in Rural India

Currently, diverse employment arrangements are possible with respect to economic activity (or occupation[4]), as well as the spatial and temporal mobility of individuals within India. These mobility patterns range from rural workers commuting daily to nearby villages for farm or non-farm work, or seeking non-farm work in their own village, or moving towards seasonal non-farm employment opportunities in

4 Throughout the dissertation, I use the term economic activity and occupation interchangeably.

neighboring towns in rural India. All of these diverse employment arrangements need to be accounted for to capture the rural labor market's complexity. The multi-dimensional nature of labor mobility doesn't blend into any neat classification (One size doesn't fit all!). In this context, two frequently used terms for comparison by researchers are *on-farm* and *off-farm* employment.

According to Haggblade *et al.* (2007:6), "Off-farm employment includes any activity carried out *away from one's own farm*". This definition needs further clarity because work done on "one's own farm" is restricted to people who own their own land and are engaged in primary agricultural production activities. It does not include the category of landless laborers. Second, as defined above, off-farm work captures the spatial and temporal aspects of labor mobility, but it doesn't tell anything about the sectoral aspects of employment. For example, an 'agricultural laborer' may also perform some other work like livestock rearing or bamboo collection. So off-farm employment could either involve agricultural or nonagricultural work. This leads one to further classify off-farm employment into two categories: a) Off-farm agriculture which is inclusive of landless workers who work on any farm and b) Off-farm non-agriculture which includes all employment categories that involve non- agricultural production activities such as wage earners in the construction industry, street vendors, electricians etc. In other words, off-farm non-agricultural work is identical to non- agricultural work. Thus, nonagricultural employment is a subset of the broader category of off-farm employment. Please refer to chart 1.1 depicting the conceptualization of employment structure in rural India.

Chart 1.1: Conceptualization of Employment Structure in Rural India

Occupational Mobility / Spatial & Temporal Mobility	Own-Farm	Others Farm	Non-Farm
Local (Own Village)	Farm work Ex: Own-farm management 1	Off-farm agricultural work Ex: Livestock and poultry rearing, Farm labor 2	Off-farm nonagricultural work Ex: construction, manufacturing 3
Non-local (Ex: Commuting to a nearby village or seasonal migration to the town)	Non-existent category 4	Off-farm agricultural work 5	Off-farm nonagricultural work 6

Own-Farm Employment = Box 1
Non-Farm Employment = Boxes (3+6)
Off-Farm Employment = Boxes (2+5+3+6)

Definitional clarity is not only important for purposes of classification, but also reflects the multiple kinds of labor arrangements prevalent within agriculture and the off-farm sector. From the literature, it is evident that various researchers analyze *off-farm* employment differently based on the sub-categories they are interested in (i.e. the level of employment detail they desire in terms of activity, location and time allocated) during

primary data collection, say through surveys or questionnaires. For secondary data users such as myself, defining sub-categories is restricted by the available data i.e. primary data collected by field researchers. Since I am using secondary data for my analysis (introduced later in the chapter), I operationally classify rural nonfarm sector as the set of all rural economic activities outside of agriculture. Nonfarm activity may occur in the home or in factories or elsewhere. In terms of the schematic shown below, I operationally define activities clubbed under boxes 3 and 6 as non-farm activity. Boxes 1, 2 and 5 are operationally defined as farm work. My operational definition contrasts with the broader conceptualization of "off-farm" activity (shown below) which also considers economic activities that occur "off of the owner's ***own*** farm" but that could, for example, include wage employment in agriculture earned on a neighbor's farm, along with nonfarm earnings from the owner's nonfarm enterprises or from nonfarm wage earnings. This is the classification scheme that I will use for my data analysis throughout the dissertation project.

Second, in the context of rural India, it is important to understand patterns of migration to explain occupational structure of male and female workers (Bhattacharya and Goyal, 2017). Overall, rural-to-rural female migration in India has been much higher than that for males. Data from the National Sample Survey Office (NSSO) show that female rural-to-rural migration during 2007-8 was 59.6 per cent while for males it was 27.5 per cent as shown in Table 1.3. On the other hand, rural to urban migration during this period has been higher for males (33.9 per cent) as compared to females (18 per cent). Bhattacharya and Goyal (2017) observe that rural to rural migration has slowed down

for both genders while rural to urban migration has increased for both over the two time periods, although the change is not significant for females.

Table 1.3. Distribution of Migrants by Sex and Migration Streams (%)

	Males		Females	
Migration Streams	55th Round (1999/2000)	64th Round (2007/2008)	55th Round (1999/2000)	64th Round (2007/2008)
Rural to Rural	32.1	27.5	60.5	59.6
Rural to Urban	29.8	33.9	16.5	18
Urban to Rural	13.1	12.1	8.3	6.8
Urban to Urban	25.1	26.5	14.7	15.6

Original Source: Mahapatro (2010) and adopted from Bhattacharya and Goyal (2017)

The authors also document that 78.14 per cent of rural female migration is due to women getting married (see Table 1.4). Only 1.78 per cent of female migration is due to employment and 2.78 per cent because of education. This is in stark contrast to the pattern of rural male migration, which is mainly due to employment (29.67 per cent) and education (23.12 per cent). Hence, it seems clear that male migration is capable of changing basic social structures while female rural migration seems to strengthen traditional family and community structures.

Table 1.4. Reasons for Rural Migration by Sex (Duration <5 yrs.) (%)

	Males		Females	
Reasons	55th Round (1999/2000)	64th Round (2007/2008)	55th Round (1999/2000)	64th Round (2007/2008)
Employment	30.92	29.67	2.06	1.78
Education	11.42	23.12	1.49	2.78
Marriage	4.8	3.59	76.53	78.14
Family	25.76	20.03	12.71	10.32
Others	27.09	23.6	7.21	6.99

Original Source: Mahapatro (2010) and adopted from Bhattacharya and Goyal (2017)

Further, under the current scenario, it is important to distinguish between *migration* and *mobility* (spatial and temporal) documented by Coffey *et. al* (2015): 1) Relative to the size of the population, there is comparatively little permanent migration out of rural areas into cities in 2015, and 2) An estimated 80% of laborers in India who leave rural areas for work each year spend less than six months away from their home village.

Gupta *et. al* (2010:S19) provide a conceptual distinction between migration and mobility:

> "Migration refers to a long term or permanent shift in physical and sociocultural milieu of a person generally from one administrative unit to another. In contrast, temporary mobility may include a variety of movements over space, both short duration such as one or two nights sleeping away or relatively longer durations such as sleeping out for a few days, a month or more, seasonal or otherwise".

From a policy perspective, Sharma and Chandrashekhar (2014) also argue that the discussion in the Indian context needs to move away from being migration-centric to

one of labor mobility. The authors provide several reasons why households seldom permanently migrate to their place of work, and rather have one or more members commute on a daily or longer basis (2014:156). One reason for this is that if the rural household opts not to move then it can retain benefits of various government programs meant for rural residents. For instance, the Government of India (GoI) has announced a scheme called the "Provision of Urban Amenities in Rural Areas" to bridge the rural-urban divide and achieve balanced socio-economic development. In addition, unlike cities, affordable housing is generally more available in rural areas. Finally, permanent migration severs social ties and compromises the availability of social capital village residents obtain from their relationships.

Debates on Feminization and De-Feminization of Farm Work

Several scholars from India and abroad (Garikipati, 2009, 2008; Desai and Banerji, 2008; Pessar and Mahler, 2003) provide evidence to show that men's move towards off-farm employment opportunities has led to the growing feminization of the farm labor market. Feminization refers to

> "a rise in female labor force participation, and a relative, if not absolute, fall in men's employment. It also implies that women are taking up many jobs that were traditionally held by men [like threshing of groundnuts]" (Mathew, 2006:67).

In addition to domestic work in their own households, many rural Indian women get hired locally as farm wage workers and contribute to household income despite their lower wages compared to men for carrying out the same work. Using rice production in Eastern Uttar Pradesh as an example, Paris et al. (2005) document that female labor contribution to total labor inputs is higher than men's contribution among households

with seasonal migrants than those without migrants. This indicates dependency on unpaid female members to work on their fields, and as exchange laborers in others' fields. A similar trend of feminization is also observed for farm employers i.e. women are now becoming farmers in the absence of their male counterparts.

Research also shows that the economic activities of rural women tend to vary by socioeconomic status and geographic region. Accordingly, it will be important to account for these factors in the present research. Based off her field research in Telangana, Rao (2011) observes that women from wealthier, upper-caste farm households neither carry out farm work in the fields of other cultivators nor do they work on their own land. But they carry out key tasks of recruiting, supervising and paying female farm workers to work on their own farm, tasks which were traditionally carried out by their spouses before their moves towards off-farm employment opportunities (Rao, 2011). Essentially, the success of the family farm depends on the critical farm management functions these upper-caste women perform yet since this is unwaged work, it is unaccounted for as a contribution to the rural economy. Unlike wage-farm work, managing production on your own farm doesn't get accounted for in conventional labor statistics. This leads to a discrepancy between rural women's real and reported workload, thereby reducing their visible contributions to the productive process.

In contrast to the above observations, some recent studies (Rangarajan, et al. 2014; Abraham, 2013; Easwaran, et. al. 2013) show that as relative incomes improve,

concerns of social status become more salient, and married women gradually begin to withdraw from the rural labor market. This trend of women withdrawing from the aggregate labor force is known as the "de-feminization" of labor. The economic status of the male worker in the labor market (as the main bread winner) becomes increasingly prominent. In such situations, women's paid work is perceived to be undesirable, low status and gets stigmatized. Upward social mobility of households is symbolized by labor market participation of males, marginalization of women in the labor force and domestication of women in Indian households. Ironically, economic marginalization of women is occurring at the same time even as they are increasingly getting educated. In 1999-2000, around 18% of rural women went back to education; this percentage increased to 25% in 2011-12 (Rangarajan, et al. 2014). In other situations, women from the aspiring upper castes seem to willingly participate in the confinement of their spatial and occupational mobility (Gidwani, 2000). In fact, both men and women jointly seek to establish women's status as housewives, not farm workers (Rao, 2012). Women consciously become a part and parcel of the very social structure that views their position as subordinate in relation to men who are treated as the 'breadwinners'. For example, women perceive their work on family-owned farms as part of their household chores rather than an economically productive activity. And, of course, they do not recognize the expense that would be required to pay someone to do their domestic work. Women might not necessarily lack agency but prefer to avoid disruption of patriarchal social norms so as to maintain family relationships and household stability. But it doesn't imply an active consent to patriarchal relations in the household (Rao, 2012; Kandiyoti, 1998).

From the above discussion, it is clear that more micro-level research at the household level is needed to understand women's participation (or non-participation) in the Indian rural economy, and this research needs to account for differences in social class, caste, education and family composition between households My dissertation contributes to the literature by examining how the changes in men's occupational roles may drive changes in women's occupational roles in the rural Indian household.

Broader Implications of the Research Project

My dissertation has broader implications for understanding women's relative autonomy in the rural household, employment generation vs. infrastructure development in the rural economy, and (re)organization of agricultural practices as well as the farm labor market in the Indian countryside.

a) Women's Relative Autonomy in the Rural Indian Household

Participation in the farm labor market could have a number of different outcomes related to women's relative autonomy in the household. As Rao observes, "Understanding women's agency requires a disaggregation of domains of decision making, and the nature and processes by which decisions are made" (2014: 98). Women's relative autonomy is based on how other social categories like class, caste & ethnicity intersect with gender to produce women's multiple identities (Singh, 2010). For example, a relatively well-off woman who manages the household farm might associate socio-economic mobility (an indicator of autonomy) with caste considerations as opposed to a woman migrant worker in construction for whom mobility might be linked to class

affiliation. On account of these differences, women cannot be thought of as an undifferentiated homogeneous group, and we need to reckon with their social and economic differences (Nakkeeran, 2003).

b) Employment Generation versus Infrastructure Development in the Rural Economy (Micro v/s Macro Effects)

While one cannot completely isolate the effect of off-farm employment on changes in mens' and womens' economic roles in rural households from its effect on the local economy, I believe there are certain direct impacts of off-farm employment on farm workers and their households which could be at variance with its overall effect on the rural economy. For instance, Carswell and De Neve (2014) observe that while the National Rural Employment Guarantee Scheme (NREGS) has provided a safety net to the poorest households, particularly for women and low-caste Dalits in Tamil Nadu, by increasing reservation wages in agriculture, the scheme has not been very successful in creating any long-term durable assets, like roads and irrigation facilities. NREGS is a policy of the Indian Government to provide 100 days of guaranteed wage employment to every rural household in India. So, while it is important to remember and recognize that NREGS, in the above scenario, has played a transformative role in terms of empowering the rural laboring poor (which is a laudable objective in its own right!), its outcomes on improving rural infrastructure are far less encouraging.

c) (Re)-organization of Agricultural Practices as well as the Farm Labor Market in the Indian Countryside

Focusing on the contradictory outcomes of women's labor market participation is important as it may reveal how the competing priorities of development are often

juxtaposed against each other. In some cases, I believe that women's role as wage-workers on the farm coupled with their demands on household work takes primacy over their considerations of family health and food security. For instance, Finnis (2009) observes that though rural women in Tamil Nadu fully realize the significance of millet cultivation as a staple grain in terms of its dietary value, nutritive health, rich flavor & food security, they have moved towards growing crops like cassava because it reduces their relative workloads, minimizes drudgery and offers them some free time. Hence, a preference towards better conditions of work ends up further legitimizing the production of cash crops at the expense of compromising the household's nutritive health security.

In the next chapter, I will examine the trends and changes in the economic activities of rural Indian men and women using household-level survey data from ICRISAT.

Monthly

VILLAGE DYNAMICS IN SOUTH ASIA (VDSA)

ICRISAT-NCAP (India) -IRRI (Bangladesh)

Employment Schedule (VDSA-K)

Identifier

Country (#)	State (# #)	Year (# #)	Village code (#)	Survey Household No. (# # # #)
I		10		

Village:_____Taluka/Tehsil/Mandal:_____District:_____State:_____Present HH No: _____

Old VLS HH No.(1975-84)[a]:_____Present VDSA member ID:_____Old VLS Member ID (1975-84)[a]:_____Member Name: _____

Month & Year (MM/YY)	LABOR PARTICIPATION (FARM, NON-FARM), OCCUPATIONS & JOB								NET INCOME (Rupees)				Inv. Un-Emp. Days	Own Work (Days)				Seri-ously ill
	Date of interview	Type Farm-1 Non-farm-2	Non-farm Work Code[b]	Place of work[c]	Mig. Yes /No	Dist-ance (Km)	Work-ing Days	Work-ing Hour (day)	Cash	Kind	Amo-unt spent	Net Income		Fa-rm	Dom-estic	Live stock	Others	

Note: This module is used for those individuals who completed 6 years of age. All income-generating activities and own work activities (farm and domestic) are to be recorded.

[a] Applicable only to six villages where ICRISAT conducted VLS studies in India in 1975-84.

[b] 1=Salaried job, 2=Gold smith, 3=Carpenter, 4=Washerman, 5=Barber, 6=Potter, 7=Cobbler, 8=Weaver, 9=Blacksmith, 10=Priest, 11=Stone cutter/wadder, 12=Toddy tapping, 13=Butcher, 14=Basket maker, 15=Mason, 16=Shepherd, 17=Vajantri/bandsman, 18=Tailor, 19=Business, 20=Unskilled labour, 21=Selling CPR (fruits/firewood/leaves, etc.), 22=Operator of own machinery hired out (tractor, sprayer, thresher, etc.), 23=Running transport vehicles (auto, cycle-rickshaw, taxi, etc.), 24=Contractor, 25=Others (Specify:_____)

[c] **1=Own village, 2=Nearby village, 3=Village within district, 4=Village in other district, 5=Urban area, 6=Others (Specify:_____)**

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CHAPTER 2

Differences in Men's and Women's Economic Activities Within Rural Indian Households

INTRODUCTION

Research conducted at the national-level across India (Himanshu, *et. al* 2013; Mkhize, 2013; Jatav and Sen, 2012; Srivasatava and Srivastava, 2010), state-level (Venkatesh, et. al 2015), and village-level (Saha and Bahal, 2015; Himanshu, et. al 2013; Arun, 2012; Garikipati, 2008) provides evidence that rural Indians are increasingly changing employment from the farm sector to the non-farm sector. Within rural households research also shows that livelihoods are diversifying in terms of multiple individuals working for pay or in-kind, as well as individuals carrying out multiple kinds of jobs like a combination of farm work as well as non-farm activities. This trend is reflected in agriculture's diminished share of Indian employment. During the past two decades, while the share of agriculture in India's national employment declined from 64% to 57%, its share in the Gross Domestic Product (GDP) was reduced by half: from about 25% to 12.5% (Venkatesh, *et. al* 2015). Most new jobs are now being created in the non-farm sector, particularly in construction where the share in employment rose by 13% between 2004-05 and 2011-12 (Chatterjee, *et. al* 2015). Further, with respect to rural employment, Vijayshankar (2016) documents that studies using disaggregated data show that while in smaller villages (i.e. having a population of up to 1,000) the agricultural sector still employs over 70% of the workforce, there has been a decline in farm employment largely in the medium- to large-sized villages. Currently, the following general trends have been observed with respect to the Indian

rural labor market: a) While male dependency on different kinds of agricultural employment (e.g. farm labor) has declined, it has increased for female workers in the recent decade (Venkatesh, et. *al* 2015), and b) Short-term migration[5] and/or commuting[6] have emerged as effective livelihood diversification strategies for households in rural India (Agrawal and Chandrasekhar, 2016; Coffey *et. al* 2015; Sharma and Chandrasekhar, 2014).

Using the above trends in the Indian rural labor market as a point of departure, in this chapter I conduct descriptive analysis to begin examining how these trends have played out for rural men and women and people with different social and economic attributes. Understanding these trends and changes provides an essential context for my dissertation's overriding research question: What is the effect of changes in men's occupational roles on changes in women's occupational roles in the rural household? More specifically, the purpose of this chapter is to examine the effect of gender on changes in occupational composition in rural India between 2009-2014 after controlling for other factors associated with employment such as social class, caste, education and village. I use cross-sectional data from six rural villages collected and maintained by

[5] An estimated 80% of migrants in India who leave rural areas for work each year spend less than six months away from the village. National Statistical Survey Organization (NSSO) defines short-term labor migrants as household members who spend between 30 and 180 days outside of the village for work (Coffey *et. al*, 2015)

[6] Commuting refers to the phenomenon of workers living in rural areas who are either commuting to urban areas for work or do not have a fixed place of work. When one or more of the household members engaged in non-agricultural activity commutes for work, it is akin to diversification of their place of work and hence their geographical sources of income, rural or urban (Sharma and Chandrasekhar, 2016)

the International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad.

IMPLICATIONS

Men's and women's occupational outcomes are important because they can reveal the micro-level processes (or mechanisms) that underlie the broader structural transformation taking place in rural Indian households. Second, these outcomes are of social relevance as they can help identify which social groups in rural India are particularly affected by the overall transformation of the Indian economy and may or may not be targets for policy interventions focusing on protecting the most vulnerable. Such an analysis can help us draw inferences on the extent to which existing hierarchies in rural Indian households continue to have a bearing on employment outcomes of household members. For instance, how do patriarchal relations in the household influence women's participation in the labor market and vice versa?

Finally, employment outcomes have direct policy implications in the area of gender relations. For instance, several authors (Rao and Mitra, 2013; Rao, 2012; Garikipati, 2008; Sikod, 2007) show how changing roles of women in the labor market affect their relative empowerment within the household. The conditions under which women labor, and the reasons why they participate in various types of economic activities shape the extent to which the potential for empowerment is realized in practice (Rao, 2012). To give a concrete example, Majlesi (2016) provides evidence that shows that as the relative number of jobs for women increase in the labor market, women have relatively greater bargaining power over decisions regarding child health in the household. In

addition, examining changes in the number of workers in diverse rural households, and the kinds of economic activities each household member engages in, shows the extent to which various household livelihood strategies are effective, or if own-effort is insufficient, hence requiring additional economic support from the State to avoid destitution.

Description of ICRISAT Data and its Relevance to the Project

Data on labor market participation and employment activities of individuals and households are available between 1975 and 1984 (ICRISAT's first generation study), 2001-2008 (second generation study), and 2009-2014 for six study villages: Aurepalle and Dokur in Andhra Pradesh, Kanzara and Kinkhed in Vidarbha, Maharashtra, Kalman and Shirpur in Sholapur, Maharashtra. The choice of these villages by ICRISAT researchers was based upon identifying three contrasting dryland agricultural regions which were selected in accordance with cropping, soil and climatic criteria (Rao and Charyulu, 2007). For this dissertation, I focus my analysis on the 2009-2014 data set. I constrained my analysis to this time period for the following reasons: a) the gender module has only been available since 2009 and, b) the household sampling strategy prior to 2009 was not consistent with that used in the 2009-2014 module. In addition, the sampling strategy was consistently uniform during 2009 and 2014.

Research based on the use of micro-level longitudinal data can provide insights into the extent, range and diversity of household livelihood patterns over time. For example, ICRISAT Village-Level Studies that provide a longitudinal dataset can be used to capture the occupational changes for the sampled rural households and for

various household members over time. This is superior to other data sources. For example, Thomas and Jayesh (2016) recently highlighted striking incompatibility in India's rural employment statistics based on two different national-level data sources: The Census of India and the National Sample Survey Organization (NSSO). With particular importance to my dissertation, the proportion of India's workforce engaged in agriculture differs greatly between the census and NSSO. The Census gives a bigger figure (54.6% of the total workforce) than does the NSSO (47.6%). At the same time, with respect to the composition of employment within the agricultural workforce, the number of cultivators in the country according to the Census is lower than the number recorded by the NSSO whereas the number of agricultural laborers according to the Census is higher than the number recorded by the NSSO. In such situations, village-level studies that capture time series data collected in comparable manner over time assume even greater importance for understanding the regional differences in employment (which includes inter- as well as intra-state variations).

A final reason I chose to use village-level data is to ascertain the extent to which local labor market patterns are in sync with or differ from the broader changes in the labor market documented by researchers using national level data sets like the Census or the NSSO.

For the purposes of this study, I use data based on the following two household surveys/questionnaire modules: a) General Information Schedule: This schedule is collected at the beginning of the survey in the selected villages. It includes household information regarding ownership of land, resource endowments (livestock and farm

machinery), caste, religion and family size, and b) Household[7] Composition Schedule: This schedule provides information on all individual members present in the household at each date. It includes information about the relationship of all the members to the head of the household[8], and each individual's sex, age, marital status, educational level, and their primary as well as secondary occupations. Information is collected about the nature of work (farm and non-farm), place of work, distance of work from village if migrated, total employment days, average working hours, involuntary unemployment days, wages received in cash and kind, and received by each individual member of the household.

After selecting the relevant survey modules from the database, I devised a data management plan in order to operationalize and execute the research strategy discussed in the next section of this chapter. Initially, this process involved creating a new derived dataset by appending and merging raw data sets from the different survey modules, checking for duplicate observations and missing data. It was also necessary that sample households were present in both 2009 and 2014, although household composition might have changed over time. A key part of data management involves decision making on transforming variables. This decision is based on a delicate balance between the principle of parsimony and preserving the essential properties of a variable. For

[7] Note: The word household and family are used interchangeably in the survey module. Households and families are basic units of analysis in demography. A household is composed of one or more people who occupy a housing unit. *For the purposes of our analysis,* the household actually refers to a family i.e. the household consists of two or more individuals who are related by birth, marriage, or adoption who occupy a housing unit.

[8] Note: Because of its gendered nature, many western censuses have abandoned the term "head of household" for householder. In contrast, the term is still in use in India.

purposes of illustration, let us consider the example of caste. In the initial survey module, caste was classified into eight different categories (along with sub-castes). But for the purposes of my analysis developed later in the chapter, I created a new aggregate variable 'Caste' that consists of three broad categories: Forward Caste (FC), Backward Caste (BC) and Scheduled Caste (SC). The rationale for optimizing on the number of categories was to get an aggregate sample size that can provide meaningful inference. At the same time, the eight categories were collapsed in such a manner that the essence of caste hierarchy remains intact. I will describe other coding decisions and data transformations throughout the next two chapters relevant to particular analyses.

Research Strategy and Empirical Analysis

My overall strategy *in this chapter* is to examine the changing composition of economic activity of rural household members between 2009 and 2014, and to determine if such changes are different with respect to household members' sex, class, caste, and level of education. These concepts are operationally defined as follows:

Individual level variables:

a) Sex: Female /Male (nominal)

   I will use sex as an operational category but the implications of my analysis are gendered.[9]

[9] 'Sex' is a word that refers to the biological differences between male and female. 'Gender' however is a matter of culture: it refers to the social classification into 'masculine' and 'feminine' (Delphy, 1993). According to Oakley (1985), psychological differences between the sexes are due to social conditioning, and there is no research which allows us to infer any biological determinism whatever. Oakley's use of the concept of gender thus covers all the established differences between men and women, whether they are individual differences

b) Eleven categories were aggregated to form five categories–Not Educated or Illiterate, Primary Education, Secondary Education, High School, and Graduate

c) *Occupation* of household members are captured by two nominal variables, Primary Occupation and Secondary Occupation. Primary and Secondary Occupations are based on time-use classification i.e. primary occupation is the occupation on which the individual spends the highest percentage time, and secondary occupation is the occupation on which the individual spends the second highest percentage time.

Twelve Occupational Categories under Primary Occupation & Eleven under Secondary Occupation were aggregated to form four categories in the following way:

a) Domestic Work i.e. Individuals carrying out household work

b) Farm Sector: Regular Farm-Servant[10]/Farm Labor/Farming/Livestock

c) Non-Farm Sector: Caste-Occupations[11]/ Non-Farm Labor/Salaried Jobs

d) Not working: Education/Disabled/Too old or young to work

(studied by psychologists), or social roles or cultural representations (studied by sociologists and anthropologists).

[10] The 'farm servant' is a category assigned under the ICRISAT employment module and is adopted from the manual. It is essentially similar to an attached labor where an individual from a lower-caste is hired by an upper-caste farmer or landlord to work on the farm for a contract period of one year (that is renewable). This hiring process could also continue over generations which means that the son of a farm-servant might be employed as farm servant as well. The basis of employment is based on caste considerations.

[11] Caste occupations include carpentry, weaving, gold and silver work, hair cutting, washing clothes, sheep rearing, toddy tapping and others.

Household-Level Variables:

a) Class: Households are classified into four categories on the basis of landownership - Landless, Small, Medium and Large

Changes in the labor market structure that include an increasing diversity in employment patterns evolve within the context of the socio-economic structure of village life. Several studies document that historically the asset holding of rural households (ex. land ownership) is a close proxy for class position i.e. households with large land holdings are at the top of the hierarchy followed by the households with small- and medium- landholdings. The landless labor class is placed at the bottom of the social hierarchy (da Corta and Venkateshwarlu, 1999; Bardhan, 1984; Roemer, 1982; Patnaik, 1976). This classification reflects the status hierarchy of rural India because those who owned land dominated the rural socio-economic structure. In other words, wage work was traditionally considered socially inferior to working on one's own land in rural India and was mainly carried out by those who lacked the ownership of the means of production (Garikipati, 2009). But, as Gupta (2005) documents, the village landholding structure has been changing over the years, and there are not enough jobs available in the fields that can engage the rural population on a sustained, albeit, suboptimal basis. Moreover, the availability of non-farm jobs in construction, etc. has been increasing over the years in rural India. In fact, in the 1980s, four out of every ten rural jobs were in the non-agricultural sector, currently it is six out of ten (Biswanger-Mkhize, 2013). Hence, class relationships have become more dynamic and complex over the years. For instance, in the case of seasonal migrants, who are engaged in farm

as well as non-farm work, it is difficult to have a conception of class based on a fixed, static, hierarchal structure. However, I believe that the classification mentioned above still serves as a reasonably good reference point for understanding class categories in the context of rural India.

b) Caste: Eight categories of caste were aggregated to form three broad categories – Forward Caste (FC), Backward Caste (BC) and Scheduled Caste (SC).

Caste is a hereditary or ascriptive form of stratification characterized, among other things, by endogamy (Vaid, 2012). A person's caste is determined by his/her birth. It is well established by scholars that one of the striking features of stratification in rural Indian society is the close correspondence between class and caste (Srinivas, 1994; Beteille, 1971; Mayer, 1960; Marriot, 1955). According to the Indian sociologist, M.N. Srinivas (1994) four factors contribute towards caste dominance: 1) land ownership 2) numerical strength 3) political power, and 4) high ritual status in the social hierarchy. Castes have been historically associated with particular occupations i.e. it was a person's caste which used to decide his/her occupation as well as social status in India. For example, the occupational roles of village artisans such as carpenter, blacksmith, tailor, potter and barber were determined by caste and the skills were acquired via socialization in the family (Desai, 1971). Using historical evidence, Gupta (2000) argues that the upward or downward mobility of a caste was dependent upon its access to valued material resources like land. In other words, what a particular caste is, and where it stands in the hierarchy is an effect of its relationship to the material conditions of existence (Singh, 2008).

In modern India, the Indian government introduced a categorization scheme in which the untouchable castes were categorized as scheduled castes (SC), the backward tribes were categorized as scheduled tribes (ST) and the disadvantaged castes as other backward castes (OBC). The Forward caste (FC) community generally constitute the high caste group (Sankaran *et. al*, 2017). The SC, ST, and OBC comprising the historically disadvantaged groups, are provided job opportunities by the government through affirmative action. The FC has historically been and, continues to be, in a strong socioeconomic position with the highest status in society. As mentioned above, I generated three broad categories of caste for operational purposes from the ICRISAT data: FC, BC and SC. Hence, caste is ordinal by construction because the scheduled caste is the socio-economically worst off compared to the other two categories.

Control Variable:

a) Village-specific effects (nominal)

<u>My Sample Extract:</u>

For this analysis, I am using data for those individuals who belong to the same households in 2009 and 2014. For example, the son of a household who got married in 2012 and moved out to form a new household will be excluded. Further, individuals could either be in the labor force at both times or only in any one of these years. For instance, an individual who was getting educated in 2009 could be working in 2014. Alternatively, an individual who was working in 2009 could be unemployed or retired in 2014.

For the purpose of this analysis, I have pooled the data for individuals from six villages for the years 2009 and 2014. The reasons for pooling cross-sections is to get a bigger sample size in order to investigate whether the relationships have changed over time. The pooled data set I have developed is a collection of cross-sectional datasets observed at different points in time. For example, if we collect data from randomly selected households in each year, but do not observe the same households in different years then we have a dataset with pooled cross-sections. In contrast, a panel data set tracks the same specific households or individuals over a period of time (i.e. following the same cross-section units over time). I use the STATA statistical software package throughout for purposes of data management and the analysis.

Next, I discuss and analyze the changes in occupational structure by each of the main predictor variables: sex, class, caste and education. This cross tabular analysis will indicate whether various attributes are associated with occupational type, and will support the following multivariate analysis where these simple associations will be tested against controls.

Changes in Occupational Structure by Sex:

Agriculture has been the main source of women's work in the developing countries. In the Indian agricultural scenario, the gender division of labor plays an important role: females carry out diverse activities like preparing seed beds to sowing and weeding. Often, all the work till harvesting is undertaken by women (Vaddiraju, 2015). For about thirty years, men have been increasingly obtaining work outside of agriculture. As a result, several studies document the trend of women's rising share in

agricultural employment as well as their increasing participation in different types of activities within farming (Jackson and Rao, 2009; Garikipati, 2009, 2008; Horrell *et al.* 2008; da Corta and Venkateshwarlu, 1999). This trend is referred to as 'feminization of agricultural labor'. For instance, Rao (2011) observes that women's work is crucial to agricultural production in Telangana due to the 'sex-sequential' nature of agricultural tasks: male tasks involve ploughing, clearing of fields, digging irrigation facilities and guarding crops at night, whereas women perform the operations of sowing, weeding, transplanting and harvesting. In many instances, when men leave agriculture for non-farm work, women carry out some of the additional tasks that men were performing before. In addition, in some cases, women in cultivator households also become responsible for recruiting, supervising and paying farm workers; tasks previously done by men.

In contrast, other studies document that under certain conditions, some rural women are either withdrawing from the farm labor market (Abraham, 2013; Harriss-White and Janakarajan, 2004; Nakkeeran 2003). According to Abraham (2013), these changes are attributed to the quest for social status of men as "breadwinners". With rising household incomes, women's (re)focus on domestic activities is often perceived to enhance the status production of the household. In a patriarchal society like rural India, this explanation is also consistent with traditional caste-based stigma regarding women's participation in public spaces. This counter-trend of withdrawal of females from the labor force in the long term is known as "de-feminization" of the labor force which is context specific. As Jackson and Rao (2009) note, feminization (or de-feminization) of agriculture is a term that needs unpacking, since it does not fit with

either the all-India level data, or with state specific data for areas such as Kerala or West Bengal. Controlling for village in this research should adjust for this phenomenon's spatial specificity.

Further, caste and class have been shown to play a crucial role in segmenting the female farm labor market i.e. class and caste interact with sex. It is problematic to assume that the nature and extent of segmentation faced by all women in a given social group is identical (Neetha, 2014). For instance, Arun (2012) provides micro-level evidence from a selected district in Kerala to show that 60% of agricultural laborers and households engaged in minor cultivation involve women who are predominantly from the lower caste (like the Schedule Caste) group. These women perform most of the farm activities and juggle their time between paid farm work, family (or unpaid) farm work, and child rearing.

During 2009-2014, I expect to observe a strong association between occupational type and sex in the following two ways: a) an increasingly higher percentage of men occupying non-farm employment, and b) an increasingly higher percentage of women getting involved in farm work. This includes women working either as wage laborers or own-farm workers or women managing their own farm. Hence the word 'employment' is not used here because it could be misread as inclusive of only women carrying out wage labor work. For example, this could include women taking up new farm activities like working on somebody else's farm or carrying out those activities on their own-farm which were previously done by men.

First, in Tables 2.1 and 2.2, I examine the relationship between sex and occupation by observing: a) the changes in gender composition of occupational types from 2009-2014, and b) changes in occupational composition of men and women from 2009-2014. These two views are different but complimentary. The first shows how the sex composition of workers changed while the other shows the changing dependence of men and women on particular occupational types.

In Table 2.1, I ask what percentage of a particular employment type is accounted for by men and women in 2009 and in 2014. As shown in Table 2.1, while the share of males amongst the farm workers has declined by 6%, their share amongst the non-farm workers has increased by 3%. Similarly, while the percentage share of females amongst farm workers has increased by 6%, their share amongst the non-farm workers has declined by 3%.

Table 2.1: Changes in Sex Composition by Employment (%)

	Not_Wking		Domestic		Farm		Non-Farm	
Gender	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**
Female	45.3	39.8	93	91	39.6	45.8	20.9	17.8
Male	54.7	60.2	7	9	60.4	54.2	79.1	82.2
Total	100	100	100	100	100	100	100	100

In Table 2.2, I show how men's and women's work is distributed across the four categories. As can be observed in Table 2.2, between 2009 and 2014, while the percentage of farm workers amongst the females has increased by about 3%, the share amongst the males has declined by about 7%. Similarly, while the percentage of non-farm workers amongst the females is about the same in both 2009 and 2014, the share

amongst the males has increased by nearly 3%. In other words, by 2014, men have become more dependent on employment outside of agriculture, while women have become more dependent on farm related work. Remember, farm work can be on either one's own land or on someone else's land.

Table 2.2: Changes in Occupational Composition by Sex (%)

	Female		Male	
Occupation	**2009**	**2014**	**2009**	**2014**
Not_Wking	29.52	28.14	32.99	37.39
Domestic	33.74	31.62	2.36	2.73
Farm	30.63	34.25	43.27	35.61
Non-Farm	6.1	5.99	21.38	24.26
Total	100	100	100	100

In the six ICRISAT villages, the percentage of males who are not-working has increased by about 4%, from about 33 to 37%.. Said differently, the share of persons who were not working and were males increased from 55% to60 %. This is the situation because the non-working category consists of people of who are mostly in education or too young or too old to work or are disabled. However, the share of women who are not in the workforce was virtually unchanged between 2009 and 2014, even though women's share of the not working category declined. This suggests that the entire category shrunk over these 5 years. Using both tables 2.1 and 2.2, between 2009-2014, the share of females that are a part of the working population has grown, and this growth is largely in the farm sector.

Overall, these results are consistent with my expectation that males have become more dependent on non-farm work whereas female participation in farm activities has continued to grow. The Pearson's chi-square and likelihood ratio statistics for these contingency tables are statistically significant at 5% level [Pearson chi-square (3) = 363.57, Prob. = 0.000]. This implies that we can reject the null hypothesis of no association between sex and occupation.

Changes in Occupational Structure Associated with Other Demographic and Socioeconomic Attributes:

Class:

A priori, there is no clear and straightforward relationship between class position and occupational structure. This issue is a matter of empirical investigation since both the landless workers as well as the farmers with big landholdings have moved into different forms of non-agricultural employment. Similarly, individuals in small- and medium-sized landholdings participate in farming and non-farm occupations. The choice of village (or region) is of central importance here because the relationship between class and occupational structure gets defined and articulated by the specific context. Further, class categories never operate in isolation from other social categories like caste and gender. I develop this point further in the next two sections. But, it is important to note that though each of these categories are analytically distinct from one another, in practice, class and other social relations interpenetrate (Camfield, 2004).

Now, I examine the class composition of each employment type, asking what share of each type is accounted for by the various class groups, and how this might have changed

over time. As shown in table 2.3, between 2009-2014, the percentage of farm workers who were landless has declined by about 3%. In contrast, the percentage of farm workers who were small landowners increased during this time. The share of farm workers accounted for by medium and large land owners was almost the same. Work off the farm is slightly more likely to be done by landless persons and less likely to be done by small holders. The share accounted for by medium and larger landowners was stable during 2009-14. Interestingly, the share of domestic workers who were landless declined during 2009-14 while large landowners increased from 18% to 21% of the category. The shares accounted for by other class categories were unchanged. This seems to support the notion that high class households withdraw women from farm and non-farm work as a sign of status. Withdrawal from the workforce was mostly accounted for by small landowners. Landless persons accounted for a significantly smaller share of non-working persons in 2009 compared with 2014. They appear to have entered the economy outside of agriculture.

Table 2.3: Changes in Class Composition by Occupation (%)

	Not_Wking		Domestic		Farm		Non-Farm	
Class	2009	2014	2009	2014	2009	2014	2009	2014
Landless	16	12.5	14.1	11.4	13.9	10.7	17.5	19.6
Small	39.4	42.6	46.5	46.6	37.6	41.1	47.1	44.5
Medium	25.7	24.4	21.4	21	26	25.6	19.8	20.6
Large	18.9	20.5	18	21	22.5	22.6	15.6	15.3
Total	100	100	100	100	100	100	100	100

Reflecting the above change in dependence on off farm work among landless persons, the data in table 2.4 shows that from 2009-2014, the percentage of landless who were farm workers declined by 5% while the percentage who worked outside of farming increased by about 8%. Similar, albeit less dramatic, trends of decline are observed for all three categories of land ownership. The percentage of small and large landowners who were outside of work increased slightly, while among those did work, they comprised at work, dependence on farming declined while non-farm work was relatively unchanged although it did tip up some among medium landowners. The percentage of all four groups not working was also very stable.

Table 2.4: Changes in Occupational Composition by Caste (%)

	Landless		Small		Medium		Large	
Occupation	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**
Not_Wking	33.22	32.31	30.04	32.77	33.26	34.04	30.16	33.06
Domestic	16.25	14.41	19.77	17.56	15.42	14.42	16.03	16.67
Farm	34.28	29.26	34.07	33.42	39.87	37.83	42.66	38.52
Non-Farm	16.25	24.02	16.12	16.25	11.45	13.71	11.14	11.75
Total	100	100	100	100	100	100	100	100

Summarizing from tables 2.3 and 2.4, between 2009-2014, regardless if one looks at the composition of employment by landowning group or at the composition of employment types by class, non-farm work was more closely associated with being in the lowest two classes. An increasing share of non-farm workers were landless and an increasing share of landless workers were in the non-farm sector. Similarly, working in agriculture is increasingly dominated by small landowners. In contrast, being out of work is less

associated with the lowest class. One of the plausible explanations for this trend is that the landless workers move towards non-farm occupations in search of better opportunities, and this is relatively easier for them because they are not stuck with land as an asset. Second, large land owners are less likely to be domestics and more likely to be out of employment in 2014 vs 2009. This is consistent with the status argument made earlier, and probably reflects the changing situation of better off women. The Pearson's chi-square and likelihood ratio statistics for these contingency tables are statistically significant at 5% level [Pearson chi-square (9) = 22.27, Prob. = 0.008]. This implies that we can reject the null hypothesis of no association between social class and occupation.

Caste:

Using national election data, Vaid (2012) observes that while the empirical relationship between class[12] and caste is not completely straightforward, there is a high level of congruence between the two, and their association seems to weaken only marginally over time. For instance, high castes are loosely concentrated in the higher social classes such as professional work and large businesses or in occupations that involve routine non-manual clerical work like administrators and salespersons. With respect to agricultural occupations where caste and class hierarchies continue to reinforce each other historically, recent micro-level evidence shows that these hierarchies are gradually changing in diverse ways with the availability of non-agricultural employment opportunities in rural areas. In other words, the rigid

[12] Class refers to an objective socio-economic position based on employment relations, rather than any subjective class identity (Vaid, 2012).

association between a particular caste and its assigned occupation is getting more complicated and messier. For example, findings by Sharma and Rodgers (2015) from a panel study of structural change in Bihar's rural economy show that an increasing share of upper and middle castes have taken up non-agricultural employment over a period of about thirty years. The authors document that the percentage of households from upper castes that were participating in non-agricultural activities has risen from 14% in 1981 to about 42% in 2009, suggesting an evolution of caste hierarchy away from an exclusively agricultural base (2015: 46). In contrast to the state of Bihar as noted above, the non-landowning castes in Uttar Pradesh are more active than the landowning communities in seeking rural non-agricultural employment opportunities (Gupta, 2005). Here, the lower caste groups (like the Scheduled Castes) reject the treatment of the hitherto dominant castes, and have given up performing menial agricultural tasks they traditionally performed for their upper-caste employers by turning towards non-agricultural work (Dutta, 2012; Gupta, 2005). Further, Sahay (1998) observes that when a person starts performing a job which is not considered his traditional caste occupation, he is not condemned or penalized by his society. For example, when a man from the Kayastha caste in rural Bihar started working as a laborer, he was not told by other members of his caste to discontinue this practice. The Kayastha caste was traditionally associated with service, clerical and government jobs but employment patterns are clearly changing across various castes.

I include both caste and class in my analysis even though land ownership figures in both measures because they are also conceptually different, and because the legacy of caste, in particular, as a determinant of occupation, seems to be weakening at least in

some geographic areas. These differences are reflected in my data set where the correlation between caste and class (land ownership) is positive but not especially strong (r[13] =0.1430). My control for respondents' village will account for some of the spatial differences identified in the Indian stratification literature.

From the above discussion, methodologically, it is important to emphasize that only by using micro-level data including respondent's residential village, can one capture the strength and nuances of the relationship between class (landownership) and caste in a disaggregated manner as compared to the tentative picture that arises from macro-level studies. For example, within the state of Bihar, Datta *et al.* (2014) documented the socio-economic changes that have occurred in the two villages of Chandkura and Mahisham based on different development trajectories: the first one based on agricultural diversification and local non-agricultural employment available through daily commuting, the other dependent on migration to distant labor markets. In Chandkura, though the caste-class hierarchy is more stable, with some large peasant households diversifying into business as a way of consolidating their economic dominance, the agricultural workers from the lower caste have also benefitted from the demise of the semi-feudal system based on indentured (or bonded) labor. Contrastingly, in Mahisham, the lower castes are now owning or leasing land due to income from migration while the upper caste, Brahmins are losing ground. The authors predict that

[13] r denotes the pairwise correlation amongst variables in STATA which are statistically significant at 5% level.

if such flattening of land and class differences continues, it may lead to divergence between the caste-class hierarchies (Datta *et al*, 2014: 1200).

Since the relationship between caste and occupational structure gets articulated differently at different places, I do not expect a straightforward relationship between caste and occupational structure.

In tables 2.5 and 2.6, I examine the relationship between caste and occupation by observing: a) the changes in caste composition of the four occupation types, and b) the changes in occupational composition of the respective caste groups. The reader should keep in mind that the scheduled caste (SC) has the lowest socioeconomic status while the forward caste (FC) is the highest ranked.

As observed in table 2.5, the SC is more heavily represented in the non-working population, but also in jobs outside of farming. In contrast, the BC comprised a smaller share of three of four categories, but like the SC increased its share of non-farm work. Interestingly, FC persons comprised a slightly larger share of not working and domestic work; a much greater share of workers in the farm sector, and a strikingly smaller share of persons in non-farm jobs.

Table 2.5: Changes in the Caste Composition of Occupation Types (%)

	Not_Wking		Domestic		Farm		Non-Farm	
Caste	2009	2014	2009	2014	2009	2014	2009	2014
SC	27.8	31.6	31.8	32.4	28.4	28.3	31.9	36.3
BC	38.7	33.2	30.3	27.9	40.2	35.7	35.4	38.4
FC	33.5	35.2	37.9	39.7	31.4	36	32.7	25.3
Total	100	100	100	100	100	100	100	100

From table 2.6, it is clear that between 2009-2014, SC persons are more likely to be out of the work force, but among those who work, more likely to be in non-farm jobs, and far less likely to be in agriculture. The BC's changing occupational composition follows the same general pattern, e.g., a smaller share of farm-related work, and a larger share of work outside of farming. In contrast, the occupational composition of the FC group is relatively stable between 2009 and 2014. These trends and changes are not a carbon copy of what I showed with respect to class (land owning); e.g., the economic activities of large landowners are not necessarily the same as those of the FC. Hence, I shall retain both caste and class in my analysis.

Table 2.6: Changes in Occupational Composition by Caste (%)

	SC		BC		FC	
Occupation	2009	2014	2009	2014	2009	2014
Not_Wking	29.69	33.39	32.47	32.24	31.47	33.6
Domestic	18.94	16.79	14.16	13.32	19.81	18.58
Farm	36.07	31.61	40.06	36.68	34.98	36.35
Non-Farm	15.3	18.21	13.3	17.76	13.74	11.47
Total	100	100	100	100	100	100

The overall trend is consistent with several of the village level studies outlined above (ex. Datta *et al*, 2014) as the lower castes are moving towards new employment opportunities created in the non-farm sector. One of the plausible reasons is that the lower castes are resenting to work for their upper-caste farm employers. Instead they prefer to go for non-farm jobs that signals their reduced dependency on upper-castes as well as the possibility to earn higher wages.

The Pearson's chi-square and likelihood ratio statistics for these contingency tables are statistically significant at 5% level [Pearson chi-square (6) = 19.1696, Pr = 0.004]. This implies that we can reject the null hypothesis of no association between caste group and occupation.

Education:

In the context of rural India, there is evidence to show that the likelihood of participation in non-farm employment is positively related to the level of education (Biswanger-Mkhize, 2013; Lanjouw and Shariff, 2004). As a result, I expect the highly educated to depend more on non-farm employment and less on farm work. For example, if an individual seeks employment as a factory worker he/she would be expected to have some level of education to acquire the basic skills and training in the job. In an alternative scenario, women in rural India use education as a marker of social status to find a suitable marriage-partner. In such a scenario, education might not lead to productive employment but rather domestic or un-waged work.

In tables 2.7 and 2.8, I examine the relationship between educational level and occupation by observing: a) the changes in educational composition by occupational groups, and b) the changes in occupational composition by education.

From table 2.7, between 2009-2014, the percentage of illiterates working in the farm sector declined by about 5%, and their percentage working in the non-farm sector also declined by about 4.5%. Similarly, the percentage of individuals who have completed high school or are graduates working in the non-farm sector has gone up by 5% and 3.5% respectively i.e. most of the people working in the non-farm sector have some form of education.

Table 2.7: Changes in Educational Composition by Occupation Types (%)

	Not_Wking		Domestic		Farm		Non-Farm	
Education	2009	2014	2009	2014	2009	2014	2009	2014
Illiterate	23	30.5	27.8	19.7	40.9	35.8	20.9	16.4
Pri.	24.7	19.3	18	17.2	17.8	17	12.6	10.3
Sec.	34.4	34	35.8	39.3	33.4	36.2	42.5	40.6
High School	12.7	10.8	12.8	8.3	6.3	7.7	14.8	19.9
Grad	5.2	5.4	5.6	5.5	1.6	3.3	9.2	12.8
Total	100	100	100	100	100	100	100	100

As shown in table 2.8, from 2009-2014, the occupational composition of persons with primary and secondary education was very stable during 2009-14. However, during this time, significant numbers of illiterate persons withdrew from the labor force. Their dependence on farm work diminished by 6% while their already low participation in non-farm employment stayed the same at less than 10%. In contrast, labor force

participation among better educated persons increased. Their participation in domestic work declined and their dependence on jobs outside of agriculture increased. Dependence on agriculture was stable for high school graduates but increased significantly for persons for post high school education.

Table 2.8: Changes in Occupational Composition by Level of Education

	Illiterate		Pri.		Sec.		High School		Grad	
Occupation	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
Not_Wking	23.85	35.5	40.17	38.13	30.42	30.69	37.19	28.96	36.9	30.48
Domestic	16.08	11.24	16.34	16.72	17.62	17.4	21.11	23.98	21.43	15.24
Farm	50.35	44.18	34.35	35.45	35.09	34.5	22.11	21.72	13.1	20
Non-Farm	9.72	9.07	9.14	9.7	16.87	17.4	19.6	25.34	28.57	34.29
Total	100	100	100	100	100	100	100	100	100	100

The Pearson's chi-square and likelihood ratio statistics for these contingency tables are statistically significant at 5% level [Pearson chi-square (12) = 113.18, Pr = 0.000]. This implies that we can reject the null hypothesis of no association between education level and choice of occupation.

Role of Village-Specific Effects:

The six villages selected by ICRISAT researchers are based in different agro-climatic zones and have considerable variation in the levels of rural industrialization. Moreover, the social demography of each region is quite different in a culturally diverse country like India. Due to the above reasons, I expect that the occupational profile of each of these villages will be different. Hence, the context becomes important.

I conduct a comparative analysis of two of the villages to demonstrate their differing context for women's economic roles. Let us consider any two villages, say, Dokur in Telangana and Kalman in Maharashtra. For these two villages, first, I examine the changes in sex composition by occupation between 2009-2014. As shown in table 2.9, women are more dependent on agriculture in Dokur than in Kalman, but dependence on farming is increasing in Kalman while it is declining in Dokur. While dependence on jobs outside of agriculture is low in both villages, it is increasing in Dokur and is almost nonexistent in Kalman. Six of ten women in Kalman are in the domestic sector, but this is a significant decline from74% five years earlier. In Dokur, in contrast, less than one in five women are in the domestic sector.

Table 2.9: Changes in Occupational Composition by Sex (%) for Dokur and Kalman Villages

	DOKUR				KALMAN			
	Females		Males		Females		Males	
Occupation	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**
Not_Wking	28	31	32	38	26	24	33	37
Domestic	15	17	2	3	70	59	2	4
Farm	49	40	49	21	1	15	42	40
Non-Farm	8	12	17	38	3	2	23	19
Total	100	100	100	100	100	100	100	100

Table 2.10: Changes in Sex Composition by Occupation (%) for Dokur Village

	Not_Wking		Domestic		Farm		Non-Farm	
Gender	2009	2014	2009	2014	2009	2014	2009	2014
Female	45	43	89	86	48	64	30	21
Male	55	57	11	14	52	36	70	79
Total	100	100	100	100	100	100	100	100

Table 2.11: Changes in Sex Composition by Occupation (%) for Kalman Village

	Not_Wking		Domestic		Farm		Non-Farm	
Gender	2009	2014	2009	2014	2009	2014	2009	2014
Female	43	35	97	92	1	24	12	9
Male	57	65	3	8	99	76	88	91
Total	100	100	100	100	100	100	100	100

The data in tables 2.10 & 2.11 shows that women are a much smaller share of either farm or non-farm work in Kalman compared with Dokur village. In both villages, non-farm work is heavily dominated by men, 91% in Kalman and 79% in Dokur. In contrast, only a quarter of farm jobs are held by women in Kalman while two thirds of jobs in this sector are held by women in Dokur. In both cases women's share of farming increased during 2009-2014. These data in tables 9 and 10 show that women's economic position varies across rural India, and that village of residence should be accounted for in an analysis of the demographic and socioeconomic determinants of occupation in rural India.

The Pearson's chi-square and likelihood ratio statistics for these cross-tabulations are statistically significant at 5% level for both the villages from 2009-2014.

Hence, to account for inter-village variability, I will *control for the village specific effects* in any kind of multivariate analysis.

Multivariate Regression Using Pooled Cross-sectional Data

The above cross tabular analysis indicates that in addition to sex, respondents' other demographic and socioeconomic characteristics are associated with their occupations in 2014. Accordingly, it is necessary to use multivariate analysis which controls for these other factors to determine if sex has an independent effect on a respondent's occupation. I use a logistic regression model where I first look at the impact of sex on a respondent's occupation. I then control for class, caste, and years of education, and village. Since a very high percentage of ICRISAT respondents are either in education or not working or carrying out domestic work, I am restricting this part of analysis to those individuals who are either working in the farm sector or in the non-farm sector. Individuals employed in the farm sector include people who either work on their own farm or on other's farm or are cultivators themselves. Since the farm versus non-farm occupational category is a discrete dependent variable, the use of Ordinary Least Squares (OLS) is not appropriate as it violates the assumptions of the classical linear regression model. The appropriate choice of model specification is logit or probit which uses the technique of maximum likelihood estimation[14]. Here, I use the pooled

[14] For further technical details on limited dependent variables, please refer to any standard regression methods text like Kennedy (1998).

cross-sectional data from the six villages for the year 2014. In this analysis, the dependent variable is primary occupation, either farm or non-farm. The independent variable of principal interest is sex, either male or female, and I control for class, caste, level of education, and village of residence. These controls let me determine if the sex coefficient persists when other variables shown to be associated with occupation are controlled in the multivariate analysis. As indicated earlier, caste and class are somewhat conceptually and operationally (via land ownership) related. Hence, there is concern about multicollinearity between these variables. Accordingly, I ran a Variance Inflation Factor (VIF)[15] test and found that the VIF=1.08 which implies that class and caste are not collinear with each other and can be run in the same model.

First, I use the binary logit model to regress the primary occupational status on the main variable of interest i.e. Sex. As shown in table 2.12, the overall model is statistically significant at 5% level as confirmed by the likelihood ratio test. Further, as we observe the effect of being a male, the likelihood of being in non-farm vs. farm increases by about 4 compared to that of being a female. In other words, the odds of taking non-farm work instead of farm work is about four times as we switch from male to female.

[15] If VIF <10 then multicollinearity is not an issue.

Table 2.12: Simple Logistic Regression* of Primary Occupation in 2014

PRI_Occ	Odds Ratio	Std. Err.	z	P>|z|
Farm	Ref. Outcome			
Non_Farm				
Sex	(Ref = Female)			
Male	3.9	0.683	7.75	0
Intercept	0.175	0.027	-11.38	0

Note: Brown color indicates the categories that were statistically significant at 5% level.

*This regression was run without any control variables

No. of Observations = 906
Log Likelihood = -526.13

LR chi-square (1) = 69.76
P>chi-square = 0.0000
Pseudo R-Square = 0.0622

Next, I use binary logistic regression to regress the Primary occupational status on Sex controlling for class, caste, level of education and village of residence. Overall the model, is statistically significant at 5% level as confirmed by the likelihood ratio test (see table 2.13 for details).

Table 2.13: Logistic Regression* of Primary Occupation in Six ICRISAT Villages in 2014

PRI_Occ	Odds Ratio	Std. Err.	z	P>|z|
Farm	Ref. Outcome			
Non_Farm				
Sex	(Ref = Female)			
Male	3.42	0.707	5.95	0
Class	(Ref = Landless)			
Small	0.54	0.142	-2.33	0.02
Medium	0.31	0.09	-4.05	0
Large	0.13	0.042	-6.31	0
Caste	(Ref = SC)			
BC	0.99	0.22	-0.05	0.96
FC	0.53	0.127	-2.63	0.008
Education_Level	(Ref = Illiterate)			
Primary	1.78	0.561	1.84	0
Secondary	3.95	1.017	5.33	0
High_School	8.99	2.96	6.66	0
Graduate or Above	18.5	7.49	7.17	0
Region	(Ref = Aurepalle)			
Dokur	2.91	0.912	3.4	0.001
Kalman	0.38	0.132	-2.77	0.006
Kanzara	0.17	0.058	-5.2	0
Kinkhed	0.47	0.163	-2.16	0.03
Shirapur	0.4	0.127	-2.87	0.004
Intercept	0.33	0.108	-3.38	0.001

Note: Blue color indicates the categories that were statistically significant at 5% level.

*This regression is run with the main variable of interest and all the control variables as specified.

No. of Observations =906
Log Likelihood = -442

LR chi-square (15) = 238.04
P>chi-square = 0.0000
Pseudo R-Square = 0.2122

Effect of Sex[16]:

As we observe the effect of being a male, the likelihood of being in non-farm vs. farm employment increases by 3.42 compared to that of being a female. In other words, the odds of taking up non-farm work instead of farm work is more than three times as we switch from female to male. This result is consistent with my expectation (and also with previous studies mentioned earlier) that males are more likely to engage in non-farm work as compared to females i.e. there is a gender segregation prevailing in the rural labor market after controlling for the other variables. The coefficient on Sex is statistically significant at 5% level. This effect is net of the effect of other covariates of occupational status including class, caste and education. In addition to the main effect of sex on occupation, the control variables also effect a respondent's occupation.

Effect of Class:

As we observe the effect of class on primary occupational status, the likelihood of being in non-farm vs. farm employment decreases by 0.13 (or 87%). This result implies that across the villages, individuals from the landless class are more likely to participate in non-farm work as compared to the large landholding class. A similar trend in likelihood is observed as one moves from landless to small as well as medium

[16] Note: To further examine the effect of sex on occupation, I estimated separate logit models for men and women. However, due to insufficient number of observations for women in a particular occupational category, the estimates from the model did not converge. Hence, the results from these models are unreliable and have not been reported. For details about non-convergence in logistic regression related to the problem of categories refer to Allison (2008).

households. One plausible explanation about this pattern is that for the landless, it is relatively easier to move into diverse occupations as compared to the landholding class because they are not constrained by having land as an asset. All the coefficients on Class are statistically significant at 5% level.

Effect of Caste:

Similarly, as we observe the effect of being from the forward caste, the likelihood of being in non-farm vs. farm employment decreases by 0.53 compared to that of being from a scheduled caste. Putting it differently, individuals from the scheduled castes are more likely to take up non-farm work as compared to the forward castes. This behavior is likely due to a combination of possible reasons: a) since class and caste are often correlated (but not perfectly collinear), the patterns for caste mimic the patterns for the caste variable because the upper or the forward castes are associated with larger landholdings as compared to the backward or the scheduled caste, and b) As documented before, in many situations, the lower castes are rejecting the traditionally dominant relationships of the upper castes by moving towards alternative occupations i.e. non-farm work opportunities.

The likelihood trends for both the backward and forward castes in comparison to the scheduled caste is the same. However, coefficient on FC is statistically significant at 5% but not so in the case of BC.

Effect of Education:

If one examines the educational level and its effect on the likelihood of being in non- farm vs. farm employment, the results are statistically significant at 5% level except for the primary category. For every additional year of education attained, we can observe the effect of secondary education on the likelihood of non-farm vs. farm work. This likelihood of being in non-farm vs. farm work increases by almost four times as compared to being illiterate. The same trend is true for all the other higher levels of education and the coefficients for all of them are statistically significant at 5% level. For instance, the effect of having a undergraduate college degree increases the likelihood of being in non-farm vs. farm by about eighteen times as compared to being illiterate. This result is consistent with my expectation (and previous studies) because many kinds of non-farm jobs like manufacturing do require some minimum level of education.

Effect of Village of Residence:

When we examine the effect of village on a respondent's occupational category, the results show that in different villages individuals are employed in different occupational categories. For instance, as we move from Aurepalle (our reference village) to Dokur, the likelihood of individuals participating in non-farm work as opposed to farm work increases by almost three fold (Odds Ratio = 2.91). The coefficient for Dokur is statistically significant at 5% level. Aurepalle and Dokur are two villages within the same state of Andhra Pradesh. In effect, this suggests that there is not only significant inter-village but also intra-state variation in patterns of occupational work. Second, as we move from Aurepalle to Kalman, the likelihood of

individuals participating in non-farm work as opposed to farm work decreases by 0.38 (i.e. by 62%). The coefficient for Kalman is statistically significant at 5% level. Kalman is a village in eastern Maharashtra. So, this result shows that there is inter-village as well as inter-state variation in patterns of occupational work. The coefficients for all the other villages are statistically significant at 5% level.

Overall, the results from the multinomial regression model are consistent with the results from the contingency tables particularly with respect to the effect of sex on occupational status. Importantly, this effect is not eliminated when other variables associated with occupation are controlled. These findings justify my continued focus on women's economic activity throughout the remainder of this research. .

Further, I examine how social class and caste interact with each other. In the Indian context, recent studies by Vaid (2012) and Desai and Dubey (2012) have shown that class and caste are closely related to each other but there is no definitive relationship between the two. In order to investigate if class moderates the effect of caste on primary occupation, I introduce a statistical interaction[17] term in the model. I use the binary logistic regression model to regress primary occupational status on Sex, the main control variables like Class, Caste, Level of Education and Region of Residence and the interaction term. Overall the model, is statistically significant at 5% level as confirmed by the likelihood ratio test (see table 2.14 for details).

[17] Note: This is equivalent to saying that we are checking whether caste moderates the effect of class in primary occupation as mathematically they are the same in terms of statistical interaction.

The effect of gender on primary occupation continues to be statistically significant at 5% level. The odds ratios of most other variables that are significant are around the same. One of the categories in the interaction terms that is statistically significant at the 5% level is the coefficient of the corresponding term (Large * FC). As we observe the effect of class on primary occupation, the likelihood of being in non-farm vs. farm employment decreases by 0.75 (or 75%) from landless to the large landholding class after controlling for the other variables. This is the main effect of class on primary occupation for the individual if he/she belongs to the SC category. Over and above this main effect, the likelihood of being in non-farm vs. farm employment further decreases by 7% for a person from landless to the large landholding class if he/she belongs to the FC instead of BC. This implies that being from the forward caste further diminishes the chances of taking up non-farm employment vs. farm employment if the individual is already a large landholder. Intuitively, this finding makes sense because the forward (or the upper) caste people who are generally also the large landowners find either farming to be profitable enough or are stuck with land as an asset and hence continue to farm.

Table 2.14: Logistic Regression* of Primary Occupation in Six ICRISAT Villages in 2014

PRI_Occ	Odds Ratio	Std. Err.	z	P>|z|
Farm	Ref. Outcome			
Non_Farm				
Sex	(Ref = Female)			
Male	3.47	0.724	5.97	0
Class	(Ref = Landless)			
Small	0.75	0.277	-0.79	0.432
Medium	0.22	0.12	-2.74	0.006
Large	0.25	0.127	-2.71	0.007
Caste	(Ref = SC)			
BC	1.17	0.57	0.33	0.738
FC	1.26	0.851	0.35	0.73
Interaction Term	(Ref = Landless *SC)			
(Class * Caste)				
Small * BC	0.66	0.37	-0.74	0.46
Small * FC	0.37	0.26	-1.38	0.169
Medium * BC	1.46	1.02	0.54	0.589
Medium * FC	0.95	0.83	-0.06	0.955
Large * BC	0.56	0.4	-0.81	0.417
Large * FC	0.18	0.156	-1.97	0.049
Education_Level	(Ref = Illiterate)			
Primary	1.78	0.561	1.84	0
Secondary	3.95	1.017	5.33	0
High_School	8.99	2.96	6.66	0
Graduate or Above	18.5	7.49	7.17	0
Region	(Ref = Aurepalle)			
Dokur	2.91	0.912	3.4	0.001
Kalman	0.38	0.132	-2.77	0.006
Kanzara	0.17	0.058	-5.2	0
Kinkhed	0.47	0.163	-2.16	0.03
Shirapur	0.4	0.127	-2.87	0.004
Intercept	0.33	0.108	-3.38	0.001

Note: Red color indicates the categories that were statistically significant at 5% level.

*This regression is run with the main variable of interest, all the control variables and an interaction term.

No. of Observations =906 LR chi-square (21) = 244.98
Log Likelihood = -438 P>chi-square = 0.0000
Pseudo R-Square = 0.2183

Hence, caste is a moderator between class and occupational status because the odds of being away from non-farm work are further triggered when the large landowner also belongs to the Forward Caste as compared to being in the Backward Caste.

CONCLUSION

With the rise of the non-farm sector, there has been a significant diversity of occupations in rural India. The diversification of livelihoods across villages has brought about major changes in the socio-economic structure of rural India. A key element of this change is reflected in the changes in the occupational structure by gender.

In this chapter, using pooled data for 2009 and 2014, I examined the relationship between sex of the individual and occupation in rural India using a) descriptive statistical analysis and b) logistic regression after controlling for caste, class, education, and village of residence. The evidence shows that sex, caste, class and education are integral to occupational patterns in rural India. In particular, gender is an extremely powerful predictor of occupational type regardless of the control variables or village of residence.

A significant portion of the work in this chapter was devoted to data management issues. This provides the ability to make the chosen data modules comparable and consistent as far as possible on key dimensions for use in the later chapters. For example, I had to merge and append data across several files using a unique identifier. Thereafter, I had to recode many variables such as primary occupation and caste to make them meaningful as well as amenable for carrying out data analysis. In this chapter, I have

considered only the primary occupation of the individual. In the next chapter, I expand the category of employment to account for the growing predominance of multiple job holding by men and women in rural India. This additional aspect of the increasing occupational complexity of rural India must be accounted for to appreciate the current situation. In chapter 3, I continue to use pool cross-sectional data to examine the determinants of occupational diversification in rural India for 2014.

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CHAPTER 3

Occupational Diversification in India's Rural Economy With a Particular Focus on Multiple Job Holding

Introduction

In the previous chapter, I examined the participation of men and women in the Indian rural labor market with reference to their primary occupation. However, over recent years, several studies show that occupational diversification including multiple job holding is becoming increasingly dominant in rural India (Himanshu et al., 2016; Garikipati, 2008; Jones, 2008; Ellis, 2000). Using micro-level longitudinal data collected from a village in western India, Jones (2008) observes that over a twenty-five year period, livelihoods have become more complex in terms of location, types of non-farm activities performed by individuals, and a combination of farm as well as non-farm activities. Hence, restricting the analysis to primary occupation as I did in chapter 2 masks important aspects of complexity in India's increasingly diversified rural economy. In this chapter, I conceptualize occupational diversification as when individual household members pursue more than one economic activity or occupation. For instance, an "agricultural laborer" may also cultivate some land and/or perform part-time work in a factory. In this analysis, the diversity in occupational status[18] of an

18 Over and above the sectoral aspects, occupational diversification could also encompass a spatial dimension (e.g. working in one's own-village or commuting for work or seasonal migration) as well as a temporal aspect (e.g. working as farm laborer for three months and seasonally migrating for manufacturing work for the rest of the year). While I acknowledge these aspects of diversification, my analysis is confined to diversity based on the sector of employment.

individual is confined to the sectoral aspect i.e. carrying out multiple jobs in different sectors (e.g. a farmer moving towards a part-time clerical job as well as practicing part-time farming). Operationally, occupational diversity is captured by examining the primary and secondary occupations that individuals perform in rural India. Primary and secondary occupations for the individuals are categorized according to the share of time spent in a job or activity in one year. In this chapter, I examine data on primary and secondary occupations for the individuals residing in the six villages of ICRISAT between 2009 and 2014.

Using the measure of primary and secondary occupations as defined in the ICRISAT survey, the purpose of this chapter is to empirically examine the following two interrelated questions:

1) What is the prevalence of combinations of primary and secondary occupations for rural men and women in 2014? How has this trend changed between 2009 and 2014?

2) What are the determinants of the different configurations of occupational status for men and women in rural India in 2014?

ICRISAT Data With Respect to Occupational Diversity

Himanshu et al. (2016) and Reddy (2013) document that the data collected by ICRISAT investigators is high frequency. They have collected data for each day in a year; hence they have a record for all 365 days on whether a person worked for wages or not; how many hours he/she worked on each day, and at what wage rate. The details include paid-work days (including at different occupations, with wage rate), work on

own-farm, domestic work (like utensils cleaning, washing clothes, etc.), work on own-livestock, and as well as sick- and unemployed-days. Unlike these data, most longitudinal village surveys have long gaps between revisits. This assumes importance for my research on the economic activities of men and women because it is well documented by scholars that the Indian census and the National Sample Survey Organization (NSSO) underestimate the economic work of women (Vijay, 2015; Antonopoulos and Hirway, 2010; Dev, 2004; Hirway, 2002; Jain 1996). Fortunately, women's work is captured in much greater detail in smaller, village-level surveys such as the ones administered by ICRISAT. For example, with respect to the classification of workers in a village in western Uttar Pradesh, Vijay (2015) observes that women who manage livestock in households and also sell milk are counted as subsidiary workers in the census, while those who manage the livestock but use dairying for domestic consumption are not counted as workers at all. Accounting for the increased participation of women in such forms of "invisible" work that are directly related to production of goods for domestic consumption has tremendous implications for household well-being and gender equity (Naidu, 2016).

For an extensive discussion on comparisons between Census and NSSO data in employment and unemployment, see Kasturi (2015). Similarly, Dewan (2016) provides an exhaustive discussion on how women's work in rural India can be better accounted for by incorporating corrective measures to the NSSO data. For instance, the author expands one of the NSSO defined categories of work performed by women i.e. from those 'who attend to domestic duties only' to those who 'attend domestic duties and also engage in foraging (vegetables; roots; firewood; cattle feed, etc.), sewing, tailoring,

weaving, etc. for household use' (Dewan, 2016). By doing so, the activities listed above (that save, augment or reduce the need of household incomes) are assigned a quantified value in terms of the hours worked by women, and make these important activities comparable to the sources of wage income earned by women. Along similar lines, ICRISAT surveys have the advantage of capturing detailed time-use information for each activity so that unpaid work, mostly done by women, (like domestic and care work) can be quantified and compared with occupations like paid construction work.

Substantive Implications of Multiple Job Holding

The main purpose of this chapter is to better understand the effects of individual participation in multiple jobs on gender differences in economic activity within rural households in India. As mentioned earlier, since women's occupational roles have been undervalued in the patriarchal context of rural Indian society, and in formal data systems, it becomes even more important to look at both primary and secondary occupations of both men and women. For instance, based on their study of social and economic changes that have occurred over the last thirty years in two villages of Bihar, Datta, et al. (2014) observe that secondary occupations are far less gendered than primary occupations. While the majority of women declare 'household work' as their primary occupation, most of them report some form of economic activity as a secondary occupation (Datta, et al., 2014). At the same time, it is important to remember that even when women report domestic or household work as their primary occupation, they undertake activities that contribute to the economic wellbeing of the households, such

as collecting food, fuel and fodder, stitching and weaving, poultry and animal husbandry, and teaching children (Siddiqui *et al*., 2017). Moreover, their domestic work would have to be hired if they did not do it. Hence, domestic work reduces the need for cash income.

In addition, the analysis of primary and secondary work by men and women will illustrate how differences in class position amongst households are associated with the likelihood of multiple job holding by men and women in rural India. Is multiple job holding more typical among higher classes, or is it a survival strategy primarily used by the lower classes to simply get by? Do current changes in occupational status that involve multiple jobs by one or more household members require us to re-think our conceptualization of rural class structure?

Research Strategy

In this chapter, I use the same ICRISAT data modules as in chapter # 2, as well as the derived data sets that were used in that analysis. More specifically, I am using data for those individuals who belong to the same households in 2009 and 2014 (unless any of those members got married between 2009 and 2014).

I operationalize each of the primary and secondary occupations into four categories:

a) Farm Sector: Regular Farm-Servant[19]/Farm Labor/Farming/Livestock

[19] Farm servants are similar to attached labor. They work for an upper-class farmer or a landlord and are often paid in-kind wages (e.g. food grains). Farm servants are employed for a fixed-term contract (e.g. for a year) and these contracts are renewable. Farm servants usually belong to the lowest ranking caste, and often they continued to be hired from one generation to the other.

b) Non-Farm Sector: Caste-Occupations/Non-Farm Labor/Business/Salaried Jobs

c) Domestic Work: Individuals carrying out household work

d) Not Working: Enrolled in school or college/Too old or young to work/Disabled

The number of occupational categories in the ICRISAT dataset is too large and detailed to carry out a meaningful analysis. Hence, in order to make the analysis more manageable, as well as capture the maximum extent of economic activity for both men and women, I recode primary and secondary occupations to give fifteen different occupational categories[20] (see table 3.1 below). Further, for purposes of parsimony, these fifteen different categories of primary[21] and secondary occupations were aggregated into four new categories based on participation of individuals in one or more occupations. The four aggregated categories form a new derived variable called 'Occupational Status'. The multi-active category means that an individual has one primary and one secondary occupation.

[20] Note: In this process of recoding primary and secondary occupations, I have excluded the category of people who are not working at all i.e. those who do not report 'not-working' under both primary and secondary occupations. For instance, this situation can arise when a boy growing up in a household goes to school and also doesn't help out with any domestic work in the household.

[21] Primary and secondary occupations for the individuals are based according to the share of time spent in a job or activity in one year.

Table 3.1: Recoding of Primary and Secondary Occupations

Primary Occupation Status	Secondary Occupation	Occupational
1) Not Working	Domestic	Part-time
2) Not Working	Farm	Part-time
3) Not Working	Non-Farm	Part-time
4) Domestic	Not Working	Domestic
5) Domestic	Domestic	Domestic
6) Domestic	Farm	Part-time
7) Domestic	Non-Farm	Part-time
8) Farm	Not Working	Primary Occ. Only
9) Farm	Domestic	Multi-active
10) Farm	Farm	Multi-active[22]
11) Farm	Non-Farm	Multi-active
12) Non-Farm	Not Working	Primary Occ. Only
13) Non-Farm	Domestic	Multi-active
14) Non-Farm	Farm	Multi-active
15) Non-Farm	Non-Farm	Multi-active[23]

[22] When the primary and the secondary occupations both are related to farming this means that an individual is working in two separate farm jobs (e.g. primary occupation as a farm worker on somebody else's farm and secondary occupation of cultivating his own land)

[23] When the primary and the secondary occupations both are related to non-farm work this means that an individual is working in two separate non-farm jobs (e.g. a woman's primary occupation is in the construction sector and her secondary occupation is tailoring)

The aggregation scheme shown above is driven by the research question as well as by methodological constraints. As Gang et al. (2016) observe, the way in which occupational categories are differentiated is critical to any analysis of employment diversification because one has to carefully balance the practical need to use only a few groupings without clubbing together fundamentally different positions. For instance, in the context of their study villages the authors distinguish between landless laborers from the self-employed. They argue that combining them into one occupational category would combine the effect of caste on occupational structure since the dominant castes are predominantly landowners whereas the lower castes largely constitute the category of landless workers (Gang et. al, 2016).

Descriptive Analysis

First, I examine the changing trends in occupational status for all rural workers in the six villages based on an aggregate measure of primary and secondary occupations from 2009-2014. As can be seen in table 3.2, there is a rise in the percentage of individuals holding multiple jobs, and a percentage decline in persons holding only one job. Hence, these data show a trend towards increasing occupational diversification when viewed through the lens of multiple job holding. Amongst the rural working population in 2009, the multi-active category is the largest group followed by workers having primary occupation only. Both of these groups are substantially more prevalent than the other two groups. Between 2009 and 2014 the multi-active group grew the fastest, and consolidated its rank as having the biggest share. In contrast, the share of people having only primary occupation declined significantly between 2009 and 2014

and now accounts for the lowest share among the working population. In fact, the percentage of workers having a primary occupation only declined by 12.2 % from 2009 to 2014. The share of workers having part-time and domestic jobs remained relatively stable during the period.

Table 3.2: Occupational Status* of Rural Workers (Females & Males) in India

	2009		2014		2009-2014
Occupational Status	Number (#)	Percentage (%)	Number (#)	Percentage (%)	% Point Change
Multiactive	631	46.1	752	57.5	11.4
Part-Time	251	18.4	238	18.2	-0.2
Domestic	157	11.5	163	12.5	1
Primary Occ. Only	329	24	154	11.8	-12.2
Total	1368	100	1307	100	

*Occupational Status includes the four derived categories based on aggregation of primary and secondary occupations.

Next, I examine the composition of occupational status by gender between 2009 and 2014 (as shown in table 3.3). First, it is clear that the composition of occupational status for females is different from that of the males [Note: Chi-square (2009) = 444.36, p-value=0.000 and Chi-square (2014) = 306.65, p-value=0.000]. Men are much more likely to hold multiple jobs, and to have only one primary job. Women are more likely to be part-time or domestic workers. From table 3.3, we can also see that between 2009 and 2014 for both rural females and males, the percentage share of workers in multiple occupations has increased by 6.6 percentage points, and 16.4 percentage points respectively. However, it should be noted that the percentage point increase is much

greater for males than females. Similarly, between 2009 and 2014, for both females and males the percentage share of rural workers having a primary occupation only has declined by 3.8 percentage points, and 20.7 percentage points respectively. In this case, the drop in percentage points is much higher for males than females.

Table 3.3: Composition of Occupational Status* by Gender in Rural India

	2009				2014			
	Females		Males		Females		Males	
Occupational Status	(#)	(%)	(#)	(%)	(#)	%	(#)	%
Multiactive	301	43.9	330	48.3	332	50.5	420	64.7
Part-Time	210	30.7	41	6	175	26.6	63	9.7
Domestic	144	21	13	1.9	147	22.3	16	2.5
Primary Occ. Only	30	4.4	299	43.8	4	0.6	150	23.1
Total	685	100	683	100	658	100	649	100

*Occupational Status includes the four derived categories based on aggregation of primary and secondary occupations.

In table 3.4, I examine the changes in gender composition of occupational status. Between 2009 and 2014, the percentage point share of females employed in multiple occupations and primary occupations both declined, by 3.7% and 6.5% respectively. Women's share of the part-time workers also declined by 10.7 percentage points during the five-year interval whereas their share in domestic worker was quite stable and high (around 90%).

In conclusion, from tables 3.3 and 3.4, there is an increase in the % of multi-active workers in the male population, and simultaneously an increase in the % of males

amongst the multi-active population between 2009 and 2014. In contrast, women's situation is different. Even though a higher percentage of women work at multiple jobs, their share of all multiple job holders declined. Their engagement with part time and primary occupations only also declined during the 5 year period. Partly, this is because the percentage of women indicating that they are *not working* increased between 2009 and 2014 (See Chapter 2). As discussed earlier persons not working are in school, disabled or too old or young to work, or are purposely kept out of work as a marker of a household's higher social status.

Table 3.4: Composition of Gender by Occupational Status* in Rural India

	Multi-Active		Part-Time		Domestic		Primary Occ. Only	
Gender	2009	2014	2009	2014	2009	2014	2009	2014
Females	301 (47.7%)	332 (44%)	210 (83.7%)	175 (73%)	144 (91.7%)	147 (90.2%)	30 (9.1%)	4 (2.6%)
Males	330 (52.3%)	420 (56%)	41 (16.3%)	63 (27%)	13 (8.3%)	16 (9.8%)	299 (90.9)	150 (97.4%)
Total	631 (100%)	752 (100%)	251 (100%)	238 (100%)	157 (100%)	163 (100%)	329 (100%)	154 (100%)

*Occupational Status includes the four derived categories based on aggregation of primary and secondary occupations

Determinants of Different Configurations in Occupational Status

Using the grouping of primary and secondary occupations developed in table 3.1, and cross-sectional ICRISAT data from six villages, I use multinomial logistic regression to model the determinants of variability among demographic groups in occupational status

in rural India for the year 2014. Note: Since the number of females participating only in primary occupation (4) is very small compared to the total number of females in the population (658) in 2014, running a separate model for females is problematic due to lack of convergence of the model. Accordingly, rather than run the model separately for men and women, I run a total model with sex as a variable. Second, I believe that all the four occupational status combinations represent distinctly different economic categories, hence a further level of aggregation would lead to a loss in meaningful information. Thus, I have chosen to estimate the model for the entire working population with four occupational categories. Since most of the rural working population in this analysis have multiple jobs, the multi-active group is chosen as the reference category for the outcome variable i.e. occupational status. The unit of analysis in this chapter is an individual who is a part of the family[24] during 2009 and 2014.

Prior to the analysis of the multinomial logit model, I examined the degree of collinearity between the independent variables to be used in the model. As discussed in chapter 2, this could be a problem especially for class and caste. The degree of collinearity can be detected by the values of the variance inflation factor (VIF) and/or the condition index. As a rule of thumb, a VIF value greater than 10, and/or a condition index greater than 30, indicates serious multicollinearity (Kennedy, 1998:190). A high degree of multicollinearity reduces the accuracy of the parameter estimates, and hence this problem needs to be dealt with.

[24] I follow the US Census Bureau's definition of family, e.g. two or more members who live in the same home and are related by birth, marriage or adoption.

Since occupational status is not expected to vary linearly[25] with the age of the individual, I included both 'Age' and the square of Age, (denoted by AgeSQ) as variables in the model. As shown in the left part of table 5, multicollinearity is not a problem except with reference to the 'Age' and 'AgeSQ' variable. This problem is generally expected with the inclusion of higher-order terms (like Age and AgeSQ) because every variable is likely to be correlated with itself. But this problem must be addressed before we proceed for further analysis. In order to do so, I centered the age variable by defining a new variable, AgeC, where AgeC = [Age of the individual – Mean Age of the working population]. As shown in the right column of table 5, the centering procedure drastically reduces the problem of collinearity (since Mean VIF is far less than 10 and the condition index is less than 30). From table 3.5, it is clear that there is also no problem of collinearity between class and caste.

25 A polynomial like a quadratic function provides a functional form that captures the curvilinearity of the variable of interest (e.g. age here) of the model.

Table 3.5: Collinearity Test between Independent Variables

Independent Variables	Non-Centered*	Centered**
Class	1.07	1.07
Caste	1.04	1.04
Family_size	1.07	1.07
Years_Edu	1.49	1.49
Marital_Status	2.03	2.03
Age	29.26	2.64
AgeSQ	25.06	1.34
Mean VIF	7.77	1.48
Condition Index	44.25	12.42

In the left column labelled non-centered*, Age is used as the original variable (along with AgeSQ)

**In the right column labelled centered, I use the centered age variable where AgeC = (Age-Mean Age). Correspondingly, the squared version AgeCSQ = $(AgeC)^2$ is used.

Next, I estimate the multinomial logit model. Overall, the model is statistically significant at 5% level as indicated by the likelihood ratio statistic (LR) given below in table 3.6:

Table 3.6

Number of Observations = 1,306
LR chi-square (51) = 1028.15
Pr > chi-square = 0.0000

The odds ratio in a multinomial logistic regression model is defined as the ratio of the probability of being in a particular category to the probability of being in the reference

category (Liu, 2016). In my analysis, this means the probability of being in a particular occupational status compared with having multiple jobs. Odds ratios greater than one are positive, while those less than one are negative. The multi-active category is chosen as the reference category in my estimated model because as indicated earlier, it is the most prevalent category, and it has grown over time.

Since a greater proportion of the population in the ICRISAT villages has multiple job holdings, it reflects the predominantly existing reality of rural India. Multiple job holding[26] is the norm in terms of employment situation rather than the exception. Hence, the multi-active category serves as a point of departure and is the adequate benchmark for comparison against other categories. So, through our estimated model, we obtain the likelihood of an ICRISAT respondent having particular characteristics (e.g. say, a married female belonging to the landless and scheduled caste category) being in a particular occupational status as compared to being multi-active. The model is organized so that one can ascertain the effect of one's socio-demographic attributes on being in each of the three categories of occupational status (part-time, domestic, primary occupation only) relative to being in the multi-active category. I show only those odds ratios that are statistically significant at 5% level in table 3.7.

[26] In the context of rural India, multiple job holding reflects a situation of economic distress. Diversification in this case can be viewed as a survival strategy.

Table 3.7: Determinants of Variability in Occupational Status for Indian Rural Workers in 2014

Reference Category for Occupational Status = Multi-active

	Part-Time	Domestic	Primary Occ. Only
Sex			
Male	0.07	0.034	21.7
Class			
Small			0.43
Medium			0.5
Large			0.22
Caste			
Backward Caste (BC)			
Forward Caste (FC)		1.78	
Marital_Status			
Married	0.14		0.37
Others	0.083		
Family_Size		1.09	1.04
Yrs_Edu	1.06	1.23	1.125
AgeC	0.92	0.94	
Region			
Dokur			4.8
Kalman	9.35		
Kanzara		2.83	0.4
Kinkhed	3.55	4.66	
Shirapur	0.43		
Constant		0.02	0.02

Odds Ratios with significance level at or under 5% (i.e. P<= 0.05) are indicated in the table.

Reference Group for the Independent Variables: Sex = Female, Class = Landless, Caste = Scheduled Caste (SC), Marital_Status = Unmarried, Region = Aurepalle

Note: Mean Age = 38 years, AgeC= Age – Mean Age = AgeC - 38

As shown in Table 3.7, men, married people, and older people beyond 38 years are less likely to be part-time workers compared with holding multiple jobs. In contrast, persons with higher educational attainment and residents of Kalman village are more likely to be part time workers than multiple job holders. Compared with women, men are 93% less likely (odds=0.07) to participate in part-time work as opposed to being multi-active. Similarly, compared with the unmarried group, married people are 86% less likely (odds=0.14) to participate in part-time work as opposed to being multi-active. For each additional year spent in education, individuals are 6% more likely (odds=1.06) to participate in part-time work as opposed to being multi-active. For each additional year of age beyond 38, individuals are 8% less likely to (odds=0.92) to participate in part-time work as opposed to being multi-active. Further, since the odds ratio for the AgeCSQ variable is one, the individual's likelihood of participating in part-time work as opposed to being multi-active does not vary nonlinearly with age i.e. the assumption that occupational status might vary non-linearly with age doesn't hold true in this context. Several of the regional controls in the model are statistically significant indicating the need to account for the location of respondents. For instance, when the location changes from Aurepalle to Kalman, the likelihood of an individual participating in part-time employment compared to being multi-active increases by almost nine times (odds=9.35).

With respect to domestic workers, the odds ratios of the following factors are statistically significant at 5% level: Sex, Class, Caste, Family Size, Years of Education, AgeC, AgeCSQ, and Region. Firstly, with respect to the sex of the respondent, men are

97% less likely than women (odds=0.03) to participate in domestic work as opposed to being multi-active. Regarding caste, the data show that members of the Forward Caste are almost 1.8 times as likely to carry out domestic work as compared to being multi-active (odds=1.78). Family size and educational attainment are also positively associated with carrying out domestic work as opposed to being multi-active. For each additional member in the family, individuals are 9% more likely (odds=1.09) to participate in domestic work as opposed to being multi-active. Similarly, for each additional year of educational attainment, individuals are 23% more likely (odds=1.23) to participate in domestic work as opposed to being multi-active. Note: This finding is quite surprising and will be discussed in detail in the next section of the chapter. For each additional year of age beyond 38, individuals are about 6% less likely to (odds=0.94) to participate in domestic work as opposed to being multi-active.

The next column in table 3.7 focuses on the association of various sociodemographic attributes on the likelihood of having only a primary occupation compared with being multi-active. Gender, family size and years of education are positively associated with having a sole occupation while social class, and being unmarried are negatively associated. Compared with women, men are about 22 times more likely (odds=21.7) to only have a primary occupation as opposed to being multi-active. Similarly, compared to the landless workers, individuals from the other three landowning classes are less likely to only have a primary occupation as opposed to being multi-active. Small landholders are 57% less likely, medium landholding class are 50% less likely, and the large landholding class is about 78% less likely to only have a primary occupation as

opposed to being multi-active. Married persons are also less likely to have only a primary occupation. Compared with the unmarried group, married people are 63% less likely to only have a primary occupation as opposed to being multi-active (odds=0.37). In contrast, people from larger families and with greater education are more likely to have only a primary occupation compared with working more than one job. As shown in the last column of table 3.7, for each additional member in the family, individuals are 4% more likely to only have a primary occupation as opposed to being multi-active (odds=1.04). and, for each additional year spent in education, individuals are 13% more likely to only have a primary occupation as opposed to being multi-active (odds=1.13).

Similar to chapter 2, after running the main multinomial logistic regress model, I examine if caste moderates social class in its relationship to occupational status. As discussed in detail in chapter 2, in the Indian context, Vaid (2014; 2012), and Desai and Dubey (2012) show that though the relationship between class and caste is not completely straightforward, a tentative picture of congruence between the two exists. To examine whether caste moderates the effect of social class on occupational status (or social class moderates the relationship between caste and occupation status), I created a multiplicative interaction term between class and caste and added this variable to the main multivariate model. All of the interaction terms are not statistically significant at 5% level after controlling for gender, class, caste, education, family size, marital status and age. Hence, after aggregation of primary and secondary occupations, I find that there is no empirical relationship to show that caste moderates the relationship between class and occupational status.

Discussion on Key Findings

Effect of Sex: From the above discussion, a major finding is that after controlling for other factors, men are more likely to have a single job (i.e. farm or non-farm as a primary occupation) over multiple occupations. Compared to women, men are also less likely to participate in part-time or domestic work as opposed to being multi-active because mostly men usually have one major primary occupation like farm or non-farm work, and certainly are unlikely to be not working or to be domestics. This finding is consistent with the perception of males being primary breadwinners in the household. After controlling for other factors, compared to women, men are much more likely to be engaged in one primary occupation alone like doing farm or non-farm work only as opposed to being multi-active. This trend is consistent with the multi-tasking nature of women's work activities (e.g. working as a farm labor on other's farm or a construction worker in the village as well as carrying out domestic work in the household).

Effect of Social class: After controlling for other factors, when we compare the large landholding group with the landless, they are less likely to participate in one primary occupation as opposed to being multi-active. One plausible explanation for this finding is that the upper classes might have more opportunities regarding work compared to the landless. For instance, the upper-class individuals might have land available to carry out some form of farming activity as well as get involved in non-farm work. But the landless might work, say, as farm laborers or as construction workers. Controlling for other factors, the above trend is true for each of the higher social classes as compared to the

landless. However, the reduction in odds ratio is less dramatic for the large landowners because some of them have better prospects of getting good quality non-farm jobs.

Effect of Caste: Surprisingly, except the single case of the domestic work category, caste is not a significant predictor of occupational status of individuals after controlling for the other variables. For domestic workers, individuals in the schedule caste group are likely to be more vulnerable compared to the forward caste and hence might need to take up multiple jobs compared relatively to the people from the forward caste[27].

Effect of Marital Status: Controlling for other factors, married people are less likely to engage in part-time work or have a primary occupation only as compared to being multi-active. One plausible explanation for this finding could be that married individuals have to support and sustain a family hence they might be more inclined towards multiple job holdings compared to having a single primary occupation. This would make sense in a multi-variate analysis where class, caste, and education are accounted for.

Effect of Family Size: Controlling for other factors, for every additional member of the family, respondents are more likely to participate in domestic work or farm or non-farm

[27] Since land distribution is largely unequal across caste groups, it is possible to conduct additional analysis by including interaction terms between caste and land size (read social class). This analysis can ascertain the differential impact of land size on occupational status for different castes. Further, to capture the effect of caste on occupational status over time, it is possible to add an interaction term between the caste group and the year as a dummy variable. This will provide us with a clear idea if there is a strengthening or weakening of the caste's relationship with occupational status over time in rural India.

work only as opposed to multiple activities. One plausible explanation is that with every additional member, responsibilities of the family will increase thereby reducing the time and scope for carrying out multiple jobs. Alternatively, one could argue that for every additional child, the burden on the family is relatively more net of other effects and hence the need to get multiple jobs increases. In other words, one could argue about this relationship going in either direction.

Effect of Education: After controlling for other factors, for each additional year of education attained by individuals, there is a higher likelihood of being in any of the other three categories (part-time or domestic or primary occupation only) as compared to being multi-active. One plausible explanation is that better educated individuals might be able to sustain with only a primary occupation like farm or non-farm work. Regarding the finding that an additional year of education might raise the likelihood of the individual towards domestic or part-time occupation in rural India, there are a couple of plausible scenarios documented in the literature. For instance, Jeffrey et. al (2005) examine why people continue to invest in formal education in the face of poor occupational outcomes as a household strategy in rural north India. Their research shows that the most recent generation of high school and college graduates amongst the Dalits (the lowest ranking caste) has failed to find salaried employment. But these young men continue to value education as a source of cultural distinction, sign of their modern status, and means of challenging caste-based notions of difference. Here, education is viewed a marker of social status though it doesn't lead to any opportunities towards job creation. Similarly, Srivastava and Srivastava (2010) document that for rural women,

work participation rates are higher for illiterate women than for women with higher levels of school education - a trend which reverses itself only for women with technical/vocational education or graduates. The authors cite the greater availability of jobs for men, and the restrictive social norms operating for women as reasons to explain this pattern.

CONCLUSION

To the best of my knowledge, this is one of the few studies that accounts for both primary and secondary occupations (i.e. multiple job holding) in defining occupational diversity in rural India. In this chapter, I used occupational diversity as a way to capture both the waged (and un-waged) work of individuals in rural India. Overall, our findings show a growing trend towards multiple job holding among ICRISAT respondents (both men and women) between 2009 and 2014. The negative associations between class and the probability of holding multiple jobs indicates that multiple job holding is not a strategy for additional economic accumulation among the relatively well off, but rather a survival strategy deployed by the least well off groups. Further, after controlling for other factors like social class, caste, marital status, family size, years of education and region, we find that gender is a key driver of occupational status in rural India in 2014. This latter finding implies that men's (and women's) occupational roles are linked to each other. But we do not know how men's and women's occupational roles are linked to each other. In the next chapter, I will use the panel/longitudinal features of the ICRISAT data to examine whether men's changing occupational roles are driving women's occupational roles in rural India between 2009 and 2014. In terms of data

management, I will use time-use data i.e. the actual time spent by the individuals in different economic activities. This will provide a more direct way of capturing waged and un-waged work.

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CHAPTER 4

Changes in Occupational Time Allocation within Households in the Indian Rural Labor Market

INTRODUCTION

In chapter 2, I examined the trends and changes in rural labor market participation of men and women with respect to their primary occupations between 2009 and 2014 using pooled cross-sectional data from six ICRISAT[28] villages. One of the key findings from this chapter is that gender is a key driver of labor market participation in rural India after controlling for social class, caste, education and village-level effects. In chapter 3, I examined the determinants of occupational status using primary and secondary occupations to describe the current structure of economic activity in rural India, how it has changed between 2009 and 2014; and the factors associated with these changes. From that comparative cross-sectional analysis, it was clear that the majority of the workforce (in the sampled ICRISAT villages) holds more than one occupation i.e. a primary and secondary occupation, and that multiple job holding had increased during the past five years. Also, after controlling for other factors, gender was shown to be associated with differences in the combination of occupations held by individuals in these rural villages. Virtually all of this previous research assumes that changes in men's occupations drive subsequent changes in women's occupations. Accordingly, in this chapter, I use micro-level, longitudinal time allocation data to examine whether changes in men's occupational roles between 2009-2014 drive changes in women's occupational

[28] International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India.

roles (or vice versa) in rural India. The availability of time-allocation data provides a measure of the actual time spent by men and women in different occupations in rural India. Hence, it is expected to account for the changing complexity of multiple job holding and rural underemployment in a more accurate manner than by way of aggregation of primary and secondary occupations.

Recent research (Lahiri-Dutt and Adhikari, 2015; Rao, 2011; Vepa, 2009; Garikipati, 2008; Jones, 2008) shows that men's movement towards non-farm employment has changed the household division of labor between men and women across sectors (including agriculture itself). For instance, certain agricultural tasks that were traditionally performed by men are now being performed by women. Vepa (2009) documents that in the hilly regions of northeast India, men traditionally cleared the forest and ploughed the land leaving the rest of the cultivation to women. But currently as non-farm work opportunities for men and less so for women have increased, they are less likely to work on family farms. In such a situation, most of the young women left behind and the elderly women cope with the increased work burden that now includes ploughing the fields (Vepa, 2009). In contrast, Eswaran *et al.* (2013) and Nakkeeran (2003) observe that despite men's movement towards non-farm activities, women do not work outside their own household in some parts of rural India. Based on the existing socio-economic realities of rural India, working outside the home is deemed to be a low-status activity for married, rural women (Eswaran, 2013). This is particularly true of the upper classes, which are often also the upper castes, which severely restrict women's activities (Srinivas, 1956). Hence, women's occupational roles are changing across India's rural landscape but not homogeneously. Past research in labor history and family

demography (Desai and Banerji, 2008; Janssens, 1997; Creighton, 1996; Desai and Jain, 1994) shows that the differential approach towards men's and women's occupational roles is based on a vision of the family that views the father as the primary breadwinner, and the mother as the primary provider of child care who may be occasionally employed. The concept of the male breadwinning family precludes wage labor by the female spouse. Moreover, since it focused exclusively on paid employment it neglects economic activities with less visible monetary links (Janssens, 1997). But, as noted above, women's work is becoming increasingly important and visible, both outside and inside the household in rural India. For instance, women are increasingly participating in own-farm supervision of hired and family labor in some rural areas, and, in other rural areas they commute to nearby towns with their spouses to carry out construction work. However, what is not known is the extent to which changes in men's occupational roles affect women's occupational roles within rural households or vice versa. The main hypothesis motivating this chapter is that changes in men's occupational roles between 2009 and 2014 drive changes in women's occupational roles within rural Indian households.

In order to examine this hypothesis, I use micro-level, longitudinal data from ICRISAT. Research using micro-level longitudinal data can effectively identify the many complexities of change in economic activities and in rural household structure. For instance, by following the same individuals within households over time, one can

examine how changes in male and female labor supply within the household affects the economic activities of the householder[29] and their spouse.

With the exception of Pal and Kynch (2000), there are very few studies that capture individual occupational changes within the household in the context of rural India. Using data from six villages in West Bengal, Pal and Kynch (2000) estimated the factors that affect the probability that individuals have successfully changed occupations over a twelve-month recall period. The main finding of their study was that the probability of changing occupation depends on gender (greater for men), age (greater for younger people), family size (greater for larger families), level of education (greater with higher levels of schooling), and village after controlling for other factors like household land size, marital status, and caste. However, this study mainly focusses on occupational changes for all the individual working members of the household. Though this study tells us that the probability of successfully changing occupation is greater for men compared to women after controlling for other factors, it does not address the issue of whether changes in men's or women's work drive changes in their respective spouse's economic activities, or if this relationship is bi-directional[30].

While accounting for the issue of bi-directionality, Skoufias (1993) was also the first study that used individual-level panel data in rural India to analyze the intra-family

[29] Householder is commonly referred to as the household head in ICRISAT surveys. I am adopting the nomenclature used by the US census for my analysis.

[30] Econometrically, the problem of directionality of men's and women's occupational roles driving each other is known as the **endogeneity** or simultaneity problem. This arises when one or more of the explanatory variables is jointly determined with the dependent variable i.e. one variable affects another variable(s) and is, in turn, affected by it (them). For detailed discussion, refer to Wooldridge (2000).

allocation of time between market, home, leisure and schooling activities. Using a time-use survey of a four year (1975-1978) panel of households from the six ICRISAT villages in rural India, a key finding of this study is that increases in the opportunity cost[31] of time of one family member not only affects the amount of time devoted to various activities by that family member but also has a significant effect on the time allocation of other family members. The author concludes that the cross-effects on the distribution of time along household members, provide evidence on the role of the family as an intermediary between public policies and individual well-being (Skoufias, 1993).

Building on the above research, my study uses an interdependent econometric model of spousal time allocation to different economic activities (*non-farm, off-farm* and *non-wage*) that allows for the simultaneity and endogeneity of changes in the time uses of the respective spouses during 2009 and 2014. My study is based on the variation (or change) in actual time use of the spouses' economic activities, not on changes in primary or/and secondary occupational status. In this study, the householder and their spouse together (i.e. *the couple*) constitute the unit of analysis. The couple is often embedded within the larger household structure that may include their children, grand-children, siblings and parents of various ages and sexes. Moreover, household composition may change over time as people are born or die, mature into working age or go into retirement

[31] Economists use the term **opportunity cost** to indicate what must be given up to obtain something that's desired. A fundamental principle of economics is that every choice has an opportunity cost. The idea behind opportunity cost is that the cost of one item is the lost opportunity to do or consume something else; in short, opportunity cost is the value of the next best alternative.

or join the household by marriage (e.g. a daughter-in-law of the couple becomes a part of the household).

IMPLICATIONS:

The implication of examining changes in occupational roles of women (and men) in rural Indian households is to unpack the substantive issues around the gendered aspects of the changing household economy in rural India, and more fully recognize women's contribution to rural household economic security. Hirway (2017) observes that even though unpaid work contributes significantly to the rural economy, it is not addressed systematically in policy making. Greater accuracy in measurement of women's work (e.g. through time-use studies) makes their contributions to the household economy more visible. Second, examining occupational change and mobility for both male and female spouses within the household has policy implications for reducing poverty in rural India. For instance, Dreze *et al.* (1992) argue that occupational mobility is a good indicator of a household's changing economic status. The authors provide evidence to show that occupational mobility is rather limited among farm workers who are generally from the poorest households in a village society. Third, occupational changes among rural women have substantial implications for the way in which the broad question of female labor force participation is framed. For instance, Desai and Jain (1994) observe that while women's work on the family farm might be a rational economic strategy, this decision is made in the context of labor market discrimination which ensures that it is chiefly women who work on the family farm and mostly men who work as wage workers. However, before one can claim that patriarchy or/and labor market discrimination against women directly influences the allocation of women's time to

various activities, within and outside of the household, one must show that women's changing economic roles are a result of changes in their husband's time spent in various kinds of economic activity.

Further, changes in occupational roles for both men and women have implications for their relative empowerment in the household. For instance, using evidence from rural north India, Rao (2012) highlights the co-performance of stereotypical gender roles, where men and women jointly seek to establish the status of women as housewives rather than farmers (or workers), and of men as providers. In this respect, changes in occupational roles affect change in women 's relative autonomy. But Rao (2012) has shown that these changes are incremental for maintaining household stability.

RESEARCH CONTEXT AND DATA MANAGEMENT:

As indicated in earlier chapters, I use ICRISAT data at the household[32] and individual levels from three districts and six villages in rural India: Aurepalle and Dokur[33] in Mahbubnagar District (Andhra Pradesh), and Shirapur and Kalman in Sholapur District, and Kanzara and Kinkheda in Akola District (Maharashtra). A more complete description of these villages can be found in Walker and Ryan (1990).

[32] In the ICRISAT database, the terms household and family are used interchangeably. But for clarification purposes, a household in the ICRISAT village includes a householder and one or more people living in the same unit who are related to the householder by birth, marriage, or adoption. All people in a household who are related to the householder are regarded as members of his or her family.

[33] Both Dokur and Aurepalle villages were located within the same district of Andhra Pradesh. Currently, both of these villages are a part of the newly formed state of Telangana.

Large scale data sources like the National Sample Survey Office (NSSO), the National Family Health Survey (NFHS), and the Indian Human Development Surveys (IHDS) contribute towards an understanding of broad questions of socio-economic transformation in rural India. But it is only studies carried out at the individual and household levels in rural villages that provide detailed, in-depth information, especially as they repeatedly trace changes over time at the household level. In this respect, the ICRISAT surveys have great promise because they involved repeated visits by researchers to households from selected villages over a long time and were exceptional in the frequency of their data collection. However, a practical issue that constrains data generated from longitudinal studies is that it requires connecting datasets that are generated from same sampling techniques, that use comparable concepts and definitions (ex. social class) and cover the same populations over time (Himanshu *et al.*, 2016). Accordingly, changes in measurement and inconsistency of coverage (in terms of surveys in selected years) over ICRISAT's history have reduced its usefulness over long periods of time. For this reason, I limit my analysis to data collected between 2009 and 2014. Between 2009 and 2014, not only do the surveys maintain consistency in the method of data collection but the measurement and definitions of the key concepts used by survey researchers were also the same throughout.

Data management is the first essential prerequisite for any empirical project. Data management involves how researchers document the data they collect; how they code their data; how they transform the raw data to operational variables; and how they ensure that the data are described and documented in a way that is consistent with the research question (Surkis and Read, 2015). For instance, the analysis in this chapter will be

confined only to those ICRISAT respondents who have the same householder status and the same spouse both of whom are married to each other in 2009 and 2014. While these restrictions involve deleting many individuals and households from the analysis, it permits me to directly examine how a change in one spouse's economic activities might affect changes in economic activities of the other spouse. A potential anomaly to this requirement would be a male member who is a son of a householder in 2009 but himself becomes the head of a new household in 2014. In this case, the member will be a part of the analysis in 2009 as an additional working member of the household but would not be a part of the analysis in 2014 because the status of the member has changed.

Each step of data management involves making decisions about the way in which variables are going to be used for subsequent analysis based on the focus of the research question, and the principle of parsimony. In the context of rural India, multiple activities fall under the category of farm work like farm labor, cultivation or a combination of the two. Similarly, activities like auto-driving, plumbing, construction work, etc. fall under the category of non-farm work. Since there are numerous activities in these categories, for purposes of recording time-use, I broadly grouped these activities into three primary occupations: Non-Farm, Off-Farm and Non-wage work. Under the ICRISAT database[34], non-farm work includes a large list of occupations e.g. working in a factory or construction or running a rickshaw, etc. The second category is off-farm work which means all farm activities carried out away from one's own farm. In other words, these

[34] In addition to database access, I have done extensive consultations about the raw data and the codebook with ICRISAT staff members to make the data amenable for analysis.

are farm activities performed not on one's own farm. The third category, non-wage work, is also complex. It includes the total time spent on one's *own-farm, own-livestock rearing and domestic work*. As will be explained below, including non-wage work is important because these non-remunerated activities are seldom counted as "work" in official labor or employment statistics.

VARIABLES USED FOR EMPIRICAL ANALYSIS:

Dependent Variable:

The *dependent variable* consists of four time categories: the time spent on non-farm, off-farm, non-wage work and non-work time (i.e. leisure time in economics) by the individual. Hence, leisure time is automatically determined because information in the dataset is available on the total number of days[35] spent per year by the householder and their respective spouse in non-farm, off-farm and non-wage work. Since one working day is equal to eight hours of work, the maximum number of working days theoretically possible is 365* 3 = 1095 days in a year. There are some extreme observations in the data i.e. having very small and very large values of days worked in a year. In this case, the logistic transformation or the natural logarithm of the proportion of time spent in an activity is helpful. This transformation treats very small and very large values symmetrically, pulling out the tails and pulling in the middle around 0.5 or 50%. For example, the time allocated by a spouse might entirely be towards non-farm work. Here, I use the logit transformation i.e. ln [(T-non-farm)/(1095-(T-non-farm+T-off-farm+T-

[35] The information about the total number of days spent per year on an occupation is provided in the several rounds of the ICRISAT survey module.

non-wage))] instead of T-non-farm. Further, in this case, the time spent by the spouse for farm and non-wage work is zero. Since ln 0 is undefined, I add one to each observation for the respective times and use the ln [(T-off-farm +1)/ (1095-(T-non-farm+T-off-farm+T-non-wage))] as my operational dependent variable for the time spent on off-farm work. Similar transformations will follow for the non-farm and non-wage work respectively. Hence, for purposes of data admissibility, the *operational dependent variable* that I use for estimation throughout is a very close approximation of the logistic transformation[36] of the original time allocation variable.

Hirway (2017) observes that the major advantage of time-use surveys over standard labor force surveys is that they do not ask any direct questions to respondents about whether they are "workers" or are engaged in any "economically productive activity". One of the major problems with standard labor force surveys is that, often, women themselves under-report their activities (such as domestic work or when they work on their own family farm). Instead, in time-use surveys information is collected on how respondents spend their time on different (and often multiple) activities throughout the day or week or month. This information is likely to have less bias as it is able to capture non-wage work in contrast to labor force surveys. In the context of a developing economy like India, Dhar (2012) observes that the average number of days of employment per worker is perhaps the best and most appropriate measure of the extent of economic participation and underemployment in the rural workforce, and a change

[36] Recall, for purposes of consistency, in my analysis all the householders are males and their spouses are females. Henceforth I will use males for householders and females for spouses respectively.

in the number of days of employment per worker is a telling indicator of changes in economic activity and livelihood. Time-use is a better measure of economic activity than individual income (or wages earned) because it captures the scenario where individuals are working on their own-farm i.e. *productive non-wage work or when the wages are paid in kind, or partly in cash and partly in kind.*

Independent Variables: Sex, caste, and class are defined as stated in previous chapters.

1) Sex: I will use sex as a nominal category (female/male) for the analysis. However, it is essential to clarify that the *implications* of this project are about gender in rural India which has to do with sex graded social and economic roles. Bezner Kerr (2017) observes that to understand gender it is first necessary to distinguish it as a social category distinct from sex:

> "A person's *sex* is their *biological attributes* as a man or a woman. A person's *gender* constitutes a multifaceted set of relations and characteristics that are related to their biological sex, but also involve their social meanings, position, and relationships to others as a man or a woman" (2017: 338).

For example, patriarchal relationships in families are about gender (not merely sex) as they are socially constructed. Gender analysis is used to study how the evolving roles and relationships of men and women develop and interact in various contexts and how this affects outcomes (Doss and Kieran, 2014). Gendered aspects of economic activity can be captured only through qualitative research techniques (e.g. by collecting data through interviews and focus groups which is beyond the scope of this study).

2) Caste: As discussed previously, in this study, eight categories of caste were aggregated to form three broad categories – Forward Caste (FC), Backward Caste (BC) and Scheduled Caste and Scheduled Tribes (SC/ST). This variable is ordinal

by construction because the scheduled caste is documented to be the socio-economically worst-off category compared to the other two categories (Vaid, 2012; Thorat and Newman, 2009).

Caste is an integral feature of Indian society. It is a system of rigid social stratification based on ascribed status i.e. a person's social position and social code are determined at birth (Jalali, 2016; Deshpande, 2001). The social code one has to follow pertains to rules regarding marriage, conduct towards women, and towards members of other castes. Goli and Pau (2014) observe that under the Indian caste system, communities are defined by thousands of endogamous hereditary groups called *Jatis*. The Jatis were traditionally grouped by the Hindu religious texts under four mutually exclusive, and occupation-specific categories (the *varnas*): Brahmins (scholars, teachers, priests), Vaishyas (agriculturists, cattle raisers, traders, merchants, bankers), Kshatriyas (kings, warriors, law enforcers, administrators) and Shudras (artisans, craftsmen, service providers). The most despicable menial jobs were carried out by a fifth category called the Ati Sudras or Dalits, formerly called untouchables (Deshpande, 2001). As mentioned above, the *varna* refers only to broad categories of Indian society, but the sub-caste (*jati*) forms the unit of social organization. Since the caste system is a social division of people of the same race, people from different castes cannot not identified by skin color. However, a person's family name, occupation, education, and residential location are often markers of caste identity (Jalali, 2016).

In order to understand how caste forms the basis of exclusion and exploitation, Desai and Dube (2012) observe that two aspects of caste inequality deserve attention: inequality of opportunity, and inequality of outcome. Historically, the caste system has

left a legacy of inequality in terms of unequal access to productive and material resources amongst the different castes. But above and beyond this inequality of opportunity, even highly qualified members of a lower caste face social and economic discrimination say in the job market, resulting in inequality of outcomes (Thorat and Newman, 2009).

3) Class: In a predominantly agricultural economy such as rural India, access to land is important because it is a primary means and instrument of production. Lack of access to land is an important determinant of rural poverty (Desai and Dubey, 2012). As shown in chapters 2 and 3, social class is an important determinant of occupational status among rural respondents to the ICRISAT surveys. In the earlier chapters, I used class as a categorical variable based on the size of landholding. However, in this chapter, I use social class as a continuous variable expressed as the operational landholding[37] [38] of the household.

[37] Operational Landholding = owned land + leased/shared/mortgaged-in – leased/shared/mortgaged-out. It is measured in Hectares/ha. (Note: 1 Hectare = 2.47 Acres)

[38] For an extensive discussion on changes in distribution of operational landholdings in rural India at the national level, please refer to Rawal (2013).

Table 4.1. Farm-size classification based on operational landholdings (ha) in six ICRISAT villages, 2009.

Farm size (ha)	Region					
	Mahbubnagar		Sholapur		Akola	
	Aurepalle	Dokur	Shirapur	Kalman	Kanzara	Kinkheda
Landless	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Small	0.2-1.2	0.2-0.9	0.2-2.0	0.2-3.6	0.2-1.8	0.2-2.0
Medium	1.2-3.2	0.9-2.1	2.0-5.3	3.7-8.5	1.8-5.3	2.0-4.5
Large	>3.2	>2.1	>5.3	>8.5	>5.3	>4.5

In chapters 2 and 3, I used social class as a categorical variable with four categories based on size of landholding: landless, small, medium and large. These four categories used in previous chapters directly correspond to the operational landholding of the household that I use in this chapter as shown in Table 4.1. The class divisions shown in table 1 were chosen by ICRISAT researchers and these divisions are diverse across the six villages because each of the villages is different in terms of demographic characteristics, agroecology, and level of economic development. This classification for

all the selected villages[39] was directly adopted from the documentation manual of the Village Dynamics Studies in South Asia project complied by ICRISAT research scientists.

Further, I examine whether the size of landholding has any non-linear effects on the time-allocation of the householders and their respective spouses towards farm, non-farm and non-waged work. I use the quadratic function of landholding i.e. landholding-squared term to estimate this effect. Apriori, I expect that with the increase in size of landholding, the effect of the squared term would be to reduce the time spent by the householders and their respective spouses on non-farm and off-farm work but increase the time spent by them on non-wage work (i.e. on the *own-farm* work component).

4) Interaction Effect of Class and Caste:

As discussed in chapters 2 and 3, class and caste are often correlated variables, and I had tested for the interaction effects of class and caste by creating a multiplicative interaction term (Class * Caste). In accordance with the previous chapters, I test for the presence of this interaction effect in my model. The idea being that a household's standing with both high (or low) class and caste is quantitatively different from that of a household with high caste, but not high class, for example.

[39] In the original ICRISAT surveys from 1975, 40 households were interviewed per village, stratified by land holding, (including a group of landless laborers). ICRISAT aimed to study *village* economies and therefore tried to keep its sample intact and representative in terms of households from the different land size groups. The implication was that households that dropped out were replaced by households from similar land classes (Badiani, *et. al*, 2007).

5) Household Labor Supply: In this chapter, my primary focus is on the time allocation of the householders and their respective spouses towards farm, non-farm and non-waged work. However, since other working individuals may reside in households, I also account for household labor supply by creating a control variable to account for their wage-work. This is important because the presence of non-spousal workers in the household might alter the incentives for both the male and female spouse to work i.e. the time allocation of the householders and their spouses is likely to be affected by the presence of other working age members in the household. One can reasonably expect that greater financial needs may require female spouses to work more intensively in households with fewer working members compared with same sized households that have a larger labor supply. For instance, if the son of a householder is also a wage-working member then his contribution will have to be accounted for in terms of work participation. In contrast, if the son is studying in school, then his presence in the household will incentivize greater work by the householder and spouse. Similarly, if an additional working member becomes a part of the household between 2009 and 2014 (e.g. say a daughter-in-law) or a member (e.g. the daughter of the household) ages into the wage-workforce after 2009, the household will gain a potential wage-worker whose contribution for 2014 will also have to be taken into account. In other words, this example captures the changing labor supply within the household. To measure household labor supply, I use the total number of other wage-earners in the household based on their time-spent working on non-farm or/and off-farm i.e. all the other wage-earning members excluding the householder and his spouse.

6) Village-level fixed effects: Since the six ICRISAT villages belong to different agro-climatic zones, and the social norms around division of labor are different, the time spent by women and men on non-farm, off-farm and non-wage employment are likely to be different for each village. Villages also differ in wage levels, the availability of non-farm jobs, and access to infrastructure like roads, railways and communication facilities. Hence, I control for these village-level effects by creating dummy variables.

7) Location of Employment: Laborers in rural India work either in their own village, in a nearby rural area, or an urban area depending on the nature and availability of work. For instance, Sharma (2017), Sharma and Chandrashekhar (2014), and Mohanan (2008) show that a large number of individuals engaged in non-farm work commute between rural and urban areas in India. It is estimated that about 24.3 million people i.e. about 13% of the non-farm workforce in India, commute between rural and urban areas (Sharma and Chandrashekhar, 2014). The focus on commuting[40] emphasizes the importance of spatial location of economic activities, and of labor market conditions in the rural and urban labor market. Unlike migration, commuting is a strategy that involves fewer risks because only the workplace location changes; the residential location remains fixed. At the same time, commuting could also reflect the precarious nature of employment in terms of uncertain availability of work either at home or away. The ICRISAT database

[40] A commuting worker is one whose place of work (rural, urban, no fixed place) differs from his or her usual place of residence (rural, urban).

provides information about the distance of work from one's home village (in kilometers) and I use this as a continuous variable in my analysis.

8) Wage-Rates: The ICRISAT database provides information about the total number of days[41] worked by an individual in a year for carrying out non-farm, off-farm and non-waged work. To recall, time spent on non-wage work is the sum of the time spent on working on one's own farm, own live-stock work and domestic work. Information is also available on the total wages earned by the individual through non-farm and off-farm work in a particular year. In some instances for off-farm work, wages are paid in-cash and in-kind. For such cases, the monetary value of in-kind wages is provided. Hence, to get total wages from off-farm work we sum the wages paid in-cash and the wages paid-in kind. The individual wage rates (i.e. wages per day) for non-farm and off-farm work are computed by dividing the total annual wages by the total number of days worked in non-farm and off-farm work respectively. The *actual* wage rate for an individual performing non-wage work is zero.

Further, consider the case that a spouse spends time working in off-farm wage-work and non-wage work in the year 2009. This implies that the time spent by the spouse in non-farm wage work in 2009 is zero. In such cases, the off-farm wage rate of the individual can be easily computed for 2009. But for non-farm wage work, since the non-farm wage

[41] **Note: Eight hours of work constitutes one working day.** This implies that twenty-four hours is equivalent to three working days. Put it differently, one calendar day is equal to three working days. Hence the maximum number of working days theoretically possible is 365* 3 = 1095 days.

rate is unobservable I use imputed values of the wage-rate. The imputed wage rate is computed by calculating the average of the village non-farm rate for 2009 and this information is assumed to be publicly available to the individual. Similarly, for non-wage work, I use an imputed value of the average of the village off-farm rate for 2009. This way I am able to assign *an economic (or monetary) value to non-wage labor time* and account for the contribution of non-wage labor such as domestic work in my analysis.

9) Household-Size: We can reasonably expect that the size of the household will affect the time spent by the couple towards non-farm, farm and non-wage work. Hence, we control for the effect of household size i.e. we count all the other members except the couple.

ECONOMETRIC MODEL:

In this chapter, I empirically examine the overall hypothesis that changes in time allocation of the householder are affected by (endogenous[42]) changes in time allocation of the spouse to non-farm, off-farm and non-wage work, net of everything else. More formally, I will use an econometric model that jointly accounts for both spouses' time dedicated to non-farm, off-farm and non-wage work, and allows for simultaneity[43] of the time uses of the partners.

[42] Endogenous Explanatory Variable: An explanatory variable in a multiple regression model that is correlated with the error term, either because of an omitted variable, measurement error, or simultaneity. In other words, variables that are determined by the equations in the system.

[43]Simultaneity: A term that means at least one explanatory variable in a multiple regression model is determined jointly with the dependent variable.

The General Two-Stage Least Squares Estimation Procedure

In a system of M simultaneous equations, let $y_1, y_2, \ldots, y_M$ denote the endogenous variables, and let there be K exogenous variables denoted by $x_1, x_2, \ldots, x_K$.

For example, let us suppose the first two structural equations within this system are given by

$$y_1 = \alpha_1 y_2 + \beta_1 x_1 + \beta_2 x_2 + \epsilon_1,$$

and

$$y_2 = \alpha_2 y_1 + \beta_3 x_2 + \beta_4 x_3 + u_1$$

These equations are *just identified*[44] because x_3 is excluded from the first equation and x_1 from the second equation. A necessary condition for identification of an equation is that the number of excluded exogenous variables must be greater or equal to the number of RHS endogenous variables. If the structural equations are estimated directly by least squares, the estimated coefficients are biased. For this reason, the RHS endogenous variables are replaced by their predicted values from the reduced form equations.

a) Estimate the parameters of the reduced-form equations by least squares

$$y_1 = \pi_{11} x_1 + \pi_{12} x_2 + \ldots + \pi_{1K} x_K + v_1$$

$$y_2 = \pi_{21} x_1 + \pi_{22} x_2 + \ldots + \pi_{2K} x_K + v_2$$

and obtain the predicted values

[44] The identification problem is concerned with whether it is possible to find estimates of the structural form parameters from the estimates of the reduced form parameters. For a detailed discussion on the issue of identification in the context of deriving structural parameters from the reduced form please refer to Seddighi (2013, Unit 2, chapter 8).

$$y_1^* = \pi^*_{11}\, x_1 + \pi^*_{12}\, x_2 + \ldots + \pi^*_{1K}\, x_K$$

$$y_2^* = \pi^*_{21}\, x_1 + \pi^*_{22}\, x_2 + \ldots + \pi^*_{2K}\, x_K$$

The traditional econometrics textbook definition of reduced form refers to simultaneous equations, where the system of equations is solved to eliminate all endogenous variables (Timmins and Schlenker, 2009). The reduced-form model links the dependent variable solely to exogenous variables, which, by definition, are not influenced through feedback loops of the system. In other words, a reduced-form equation is a linear equation where an endogenous variable is a function of exogenous variables and unobserved errors. The derived reduced form parameters are non-linear functions of the parameters of the structural form.

The advantage of the reduced form equations is that they may be estimated separately using OLS i.e. the coefficients in the reduced form equations can be consistently estimated using OLS. Since the structural parameters are part of the reduced form coefficients it is sometimes possible to indirectly find the structural coefficient using the estimated values of the reduced form coefficients. For that to be possible, a certain requirement needs to be fulfilled i.e. the structural coefficients must be exactly identified.

b) Replace the endogenous variables y_2 and y_1 on the right-hand side of the structural equations by their predicted values to estimate the following structural model

$$y_1 = \alpha_1\, y_2^* + \beta_1\, x_1 + \beta_2\, x_2 + \epsilon_1^*$$

$$y_2 = \alpha_2\, y_1^* + \beta_3\, x_2 + \beta_4\, x_3 + u_1^*$$

ESTIMATION STRATEGY:

The objective of my estimation in this chapter is to test the hypothesis that changes in men's time allocation to different activities (non-farm, off-farm and non-wage) drive the changes in women's time allocation to work (non-farm, off-farm and non-wage) in 2009 and 2014, and not visa-versa. In other words, the null hypothesis implies that a man determines how to allocate his time, and then his wife responds to this allocation to determine her own time allocation. The model, under the null hypothesis, has a block-recursive structure, implying that the coefficients of the time allocation of the wife are not significant in the equations that predict the time allocation of the husband.

a) Reduced Form Estimation:

As mentioned in the previous section, to ensure the data admissibility of the predicted times, I am using an approx. logit transformation of the time allocation variable T throughout the analysis. To estimate the reduced form parameters, I run the ordinary least squares model by regressing the log-odds of the time spent on each of the three activities performed by the householder and the spouse separately for the years 2009 and 2014 against the same set of eighteen exogenous variables (listed in Table 4.2 for 2014).

Table 4.2: Exogenous Variables in the Reduced Form Equations for 2014

Economic
Landholding (as proxy for social class)
Landholding-Square
Non-Farm Wage Rate of the Householder
Farm Wage-Rate of the Householder
Distance travelled by the householder for non-farm
Number of other wage earners in 2014 (apart from the couple)
Non-Farm Wage Rate of the Spouse
Farm Wage-Rate of the Spouse
Distance travelled by the Spouse for non-farm
Sociological
Caste-Group (Two Categories)
***Reference Category = SC*
Socio-Economic (Interaction Term)
Landholding * Caste Group
Demographic
Age of the Householder
Number of Years of Education of the Householder
Family Size
Age of the Spouse
Number of Years of Education of the Spouse
Control
Village (Five)
***Reference Category = AUR*

In other words, for each year, I estimated a system of six equations. The R-squares for the twelve equations (i.e. for both men and women) are reported below in Table 4.3:

Table 4.3: Reduced Form Model

MEN

	T_Non-Farm		T_Off-Farm		T_Non-Wage	
	2009	**2014**	**2009**	**2014**	**2009**	**2014**
R-Square	0.26	0.34	0.49	0.36	0.43	0.32
F	4.73	6.53	13.26	7.18	10.47	5.98
N	338	311	338	311	338	311

WOMEN

	T_Non-Farm		T_Off-Farm		T_Non-Wage	
	2009	**2014**	**2009**	**2014**	**2009**	**2014**
R-Square	0.6	0.45	0.56	0.33	0.53	0.48
F	20.89	10.34	17.32	6.28	15.11	11.45
N	338	311	338	311	338	311

The reduced form parameters are difficult to interpret because they are non-linear functions of the interesting, structural coefficients, but the predicted values of time spent from the reduced form equations are needed in the structural form of the model to get unbiased estimates of the structural coefficients.

b) Structural Form Estimation:

For the structural form equations, I estimated different models based on the logic of starting with the full model that has the most general structure and the largest number of coefficients, and then imposing successive restrictions to reduce the number of coefficients estimated. In general, reducing the number of coefficients estimated in an equation increases the accuracy of the remaining coefficients estimated. In a linear regression using the least squares estimator, the "useful" information in an explanatory variable that determines its estimated coefficient is the residual from regressing that variable on all of the other explanatory variables. If there are a large number of explanatory variables in the equation, these residuals will tend to be small, and as a result, the standard error of the estimated coefficient will tend to be large.

In a structural model, the least squares estimator is unbiased if the dependent variables used as explanatory variables in an equation are replaced by their predicted values from the reduced form equations. However, the structural coefficients in an equation are not identified unless some of the explanatory (exogenous) variables from the reduced form are excluded from the equation. The standard rule is that the number of excluded exogenous variables must be at least as large as the number of dependent variables used as explanatory variables on the right-hand-side of the equation.

1) The Complete Model:

This model is known as complete because each equation contains the other five dependent variables of time allocation for both men and women as explanatory variables. For instance, in this model, an individual's level of time spent on non-farm work is modeled as a function of one's own time spent on off-farm and non-wage work

as well as their partner's time spent on non-farm, off-farm and non-wage work. Also, separate models are estimated for 2009 and 2014.

Since each equation has five dependent variables as explanatory variables, each equation must exclude at least five exogenous variables in order to be identified. *The basic strategy used for getting identification is to exclude the two demographic variables for the spouse [i.e. age and years of education attained] and the three economic variables for the spouse [i.e. non-farm wage rate, off-farm wage rate and the distance travelled]*.

The estimates of the complete model are presented in the technical appendix associated with this chapter. In the complete model, most of the estimated coefficients are poorly determined with low t-ratios, and as a result, cannot be used to make reliable inferences about time-allocation.

In order to compare whether the association between the predictors and time allocated to different activities changed over the five year period i.e. between 2009 and 2014, I use the Chow[45] test. The Chow test is a special F-test to determine whether a multiple regression function differs across two groups. We can apply the same test to two different time periods as well. To perform the Chow test, I carried out the following steps:

a) Run the structural models for men and women using the pooled data i.e. combining all the observations for 2009 and 2014 and using the time dummy for the year.

[45] For a full-length discussion and detailed mechanics of the Chow test, please refer to pages 230 and 413 of the econometrics textbook by Wooldridge (2000).

b) Subsequently, I run the structural models for men and women for each of the two years, 2009 and 2014 separately.

The null hypothesis for testing that the structural parameters of each equation are the same for 2009 and 2014 (i.e. that the data for the two years can be pooled) is rejected for five of the six equations. The F-statistics from the Chow test are reported below :

T-non-farm(men): F-computed = 1.89 < F-critical = 2 at 5% → Do not Reject
T-off-farm (men): F-computed = 6.00 > F-critical = 2 at 5% → Reject
T-non-wage (men): F-computed = 3.15 > F-critical = 2 at 5% → Reject
T-non-farm (women): F-computed = 3.13 > F-critical = 2 at 5% → Reject
T-off-farm (women): F-computed = 6.00 > F-critical = 2 at 5% → Reject
T-non-wage (women): F-computed = 3.15 > F-critical = 2 at 5% → Reject

Putting it differently, the associations between predictors and labor time allocation for men and women changed over 5 years i.e. between 2009 and 2014. Broadly, this result is consistent with my analysis from chapters 2 and 3 where I used occupational category as the dependent variable. *The implication for my analysis is that the model should be estimated separately for each year, and the discussion that follows focuses on 2014.*

From the tables in the technical appendix, we can observe that barring a few exceptions, spouses' time allocations don't affect each other. Hence, bi-directional causal relationships between men's and women's time allocation towards non-farm, off-farm and non-wage work are not supported by the data. Since the estimation of the complete structural model for 2014 with all of the exogenous variables doesn't yield statistically significant estimates of coefficients, additional simplifications of the structure of the model will be tested.

2) Complete Model with restrictions on the Village Control Variable:

In our model so far, we have six villages and to begin with we have five categories and one village as a reference group. This allows to capture the variation within each village but to capture the variation across villages, if we assume that one of the villages is very different than the other five villages then we can merge the five other village dummies to a single category. The collapsing of the categories is likely to improve the precision of our model estimates as we would have more degrees of freedom. Hence, I collapse the five villages to create another categorical variable (V) which consists of two categories: an "Others" category and use DOKUR as the village of reference.

Further, I carry out the F-test to test whether the restriction of collapsing the villages is supported by the data or not. The results of the F-test are reported below:

T-non-farm(men): F (4, 287) = 0.08 with Prob. > F = 0.9882 → Do not Reject
T-off-farm (men): F (4, 287) = 1.40 with Prob. > F = 0.2350 → Do not Reject
T-non-wage (men): F (4, 287) = 7.80 with Prob. > F = 0.0000 → Reject
T-non-farm (women): F (4, 287) = 2.18 with Prob. > F = 0.0718 → Do not Reject
T-off-farm (women): F (4, 287) = 0.74 with Prob. > F = 0.5666 → Do not Reject
T-non-wage (women): F (4, 287) = 1.46 with Prob. > F = 0.2141 → Do not Reject

Except for one of the situations indicated above, we cannot reject the hypothesis i.e. the restriction of collapsing the villages.

From the tables in the appendix, one can observe a significant improvement in the precision of the estimates. One of the key findings from this model is that one cannot remove the two variables that pertain to one's own time-use in the other two activities from any of the equations because they have do have explanatory power in some of the equations. Second, the overall relationship shows that men's occupational time-use is determined by women's occupational time use and vice versa i.e. the relationships are

bi-directional. So the data do not support the main hypothesis that men's time-use drives women's time use.

My next simplification is to impose further restrictions on the structural model based on *economic logic.* I begin to explore if any of the particular sources of earnings of the spouse might explain the time spent by the other partner on non-farm, off-farm and non-wage work respectively. More specifically, the expected earnings of the spouse from non-farm, off-farm and non-wage work[46] are the three economic variables that I use to proceed further.

3) Estimating the Structural Models using the Disaggregated Earnings of the Spouse:

In this model, I examine the hypothesis that the disaggregated earnings of men drive the time allocated by women towards the three activities (non-farm, off-farm and non-wage work). Intuitively, the disaggregated earnings from each activity (say non-farm) reflect the time-spent by an individual on this activity because time is embedded in the calculation i.e. the individual earnings for both the spouses are computed using the predicted values of the time spent on each activity multiplied by the respective wage-rate. For example, the individual earning of men from working non-farm is given by:

$$\mathbf{I^{*}_{Men(Non\text{-}Farm)2014} = T^{*}_{Men(Non\text{-}Farm)\ 2014} * \text{Men's Non-Farm Wage Rate for 2014}}$$ [47]

[46] **As mentioned earlier in the chapter, in case of non-wage work, all the wages are imputed wages. This is precisely done to assign a monetary value to non-wage work, which is especially important to account for women's time spent on non-wage work. I have chosen the average village off-farm wage rate of the year as value for the imputed wage-rate for non-wage work.** Recall, as defined, time spent on non-wage work is T (non-wage work) = T (own-farm work) + T (live-stock work) + T (domestic work).

[47] **If the spouse worked on the non-farm, the wage rate (Rupees/day) is directly computed by dividing the total annual wages received in non-farm work to the total time spent by the spouse in non-farm work. However, if the spouse did not do any non-farm work in 2014 then I impute the non-farm wage rate as the average non-farm wage rate of the village for 2014.**

where $\mathbf{T^{*}}_{\textbf{Men(Non-Farm) 2014}}$ is the predicted value of time allocation for men's non-farm work obtained as an estimate from the reduced form model.

Each estimated equation contains the three dis-aggregated expected earnings of the spouse along with the same exogenous variables used in the complete model for 2014. The results of this model are presented in the appendix. The results of the structural model show that some of the disaggregated earning variables of the spouse explain the time spent by men and women towards non-farm and off-farm work and the relationship is bi-directional. For instance, greater is the non-farm income of women, greater is the time spent by the men on non-farm activities whereas the other earnings of the spouse donot matter. Also, greater is the non-farm income of men, lesser is the time spent by women on non-farm work and the other earnings of the spouse donot matter. In other words, the disaggregated earnings of the men do not drive the time allocated by women towards non-farm, off-farm and non-wage work respectively (and vice versa).

Further, the next simplification that I use to estimate the structural model is to use the wage and non-wage earnings of the spouse to estimate the time spent by the other partner on non-farm, off-farm and non-wage work respectively. The economic rationale behind this approach is to separate the effect of the wage income (i.e. an aggregate sum of the *actual* earnings from non-farm and off-farm work) from the non-wage income of the spouse which is calculated using the imputed wage-rate as discussed earlier.

4) <u>Estimating the Structural Model using the Wage and Non-Wage Earnings of the Spouse:</u>

The same logic follows for the case if the spouse does not spend any time off-farm in 2014. This was discussed earlier in the chapter as well.

In this model, I examine the hypothesis that the wage and non-wage earnings of men drive women's time allocation towards non-farm, off-farm and wage work respectively. Each estimated equation contains the wage and non-wage earnings of the spouse along with the same exogenous variables used in the complete model for 2014. Before I estimate the model, I use an F-test to test the restriction if the models using disaggregated earnings, and wage and non-wage earnings of the spouse are statistically different or not. In other words, I test the restriction that aggregation of non-farm and off-farm income of the spouse is supported or rejected by the data. Testing this restriction involves the following steps:

a) Regress Y on X_1, X_2, X_3 and any other independent variables in the model. I refer to this as the *unconstrained* model, because the effects of X1 and X2 are *not* constrained to be equal. So we estimate the model

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \sum_{k=4}^{K} \beta_k X_k + e$$

where Y is the time-use variable and X_1, X_2 and X_3 are the *disaggregated incomes for men and women working non-farm, off-farm and non-wage respectively*.

b) Compute a new variable that is equal to the sum of the two variables and hypothesize whether the models with disaggregated income are statistically the same as models with aggregate income

i.e. test if $\mathbf{I^*}_{\mathbf{Men(Wage)2014}} = \mathbf{I^*}_{\mathbf{Men(Non\text{-}Farm)2014}} + \mathbf{I^*}_{\mathbf{Men\ (Off\text{-}Farm)2014}}$

c) Run a second regression in which I regress Y on $\mathbf{I^*}_{\mathbf{Men(Wage)2014}}$ and any other independent variables in the model. We refer to this as the *constrained* model, because, by adding X_1, X_2 together, only one beta is being estimated for the two variables. In other words, I estimate the following model

$$Y = \alpha + \beta_1(X_1 + X_2) + \beta_3 X_3 + \sum_{k=4}^{K} \beta_k X_k + e$$

In practice, I estimate this via

$$Y = \alpha + \beta_1 * \mathbf{I}^*_{\mathbf{Men(Wage)2014}} + \beta_3 X_3 + \sum_{k=4}^{K} \beta_k X_k + e$$

I use the Maarten's Buis's[48] ftest to test the hypothesis that the constrained model is nested in the unconstrained model.

T-non-farm(men): F (1, 293) = 0.03 with Prob. > F = 0.8697 → Do not Reject
T-off-farm (men): F (1, 293) = 0.44 with Prob. > F = 0.5085 → Do not Reject
T-non-wage (men): F (1, 293) = 0.74 with Prob. > F = 0.3905 → Do not Reject
T-non-farm (women): F (1, 293) = 0.69 with Prob. > F = 0.4058 → Do not Reject
T-off-farm (women): F (1, 293) = 4.75 with Prob. > F = 0.0300 → Reject
T-non-wage (women): F (1, 293) = 0.07 with Prob. > F = 0.7886 → Do not Reject

Except for one equation as indicated above, I cannot reject the null hypothesis that the model with the disaggregated earnings of the spouse are statistically same as models with the wage and non-wage earnings of the spouse.

The results of the structural model using the wage and non-wage earnings of the spouse (are listed in Table 4.3).

[48] For a longer discussion, please refer to Buis (2012)

Table 4.3: Structural Model with Cash and Non-Cash Income of the Spouse

	2014					
	MALE			FEMALE		
	T_Non-Farm	T_Off-Farm	T_Non-Wage	T_Non-Farm	T_Off-Farm	T_Non-Wage
CASHIncMale14				-0.764(0.220)	0.639(0.313)	
CASHIncFemale14	0.457(0.164)	0.316(0.111)				
Non-WageIncMale14				-3.233(1.279)	4.127(1.822)	
Non-WageIncFemale14		11.50(2.560)				
Landholding	-0.294(0.060)		0.200(0.032)		-0.264(0.082)	
LandholdingSQ	0.005(0.001)		-0.003(0.008)		0.004(0.001)	
Caste_Group						
BC			-0.855(0.371)	1.708(0.418)		-0.284(0.140)
FC	-0.882(0.414)		0.436(0.214)		-0.934(0.393)	
Caste_Group * Landholding						
BC						0.041(0.015)
FC			-0.05(0.022)			
Family_Size				-0.133(0.046)		-0.089(0.015)
N_other_wage_earners						
WDist_Male	0.028(0.011)					
Yrs_ED_Male	0.064(0.032)	-0.042(0.022)	-0.05(0.017)			
AGE_Male	-0.037(0.014)		-0.026(0.007)			
NFa_WR_Male	0.002(0.0007)	-0.0012(0.0005)				
Fa_WR_Male		0.020(0.002)				
WDist_Fem						
Yrs_ED_Fem					-0.096(0.041)	0.007(0.009)
AGE_Fem				-0.027(0.010)		-0.013(0.003)
NFa_WR_Fem				-0.012(0.001)	0.012(0.176)	-0.0015(0.0005)
Fa_WR_Fem				0.007(0.003)	-0.011(0.004)	

Significance: $p<0.05$, (.) indicates standard error associated with the estimated coefficients

Reference Group: Caste = SC, Village = DOK, Sample Size: N=311

Note:

1) Male-specific variables are color coded in brown
2) Female-specific variables are color coded green
3) Household Variables are color coded in blue and
4) Village controls are not indicated in the table

The results of this structural model show that the cash earnings of the women are positively related to the amount of time spent by the men towards non-farm and off-farm work (columns 1 and 2) whereas the cash earnings of the men are negatively related to the amount of time spent by women on non-farm work (columns 4 and 6 of table 4.3). Next, the non-wage earnings of the women are positively related to the amount of time spent by the men off the farm (column 2) whereas the non-wage earnings of the men are negatively related to the amount of time spent by women for non-farm work (column 4) but positively related to the time spent by women for off-farm work (column 5). None of the income variables for both men and women affect the time spent by men and women on non-wage work respectively. Overall, both men's and women's earnings drive the time spent by the other spouse towards non-farm and off-farm work respectively.

The result that increasing men's cash and non-wage earning is likely to reduce participation of women in non-farm activities (column 4) after controlling for the other variables is consistent with the fact that the non-farm sector is still predominated by males in the countryside and the increase in male earnings is likely to confine the females towards off-farm work (column 5). I believe this finding is quite plausible because higher cash income of the spouse might involve more women spending time on particular farm-related tasks. In other words, often, there is a division of labor between men and women within agriculture regarding particular activities. Men carry out particular tasks like land clearing and planting and women carry out weeding. Harvesting is done by both men and women. Hence, within agriculture, men may spend time working on tasks that are more remunerative and therefore higher income, whereas

women might do other tasks. Second, women are often involved in particular tasks like weeding that takes more time because it is monotonous. The other option is that there is a division of labor where men carry out purely non-farm work or a combination of non-farm and off-farm work (i.e. multiple jobs) and the women carry out off-farm work. Also, an increase in the woman's cash income is likely to increase the time spent by men on non-farm and off-farm activities (columns 1 and 2). Such a situation can exist because if the household has more income from the women's non-farm or farm work, men might also spend more time working in either non-farm jobs because it is more remunerative than farm work or spend their time working off-farm (but in more remunerative tasks as mentioned earlier) or do multiple jobs. On an average, when the female non-wage income increases, men are likely to spend more time on other's farm (column 2). This is possible if men get better wages working off-farm while women spend more time working at home (i.e. working on their own-farm or livestock rearing or domestic work).

Further, on an average, an increase in the size of landholding is likely to decrease the time spent by men on non-farm work but increase the time spent on non-wage work (columns 1 and 2). However, beyond a certain threshold, having more land reverse the sign i.e. men are likely to increase their participation in non-farm work and reduce their time spent on non-wage work. Such a scenario is plausible because initially the gain from working on one's own land could be greater than carrying out non-farm activities but eventually non-farm jobs might be more profitable than working on one's own farm. For women, an increase in the size of landholding is likely to increase their time spent on other's farm up to a point that further increase in landholding will decrease the time

spent on other's farm (column 5). This finding is not quite obvious to me but many factors like the special circumstances of the family could make this a real possibility.

On an average, men from upper most caste (FC) are likely to spend more time on non-farm work and less time on non-waged work compared to men from the lower caste (SC/ST i.e. our reference group/columns 1 and 3). This could be true because upper caste men have access to better non-farm job opportunities and social networks compared to the lower caste. However, for non-waged work, the time spent by upper caste men increases if the size of landholding increases on an average (column 3) because of the interaction effects of landholding *read* social class and caste. In other words, the interaction and main effects move in opposite directions but *the interaction effect diminishes the magnitude of the main effect*. This finding is tune with my expectation because the upper caste men who are also big landlords are often able to farm their own land. With increase in landholding, backward caste (BC) men are likely to spend less time on non-waged work compared to the SC (column 3) as they have better chances to get work off-farm or non-farm than the scheduled caste group. On an average, backward caste women have a greater chance to carry out non-farm work (column 4) but are likely to spend lower time on non-wage activities than the scheduled caste. Again the reason for this possibility is that the BC is likely to have better access to social networks and more social acceptability by the employers in the job market. However, with an increase in landholding on an average, the time spent by backward caste women increases due to the interaction effect of social class and caste. This scenario is again plausible because with increase in the size of landholding, backward caste women might have to work on their own-farm. In this case, it is observed that

though the main and the interaction effects still operate in opposite directions as in the case of upper caste men, *the interaction effect raises the magnitude of the main effect*. Also, upper caste women (FC) are less likely to work off-farm compared to the SC because often women working outside the home is considered *low status* in upper caste households.

For men, an increase in the non-farm wage rate is likely to increase the time spent by men on non-farm work and reduced their time spent on off-farm activities (columns 1 and 2). This is intuitive because higher the wage rate, greater is the proportion of time one would allocate towards that job due to the incentive structure. Similarly, an increase in the off-farm wage rate for men is likely to increase their participation in off-farm work (column 2). However, for women, the signs are opposite and counterintuitive for the time spent on non-farm, off-farm and non-waged work.

Greater the size of the family, lesser is the time spent by women towards non-farm and non-wage work. This scenario is plausible when women have enough members in the household to work outside as well as others who can shoulder responsibilities at home. Interestingly, family size has no effect on men's time allocation towards any of the three activities at all.

Surprisingly, the presence of other members in the household is not significant in this model for predicting any of the time allocations for men and women. For men, the greater the distance travelled, the greater is the time spent by them towards non-farm work activities (column 1). This is likely to be the case because men often travel the greatest distance to find relatively better paying non-farm activities in rural India. On an average for every unit year of increase in education, the time spent by men on non-

farm activities is likely to increase (column 1) because non-farm jobs often require a relatively higher level of education to perform the skills on the job whereas the time spent by them for off-farm and non-wage work reduces (column 2 and 3). In the case of women, every additional year of education reduces the time spent working away off-farm (column 5) but increases the time spent on non-wage work (column 6). This is often the case for women in rural India because education does not necessarily translate into employment opportunities. Women often acquire education for better matrimonial prospects and they spent more time at home. In upper caste households, educated women often do not go to work outside due to patriarchal or status considerations.

For men and women, an average increase in their age reduces the time spent by them both on non-farm work and non-wage work (columns 1, 3, 4 and 6). This finding is not obvious to me and due to estimation of a large number of parameters in the model, I did not choose to include age-square as a variable to examine the curvilinear nature of the age variable.

Overall this model is an improvement over the previous model with disaggregated incomes of the spouse but the relationship between men's and women's wage and non-wage income to the time spent by their spouse on non-farm and off-farm activities is bi-directional in nature. From the above discussion, it is clear that all the estimated structural models do not support the main hypothesis of this chapter i.e. changes in men's occupational time allocation drives changes in women's time allocation within rural households.

CONCLUSION

In this chapter, my main hypothesis was to examine whether changes in men's occupational time allocation affect changes in women's occupational time allocation. Using the method of simultaneous equations which accounts for the structure of simultaneity while addressing the issue of endogeneity, I estimate two structural models based on predicted time-use values with and without village aggregation, and then two models based on the disaggregated earnings of the spouse, and cash and non-wage earnings of the spouse to examine the relationship between men's time-use and women's time use. In this process of estimating structural models, I used the complete model as a point of departure and thereafter examined more models by imposing restrictions based on economic logic. With respect to the ICRISAT sampled population, all the four estimated structural models nearly refute my hypothesis that changes in men's occupational time-use drive changes in women's occupational time-use.

One of the key factors that emerges from this analysis of the different structural models is the size of landholding which is used a measure of social class. As per the final model, it was observed that up to a threshold level of increase in landholding, the time spent by men on non-farm work reduces and non-wage work increases. This means that there are greater gains to cultivating one's own land compared to being employed in non-farm work. However, beyond the threshold level, a further increase in the size of landholding leads to the opposite effect which means that the incentive to being employed non-farm becomes greater than working at home. This finding is in accordance with many studies in rural India. Second, it was observed that the interaction effect between social class and caste becomes important when we examine the time spent by upper caste men and

backward caste women on non-farm work in comparison to the scheduled castes (i.e. the reference category in our model). In both cases, the interaction effect operate in opposite direction to the main effect but for upper caste men, the interaction effect reduces the magnitude of the main effect whereas for the backward caste women, the interaction effect raises the magnitude of the main effect. This finding is quite consistent with the social reality of the rural Indian labor market.

Cumulatively, a major learning from this chapter is that time allocation data can certainly reveal the importance of non-wage work in the rural Indian economy.

APPENDIX

Structural Model 1: Complete Model Exogenous Variables

T(Non-Farm) Male 2014

Source	SS	df	MS
Model	719.286337	23	31.273319
Residual	1373.51708	287	4.78577381
Total	2092.80342	310	6.75097878

Number of obs	=	311
F(23, 287)	=	6.53
Prob > F	=	0.0000
R-squared	=	0.3437
Adj R-squared	=	0.2911
Root MSE	=	2.1876

TNFmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_Fmalehat14	.2180982	13.94649	0.02	0.988	-27.23229	27.66848
Y_NWmalehat14	.4563093	14.67478	0.03	0.975	-28.42754	29.34016
Y_NFfemhat14	.5751309	.2047544	2.81	0.005	.1721203	.9781416
Y_Ffemhat14	.5564002	4.783653	0.12	0.907	-8.859092	9.971893
Y_NWfemhat14	2.454857	7.637685	0.32	0.748	-12.57812	17.48784
Landholding	-.4191966	3.193106	-0.13	0.896	-6.704072	5.865679
LandholdingSQ	.0095466	.0658814	0.14	0.885	-.1201254	.1392186
Caste_Group						
BC	.9301917	7.278571	0.13	0.898	-13.39596	15.25634
FC	-.3724646	5.765993	-0.06	0.949	-11.72146	10.97653
Caste_Group#c.Landholding						
BC	-.0919333	.3777037	-0.24	0.808	-.835354	.6514874
FC	.0493324	.3800409	0.13	0.897	-.6986886	.7973534
Oth_Wage_Wks	-.4465133	.7289878	-0.61	0.541	-1.881354	.9883273
Fa_WR_Male	-.0258602	.4177351	-0.06	0.951	-.8480732	.7963528
NFa_WR_Male	.0024455	.0098969	0.25	0.805	-.0170343	.0219253
WDist_Male	.0328021	.1824748	0.18	0.857	-.3263565	.3919607
Family_Size	.3108332	.6506076	0.48	0.633	-.9697344	1.591401
AGE_Male	.0367842	.6206549	0.06	0.953	-1.184829	1.258397
Yrs_ED_Male	.1719329	1.397924	0.12	0.902	-2.579551	2.923417
VILLAGE						
DOK	-2.206031	9.006626	-0.24	0.807	-19.93345	15.52139
KAL	-1.673853	9.947256	-0.17	0.866	-21.25268	17.90497
KAN	-3.12588	30.40572	-0.10	0.918	-62.97236	56.7206
KIN	-3.297784	26.45622	-0.12	0.901	-55.37061	48.77504
SHI	-1.493947	9.741234	-0.15	0.878	-20.66727	17.67937
_cons	9.312292	130.2454	0.07	0.943	-247.0451	265.6697

T(Off-Farm) Male 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(23, 287)	=	7.18
Model	342.614419	23	14.8962791	Prob > F	=	0.0000
Residual	595.174067	287	2.07377724	R-squared	=	0.3653
				Adj R-squared	=	0.3145
Total	937.788487	310	3.02512415	Root MSE	=	1.4401

TFmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFmalehat14	4.92792	11.88066	0.41	0.679	-18.45636	28.3122
Y_NWmalehat14	-.1422996	1.902383	-0.07	0.940	-3.886692	3.602092
Y_NFfemhat14	-2.852956	7.075157	-0.40	0.687	-16.77873	11.07282
Y_Ffemhat14	-2.581425	5.492056	-0.47	0.639	-13.39124	8.228392
Y_NWfemhat14	-17.17217	27.75926	-0.62	0.537	-71.80973	37.46538
Landholding	1.13305	2.728116	0.42	0.678	-4.236604	6.502703
LandholdingSQ	-.0285937	.0635003	-0.45	0.653	-.153579	.0963916
Caste_Group						
BC	-7.709278	14.48533	-0.53	0.595	-36.22023	20.80168
FC	-.0408869	1.118586	-0.04	0.971	-2.24256	2.160786
Caste_Group#c.Landholding						
BC	1.122243	1.794193	0.63	0.532	-2.409203	4.653689
FC	.069221	.1043189	0.66	0.508	-.1361062	.2745481
Oth_Wage_Wks	1.274854	2.260047	0.56	0.573	-3.173515	5.723222
Fa_WR_Male	.1167621	.1749192	0.67	0.505	-.2275251	.4610494
NFa_WR_Male	-.010628	.0236489	-0.45	0.653	-.0571753	.0359192
WDist_Male	-.0370807	.1113573	-0.33	0.739	-.2562612	.1820998
Family_Size	-1.594598	2.678378	-0.60	0.552	-6.866352	3.677157
AGE_Male	-.1526189	.1619279	-0.94	0.347	-.4713357	.1660979
Yrs_ED_Male	-.7323952	1.575083	-0.46	0.642	-3.832574	2.367784
VILLAGE						
DOK	3.963932	10.10098	0.39	0.695	-15.91747	23.84534
KAL	11.7751	19.81243	0.59	0.553	-27.22098	50.77119
KAN	14.98992	22.12399	0.68	0.499	-28.55595	58.53578
KIN	18.34357	29.1526	0.63	0.530	-39.03644	75.72358
SHI	7.485729	11.73236	0.64	0.524	-15.60665	30.57811
_cons	-45.38298	70.19792	-0.65	0.518	-183.551	92.78506

T(Non-wage)Male 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(23, 287)	=	5.98
Model	169.497269	23	7.36944647	Prob > F	=	0.0000
Residual	353.899669	287	1.23309989	R-squared	=	0.3238
				Adj R-squared	=	0.2697
Total	523.396938	310	1.68837722	Root MSE	=	1.1105

TNWmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFmalehat14	.1856118	7.884969	0.02	0.981	-15.33409	15.70531
Y_Fmalehat14	-1.499167	1.199916	-1.25	0.213	-3.860918	.8625842
Y_NFfemhat14	-.0998888	4.694028	-0.02	0.983	-9.338976	9.139199
Y_Ffemhat14	.5306331	3.98141	0.13	0.894	-7.305833	8.367099
Y_NWfemhat14	-.9470445	18.98079	-0.05	0.960	-38.30626	36.41217
Landholding	.2835288	1.5799	0.18	0.858	-2.826132	3.39319
LandholdingSQ	-.0062043	.0375528	-0.17	0.869	-.0801182	.0677096
Caste_Group						
BC	-1.101883	9.178518	-0.12	0.905	-19.16763	16.96387
FC	.4966662	.3528425	1.41	0.160	-.197821	1.191153
Caste_Group#c.Landholding						
BC	.0633155	1.214572	0.05	0.958	-2.327283	2.453914
FC	-.0190683	.0923792	-0.21	0.837	-.200895	.1627584
Oth_Wage_Wks	-.0058045	1.552914	-0.00	0.997	-3.062349	3.05074
Fa_WR_Male	.0393758	.0913984	0.43	0.667	-.1405204	.2192719
NFa_WR_Male	-.0013055	.0150445	-0.09	0.931	-.0309169	.028306
WDist_Male	-.018254	.0604305	-0.30	0.763	-.1371972	.1006892
Family_Size	-.1328287	1.763799	-0.08	0.940	-3.604451	3.338794
AGE_Male	-.065662	.0814281	-0.81	0.421	-.225934	.09461
Yrs_ED_Male	-.143928	.9483304	-0.15	0.879	-2.010493	1.722637
VILLAGE						
DOK	.9768213	6.072854	0.16	0.872	-10.97616	12.9298
KAL	.2837977	13.91666	0.02	0.984	-27.10786	27.67546
KAN	2.937657	13.08134	0.22	0.822	-22.80988	28.68519
KIN	4.254397	17.98625	0.24	0.813	-31.1473	39.6561
SHI	1.753044	7.394244	0.24	0.813	-12.80078	16.30687
_cons	-13.39821	38.76665	-0.35	0.730	-89.70121	62.9048

T(Non-Farm) Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(23, 287)	=	10.34
Model	473.846562	23	20.6020244	Prob > F	=	0.0000
Residual	571.570864	287	1.99153611	R-squared	=	0.4533
				Adj R-squared	=	0.4094
Total	1045.41743	310	3.37231428	Root MSE	=	1.4112

TNFfem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_Ffemhat14	-1.309365	1.183819	-1.11	0.270	-3.639433	1.020703
Y_NWfemhat14	-4.89382	3.135234	-1.56	0.120	-11.06479	1.277148
Y_NFmalehat14	.6820581	.3126448	2.18	0.030	.0666905	1.297426
Y_Fmalehat14	.7736655	.6996832	1.11	0.270	-.6034957	2.150827
Y_NWmalehat14	1.86293	1.098021	1.70	0.091	-.2982664	4.024126
Landholding	-.3262232	.2838812	-1.15	0.251	-.8849764	.23253
LandholdingSQ	.0042466	.0045268	0.94	0.349	-.0046634	.0131566
Caste_Group						
BC	-.8590981	1.082738	-0.79	0.428	-2.990213	1.272016
FC	-1.55325	1.229778	-1.26	0.208	-3.973777	.8672769
Caste_Group#c.Landholding						
BC	.2857364	.2155787	1.33	0.186	-.1385794	.7100522
FC	.0980904	.0660259	1.49	0.138	-.031866	.2280468
Oth_Wage_Wks	.340325	.3184146	1.07	0.286	-.286399	.967049
Fa_WR_Fem	-.0119027	.0235988	-0.50	0.614	-.0583513	.034546
NFa_WR_Fem	-.0047361	.0070595	-0.67	0.503	-.0186312	.0091589
WDist_fem	.0630881	.025457	2.48	0.014	.012982	.1131943
Family_Size	-.41874	.2458209	-1.70	0.090	-.9025805	.0651006
AGE_Fem	-.0067369	.0241908	-0.28	0.781	-.0543508	.040877
Yrs_ED_Fem	-.008308	.0761375	-0.11	0.913	-.1581668	.1415508
VILLAGE						
DOK	-3.96296	1.239497	-3.20	0.002	-6.402617	-1.523303
KAL	4.545408	2.166956	2.10	0.037	.2802658	8.810551
KAN	.536183	1.647645	0.33	0.745	-2.706818	3.779184
KIN	1.458301	2.082072	0.70	0.484	-2.639766	5.556368
SHI	.5061318	1.327029	0.38	0.703	-2.105811	3.118075
_cons	-1.310704	3.856771	-0.34	0.734	-8.901847	6.28044

T(Off-Farm) Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(23, 287)	=	6.28
Model	598.89806	23	26.0390461	Prob > F	=	0.0000
Residual	1189.21098	287	4.14359228	R-squared	=	0.3349
				Adj R-squared	=	0.2816
Total	1788.10904	310	5.76809369	Root MSE	=	2.0356

TFfem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFfemhat14	-11.66122	11.31895	-1.03	0.304	-33.93991	10.61747
Y_NWfemhat14	6.12456	5.818067	1.05	0.293	-5.326931	17.57605
Y_NFmalehat14	-.0905678	.5441522	-0.17	0.868	-1.161603	.9804674
Y_Fmalehat14	-.1399011	.5363571	-0.26	0.794	-1.195594	.9157914
Y_NWmalehat14	.8546079	1.218691	0.70	0.484	-1.544098	3.253314
Landholding	-.6587343	.3601139	-1.83	0.068	-1.367533	.0500649
LandholdingSQ	.0112472	.0057724	1.95	0.052	-.0001144	.0226088
Caste_Group						
BC	14.23795	13.65981	1.04	0.298	-12.64816	41.12406
FC	-6.643165	5.265099	-1.26	0.208	-17.00627	3.719941
Caste_Group#c.Landholding						
BC	-.600972	.5630134	-1.07	0.287	-1.709131	.507187
FC	.1947497	.1697615	1.15	0.252	-.1393858	.5288851
Oth_Wage_Wks	1.180517	1.111129	1.06	0.289	-1.006479	3.367512
Fa_WR_Fem	.0267713	.0417202	0.64	0.522	-.055345	.1088876
NFa_WR_Fem	-.2619725	.2567208	-1.02	0.308	-.7672667	.2433218
WDist_fem	-.2727984	.2513318	-1.09	0.279	-.7674858	.221889
Family_Size	-.3248663	.3912112	-0.83	0.407	-1.094873	.4451407
AGE_Fem	-.1129072	.0918831	-1.23	0.220	-.2937573	.067943
Yrs_ED_Fem	-.0155291	.0740746	-0.21	0.834	-.1613274	.1302692
VILLAGE						
DOK	-.3895938	1.518357	-0.26	0.798	-3.378121	2.598933
KAL	40.80562	40.99652	1.00	0.320	-39.88635	121.4976
KAN	-20.7186	17.80419	-1.16	0.246	-55.76195	14.32475
KIN	-20.32017	17.27703	-1.18	0.241	-54.32592	13.68559
SHI	9.860759	11.43105	0.86	0.389	-12.63856	32.36008
_cons	18.22649	13.874	1.31	0.190	-9.081201	45.53419

T(Non-wage)Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(23, 287)	=	11.45
Model	59.1670692	23	2.57248127	Prob > F	=	0.0000
Residual	64.5020882	287	.224745952	R-squared	=	0.4784
				Adj R-squared	=	0.4366
Total	123.669157	310	.398932766	Root MSE	=	.47407

TNWagefem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFfemhat14	10.60837	6.762298	1.57	0.118	-2.701621	23.91836
Y_Ffemhat14	1.701814	1.312448	1.30	0.196	-.8814297	4.285058
Y_NFmalehat14	-.5089155	.3324944	-1.53	0.127	-1.163352	.1455212
Y_Fmalehat14	-.5793783	.4870326	-1.19	0.235	-1.537987	.3792304
Y_NWmalehat14	-1.817302	1.380397	-1.32	0.189	-4.534288	.8996844
Landholding	.6599789	.4872609	1.35	0.177	-.2990792	1.619037
LandholdingSQ	-.0096861	.0072808	-1.33	0.184	-.0240166	.0046445
Caste_Group						
BC	-11.39683	7.128416	-1.60	0.111	-25.42744	2.633772
FC	6.551288	4.42123	1.48	0.139	-2.150861	15.25344
Caste_Group#c.Landholding						
BC	.2246687	.1069368	2.10	0.037	.0141888	.4351485
FC	-.2271642	.159116	-1.43	0.154	-.5403466	.0860182
Oth_Wage_Wks	-1.447549	.9807066	-1.48	0.141	-3.377838	.4827411
Fa_WR_Fem	-.0090247	.0070786	-1.27	0.203	-.0229572	.0049078
NFa_WR_Fem	.2311521	.1465206	1.58	0.116	-.0572392	.5195433
WDist_fem	.2082121	.1344198	1.55	0.122	-.0563616	.4727858
Family_Size	.5814246	.4436965	1.31	0.191	-.2918872	1.454736
AGE_Fem	.0997633	.0733436	1.36	0.175	-.0445963	.244123
Yrs_ED_Fem	.0523435	.0438473	1.19	0.234	-.0339596	.1386465
VILLAGE						
DOK	1.034078	.841746	1.23	0.220	-.6227008	2.690856
KAL	-39.75706	25.78908	-1.54	0.124	-90.51678	11.00266
KAN	16.04435	10.35034	1.55	0.122	-4.327856	36.41655
KIN	14.99604	9.482542	1.58	0.115	-3.668105	33.66019
SHI	-10.20508	6.637292	-1.54	0.125	-23.26903	2.858863
_cons	-15.49422	10.69644	-1.45	0.149	-36.54764	5.559211

Structural Model 2: Complete Model with the Aggregated Village Restriction

T(Non-Farm) Male 2014

Source	SS	df	MS
Model	717.741749	19	37.7758815
Residual	1375.06167	291	4.72529784
Total	2092.80342	310	6.75097878

Number of obs	=	311
F(19, 291)	=	7.99
Prob > F	=	0.0000
R-squared	=	0.3430
Adj R-squared	=	0.3001
Root MSE	=	2.1738

TNFmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_Fmalehat14	-.4666842	.3023568	-1.54	0.124	-1.061768	.1283992
Y_NWmalehat14	.4692042	.3822531	1.23	0.221	-.2831271	1.221535
Y_NFfemhat14	.615134	.1649226	3.73	0.000	.2905417	.9397262
Y_Ffemhat14	.6354604	.2815011	2.26	0.025	.0814241	1.189497
Y_NWfemhat14	.2247956	.8963429	0.25	0.802	-1.539341	1.988932
Landholding	-.3713787	.0969235	-3.83	0.000	-.5621387	-.1806187
LandholdingSQ	.0074975	.0021133	3.55	0.000	.0033383	.0116567
Caste_Group						
BC	.182879	.7941937	0.23	0.818	-1.380213	1.745971
FC	-.4918284	.4973793	-0.99	0.324	-1.470745	.4870884
Caste_Group#c.Landholding						
BC	.0457043	.0814281	0.56	0.575	-.1145584	.2059671
FC	.0646191	.0460621	1.40	0.162	-.026038	.1552762
Oth_Wage_Wks	-.3482123	.2079922	-1.67	0.095	-.757572	.0611473
Fa_WR_Male	-.0001125	.0054725	-0.02	0.984	-.0108832	.0106582
NFa_WR_Male	.0018675	.0009028	2.07	0.039	.0000906	.0036444
WDist_Male	.0327437	.0122855	2.67	0.008	.0085639	.0569235
Family_Size	.1220567	.108621	1.12	0.262	-.0917257	.3358391
AGE_Male	-.0104999	.0197281	-0.53	0.595	-.0493277	.028328
Yrs_ED_Male	.1216815	.0459461	2.65	0.009	.0312526	.2121103
V						
Others	2.070499	.7950245	2.60	0.010	.5057721	3.635226
_cons	-1.399595	2.193887	-0.64	0.524	-5.717493	2.918303

T(Off-Farm) Male 2014

Source	SS	df	MS
Model	331.023965	19	17.422314
Residual	606.764521	291	2.08510145
Total	937.788487	310	3.02512415

Number of obs	=	311
F(19, 291)	=	8.36
Prob > F	=	0.0000
R-squared	=	0.3530
Adj R-squared	=	0.3107
Root MSE	=	1.444

TFmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFmalehat14	-2.684549	.4811892	-5.58	0.000	-3.631601	-1.737496
Y_NWmalehat14	2.082048	.4124861	5.05	0.000	1.270214	2.893883
Y_NFfemhat14	1.726674	.3025986	5.71	0.000	1.131114	2.322233
Y_Ffemhat14	1.121046	.1633218	6.86	0.000	.7996042	1.442488
Y_NWfemhat14	.3677454	.4962044	0.74	0.459	-.6088591	1.34435
Landholding	-.8400577	.1558549	-5.39	0.000	-1.146803	-.5333118
LandholdingSQ	.0164129	.0030407	5.40	0.000	.0104284	.0223974
Caste_Group						
BC	1.930899	.6646271	2.91	0.004	.6228139	3.238985
FC	-.9602073	.3772847	-2.55	0.011	-1.70276	-.2176547
Caste_Group#c.Landholding						
BC	-.0152845	.0518887	-0.29	0.769	-.1174092	.0868401
FC	.0586005	.0315213	1.86	0.064	-.0034382	.1206391
Oth_Wage_Wks	-.2181877	.1311487	-1.66	0.097	-.4763079	.0399325
Fa_WR_Male	-.0051861	.0040054	-1.29	0.196	-.0130692	.0026971
NFa_WR_Male	.0045011	.0011999	3.75	0.000	.0021394	.0068628
WDist_Male	.0444787	.0111294	4.00	0.000	.0225745	.066383
Family_Size	.1601183	.0635381	2.52	0.012	.0350657	.2851708
AGE_Male	-.0225232	.0140939	-1.60	0.111	-.050262	.0052157
Yrs_ED_Male	.3633197	.067394	5.39	0.000	.2306783	.4959611
V						
Others	2.747841	.7643176	3.60	0.000	1.24355	4.252133
_cons	.635632	1.535071	0.41	0.679	-2.385618	3.656882

T(Non-wage)Male 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(19, 291)	=	5.11
Model	131.033217	19	6.8964851	Prob > F	=	0.0000
Residual	392.363721	291	1.34832894	R-squared	=	0.2504
				Adj R-squared	=	0.2014
Total	523.396938	310	1.68837722	Root MSE	=	1.1612

TNWmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFmalehat14	.4695559	.2578136	1.82	0.070	-.0378598	.9769717
Y_Fmalehat14	.2826507	.1748107	1.62	0.107	-.0614029	.6267043
Y_NFfemhat14	-.3652463	.1718921	-2.12	0.034	-.7035557	-.0269369
Y_Ffemhat14	-.4645372	.1738781	-2.67	0.008	-.8067553	-.122319
Y_NWfemhat14	-.9044805	.4867819	-1.86	0.064	-1.86254	.0535792
Landholding	.2444898	.0573285	4.26	0.000	.1316587	.357321
LandholdingSQ	-.0047449	.0012803	-3.71	0.000	-.0072647	-.0022251
Caste_Group						
BC	-1.034781	.4482856	-2.31	0.022	-1.917074	-.1524883
FC	.2294177	.2642966	0.87	0.386	-.2907575	.7495928
Caste_Group#c.Landholding						
BC	.0623735	.0440522	1.42	0.158	-.0243278	.1490749
FC	-.0400547	.0232345	-1.72	0.086	-.0857836	.0056741
Oth_Wage_Wks	.1478607	.1104813	1.34	0.182	-.0695831	.3653045
Fa_WR_Male	.0025175	.0028538	0.88	0.378	-.0030992	.0081342
NFa_WR_Male	-.0009167	.0005874	-1.56	0.120	-.0020728	.0002395
WDist_Male	-.0127818	.0066694	-1.92	0.056	-.0259083	.0003446
Family_Size	-.1063418	.0580615	-1.83	0.068	-.2206156	.0079319
AGE_Male	-.0216899	.0114452	-1.90	0.059	-.0442157	.0008359
Yrs_ED_Male	-.1242347	.030373	-4.09	0.000	-.1840133	-.0644562
V						
Others	-.2921944	.476085	-0.61	0.540	-1.229201	.644812
_cons	-2.247518	1.121892	-2.00	0.046	-4.455568	-.0394675

T(Non-Farm) Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(19, 291)	=	11.87
Model	456.51267	19	24.0269826	Prob > F	=	0.0000
Residual	588.904757	291	2.02372769	R-squared	=	0.4367
				Adj R-squared	=	0.3999
Total	1045.41743	310	3.37231428	Root MSE	=	1.4226

TNFfem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_Ffemhat14	1.40618	.4769678	2.95	0.003	.4674358	2.344924
Y_NWfemhat14	1.379376	.8487002	1.63	0.105	-.2909933	3.049744
Y_NFmalehat14	.6088438	.1345812	4.52	0.000	.3439678	.8737198
Y_Fmalehat14	-.7820823	.3283647	-2.38	0.018	-1.428353	-.1358116
Y_NWmalehat14	-.444841	.2305942	-1.93	0.055	-.8986848	.0090027
Landholding	.3454752	.0827598	4.17	0.000	.1825915	.5083589
LandholdingSQ	-.0057409	.0015598	-3.68	0.000	-.0088108	-.0026711
Caste_Group						
BC	1.250961	.5531782	2.26	0.024	.1622233	2.339698
FC	1.418235	.4754627	2.98	0.003	.4824537	2.354017
Caste_Group#c.Landholding						
BC	-.1819908	.0717742	-2.54	0.012	-.3232532	-.0407284
FC	-.0414652	.0315879	-1.31	0.190	-.1036349	.0207045
Oth_Wage_Wks	-.3806141	.1673368	-2.27	0.024	-.7099579	-.0512702
Fa_WR_Fem	.0399757	.0095357	4.19	0.000	.0212081	.0587433
NFa_WR_Fem	-.0142912	.0033763	-4.23	0.000	-.0209362	-.0076461
WDist_fem	.0322129	.0159309	2.02	0.044	.0008585	.0635673
Family_Size	.1297699	.0967797	1.34	0.181	-.0607071	.3202469
AGE_Fem	.0469741	.0155844	3.01	0.003	.0163016	.0776465
Yrs_ED_Fem	.1108303	.0486948	2.28	0.024	.0149917	.2066689
V						
Others	2.09848	.8856926	2.37	0.018	.3553046	3.841656
_cons	-9.76557	1.639649	-5.96	0.000	-12.99264	-6.538495

T(Off-Farm) Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(19, 291)	=	7.48
Model	586.663549	19	30.8770289	Prob > F	=	0.0000
Residual	1201.44549	291	4.12867868	R-squared	=	0.3281
				Adj R-squared	=	0.2842
Total	1788.10904	310	5.76809369	Root MSE	=	2.0319

TFfem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFfemhat14	.3514546	.2492837	1.41	0.160	-.139173	.8420822
Y_NWfemhat14	-1.517566	.7327301	-2.07	0.039	-2.959688	-.0754434
Y_NFmalehat14	-.3092542	.2731509	-1.13	0.258	-.846856	.2283476
Y_Fmalehat14	.4744078	.159794	2.97	0.003	.1599093	.7889063
Y_NWmalehat14	.5210516	.3403245	1.53	0.127	-.1487579	1.190861
Landholding	-.2530962	.1209137	-2.09	0.037	-.4910725	-.0151199
LandholdingSQ	.0042033	.0024564	1.71	0.088	-.0006313	.0090379
Caste_Group						
BC	-.5428843	.7584377	-0.72	0.475	-2.035603	.9498346
FC	-1.099906	.4471745	-2.46	0.014	-1.980012	-.2197997
Caste_Group#c.Landholding						
BC	.1004007	.075729	1.33	0.186	-.0486453	.2494466
FC	.0304343	.0429343	0.71	0.479	-.0540667	.1149354
Oth_Wage_Wks	.1292603	.1748934	0.74	0.460	-.2149562	.4734767
Fa_WR_Fem	-.0128458	.0065327	-1.97	0.050	-.0257031	.0000114
NFa_WR_Fem	.0092879	.0026986	3.44	0.001	.0039767	.0145992
WDist_fem	-.0082346	.0225512	-0.37	0.715	-.0526186	.0361495
Family_Size	-.1574509	.0783463	-2.01	0.045	-.3116481	-.0032537
AGE_Fem	-.0328409	.0173442	-1.89	0.059	-.0669769	.0012952
Yrs_ED_Fem	-.0432979	.0452461	-0.96	0.339	-.1323491	.0457532
V						
Others	.0361548	1.251225	0.03	0.977	-2.426444	2.498754
_cons	1.249546	2.108345	0.59	0.554	-2.899993	5.399085

T(Non-wage)Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(19, 291)	=	13.46
Model	57.8533482	19	3.04491306	Prob > F	=	0.0000
Residual	65.8158093	291	.226171166	R-squared	=	0.4678
				Adj R-squared	=	0.4331
Total	123.669157	310	.398932766	Root MSE	=	.47557

TNWagefem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Y_NFfemhat14	.186841	.0647637	2.88	0.004	.0593764	.3143057
Y_Ffemhat14	-.4148769	.1069835	-3.88	0.000	-.6254364	-.2043175
Y_NFmalehat14	-.0777342	.0664971	-1.17	0.243	-.2086105	.0531421
Y_Fmalehat14	.2356009	.0614647	3.83	0.000	.1146292	.3565726
Y_NWmalehat14	.1380176	.0793652	1.74	0.083	-.018185	.2942203
Landholding	-.0818869	.0348853	-2.35	0.020	-.1505463	-.0132275
LandholdingSQ	.0013323	.0006636	2.01	0.046	.0000262	.0026384
Caste_Group						
BC	-.4370994	.1587628	-2.75	0.006	-.7495683	-.1246306
FC	-.3610257	.138898	-2.60	0.010	-.6343976	-.0876537
Caste_Group#c.Landholding						
BC	.0644272	.0165881	3.88	0.000	.0317793	.0970751
FC	.0130471	.0104572	1.25	0.213	-.0075341	.0336284
Oth_Wage_Wks	.0878456	.0462812	1.90	0.059	-.0032428	.178934
Fa_WR_Fem	-.0103089	.0031191	-3.31	0.001	-.0164477	-.0041701
NFa_WR_Fem	.0051531	.0010171	5.07	0.000	.0031512	.007155
WDist_fem	-.0028129	.0053152	-0.53	0.597	-.0132741	.0076482
Family_Size	-.1134365	.0182664	-6.21	0.000	-.1493874	-.0774855
AGE_Fem	-.0196841	.0047797	-4.12	0.000	-.0290913	-.0102769
Yrs_ED_Fem	-.0192967	.0145984	-1.32	0.187	-.0480286	.0094352
V						
Others	.0665944	.295659	0.23	0.822	-.5153068	.6484956
_cons	1.218934	.6366432	1.91	0.057	-.0340754	2.471943

Structural Model 3: Structural Model with Disaggregated Earnings of the Spouse

T(Non-Farm) Male 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(17, 293)	=	8.30
Model	680.285701	17	40.0168059	Prob > F	=	0.0000
Residual	1412.51772	293	4.82087959	R-squared	=	0.3251
				Adj R-squared	=	0.2859
Total	2092.80342	310	6.75097878	Root MSE	=	2.1957

TNFmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NFIFhat14	.4727135	.1901383	2.49	0.013	.0985034	.8469235
FIFhat14	.4141071	.3093021	1.34	0.182	-.1946283	1.022842
NWIFhat14	-7.063589	3.800455	-1.86	0.064	-14.54324	.416061
Landholding	-.2932542	.0611424	-4.80	0.000	-.4135881	-.1729202
LandholdingSQ	.0056012	.0016233	3.45	0.001	.0024064	.0087959
Caste_Group						
BC	.6736126	.7147106	0.94	0.347	-.7330046	2.08023
FC	-.8298245	.4174741	-1.99	0.048	-1.651453	-.0081964
Caste_Group#c.Landholding						
BC	.0909937	.075624	1.20	0.230	-.0578415	.2398288
FC	.0528541	.0428179	1.23	0.218	-.0314156	.1371238
Oth_Wage_Wks	-.1178092	.185735	-0.63	0.526	-.4833531	.2477347
Fa_WR_Male	.0007221	.003793	0.19	0.849	-.0067428	.0081871
NFa_WR_Male	.0024967	.0007623	3.28	0.001	.0009965	.0039969
WDist_Male	.0280762	.0118297	2.37	0.018	.0047943	.0513581
Family_Size	-.0823099	.077634	-1.06	0.290	-.2351008	.0704811
AGE_Male	-.038134	.0143386	-2.66	0.008	-.0663537	-.0099142
Yrs_ED_Male	.0631463	.0336309	1.88	0.061	-.0030425	.1293351
V						
Others	2.699264	.7616296	3.54	0.000	1.200306	4.198222
_cons	-5.283412	1.338328	-3.95	0.000	-7.917366	-2.649458

T(Off-Farm) Male 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(17, 293)	=	7.87
Model	293.857044	17	17.2857085	Prob > F	=	0.0000
Residual	643.931443	293	2.19771824	R-squared	=	0.3134
				Adj R-squared	=	0.2735
Total	937.788487	310	3.02512415	Root MSE	=	1.4825

TFmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NFIFhat14	.2742154	.1283786	2.14	0.034	.0215543	.5268764
FIFhat14	.4337151	.2088362	2.08	0.039	.022706	.8447242
NWIFhat14	11.4405	2.566011	4.46	0.000	6.390348	16.49064
Landholding	-.0746773	.0412824	-1.81	0.071	-.155925	.0065704
LandholdingSQ	.0014567	.001096	1.33	0.185	-.0007004	.0036137
Caste_Group						
BC	-.2866147	.4825619	-0.59	0.553	-1.236342	.6631123
FC	-.1715795	.2818723	-0.61	0.543	-.7263305	.3831716
Caste_Group#c.Landholding						
BC	-.0175857	.0510602	-0.34	0.731	-.1180769	.0829056
FC	.016514	.02891	0.57	0.568	-.0403837	.0734116
Oth_Wage_Wks	-.0306841	.1254055	-0.24	0.807	-.2774939	.2161257
Fa_WR_Male	.0201473	.002561	7.87	0.000	.0151071	.0251875
NFa_WR_Male	-.0013074	.0005147	-2.54	0.012	-.0023203	-.0002945
WDist_Male	-.0009256	.0079872	-0.12	0.908	-.0166452	.014794
Family_Size	.0734405	.0524173	1.40	0.162	-.0297217	.1766026
AGE_Male	-.0021017	.0096812	-0.22	0.828	-.0211552	.0169518
Yrs_ED_Male	-.0399816	.0227071	-1.76	0.079	-.0846713	.0047081
V						
Others	-.4448317	.514241	-0.87	0.388	-1.456906	.5672427
_cons	-4.791174	.903619	-5.30	0.000	-6.569581	-3.012767

T(Non-wage)Male 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(17, 293)	=	5.46
Model	125.840388	17	7.40237578	Prob > F	=	0.0000
Residual	397.55655	293	1.35684829	R-squared	=	0.2404
				Adj R-squared	=	0.1964
Total	523.396938	310	1.68837722	Root MSE	=	1.1648

TNWmale	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NFIFhat14	.1419827	.1008724	1.41	0.160	-.0565436	.3405089
FIFhat14	-.0208176	.1640912	-0.13	0.899	-.3437644	.3021293
NWIFhat14	-3.487995	2.016221	-1.73	0.085	-7.456105	.4801162
Landholding	.1984524	.0324373	6.12	0.000	.1346127	.2622921
LandholdingSQ	-.0035471	.0008612	-4.12	0.000	-.005242	-.0018522
Caste_Group						
BC	-.918211	.3791689	-2.42	0.016	-1.664451	-.1719711
FC	.4171396	.2214787	1.88	0.061	-.0187513	.8530305
Caste_Group#c.Landholding						
BC	.033983	.0401201	0.85	0.398	-.0449771	.1129432
FC	-.0504771	.0227158	-2.22	0.027	-.0951839	-.0057702
Oth_Wage_Wks	.0164492	.0985363	0.17	0.868	-.1774795	.2103779
Fa_WR_Male	.0017568	.0020123	0.87	0.383	-.0022035	.0057171
NFa_WR_Male	-.0003553	.0004044	-0.88	0.380	-.0011511	.0004406
WDist_Male	-.0093087	.0062759	-1.48	0.139	-.0216602	.0030429
Family_Size	-.0275212	.0411865	-0.67	0.505	-.10858	.0535375
AGE_Male	-.0269029	.0076069	-3.54	0.000	-.041874	-.0119317
Yrs_ED_Male	-.0567995	.0178419	-3.18	0.002	-.0919141	-.021685
V						
Others	-.0010337	.4040604	-0.00	0.998	-.7962625	.794195
_cons	-1.676708	.7100109	-2.36	0.019	-3.074076	-.2793402

T(Non-Farm) Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(17, 293)	=	11.64
Model	421.512755	17	24.794868	Prob > F	=	0.0000
Residual	623.904672	293	2.12936748	R-squared	=	0.4032
				Adj R-squared	=	0.3686
Total	1045.41743	310	3.37231428	Root MSE	=	1.4592

TNFfem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NFIMhat14	-.7145613	.2280917	-3.13	0.002	-1.163467	-.2656556
FIMhat14	-1.37943	.7712342	-1.79	0.075	-2.897291	.1384313
NWIMhat14	-2.606581	1.484831	-1.76	0.080	-5.528866	.3157046
Landholding	.0056253	.0637516	0.09	0.930	-.1198438	.1310945
LandholdingSQ	-.0002654	.0014039	-0.19	0.850	-.0030284	.0024976
Caste_Group						
BC	1.624268	.43071	3.77	0.000	.77659	2.471945
FC	-.2189142	.3000292	-0.73	0.466	-.8093997	.3715713
Caste_Group#c.Landholding						
BC	-.0651546	.047204	-1.38	0.169	-.1580564	.0277472
FC	-.0053487	.0299517	-0.18	0.858	-.0642964	.053599
Oth_Wage_Wks	.0114483	.1242739	0.09	0.927	-.2331344	.256031
Fa_WR_Fem	.0057617	.0039735	1.45	0.148	-.0020585	.013582
NFa_WR_Fem	-.011805	.0016631	-7.10	0.000	-.0150782	-.0085319
WDist_fem	.0118775	.0158252	0.75	0.454	-.0192679	.0430229
Family_Size	-.1331563	.0467408	-2.85	0.005	-.2251465	-.0411661
AGE_Fem	-.0279243	.0107344	-2.60	0.010	-.0490505	-.0067981
Yrs_ED_Fem	-.0244087	.0289984	-0.84	0.401	-.0814803	.032663
V						
Others	1.927507	.8749472	2.20	0.028	.2055297	3.649485
_cons	-6.500735	1.256527	-5.17	0.000	-8.973697	-4.027774

T(Off-Farm) Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(17, 293)	=	7.44
Model	539.248401	17	31.7204942	Prob > F	=	0.0000
Residual	1248.86064	293	4.26232301	R-squared	=	0.3016
				Adj R-squared	=	0.2611
Total	1788.10904	310	5.76809369	Root MSE	=	2.0645

TFfem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NFIMhat14	.455631	.3227062	1.41	0.159	-.179485	1.090747
FIMhat14	2.919408	1.091149	2.68	0.008	.7719243	5.066891
NWIMhat14	1.805087	2.100752	0.86	0.391	-2.329389	5.939564
Landholding	-.1845633	.0901964	-2.05	0.042	-.3620781	-.0070484
LandholdingSQ	.0031138	.0019862	1.57	0.118	-.0007953	.0070228
Caste_Group						
BC	.4172171	.6093724	0.68	0.494	-.7820848	1.616519
FC	-.5865929	.4244841	-1.38	0.168	-1.422017	.2488314
Caste_Group#c.Landholding						
BC	.0135273	.0667846	0.20	0.840	-.117911	.1449656
FC	.0305188	.0423759	0.72	0.472	-.0528809	.1139185
Oth_Wage_Wks	.1250602	.1758239	0.71	0.477	-.2209777	.471098
Fa_WR_Fem	-.0040526	.0056218	-0.72	0.472	-.0151168	.0070116
NFa_WR_Fem	.0113185	.002353	4.81	0.000	.0066877	.0159494
WDist_fem	-.005595	.0223896	-0.25	0.803	-.0496598	.0384698
Family_Size	-.0927522	.0661293	-1.40	0.162	-.2229008	.0373964
AGE_Fem	-.0138134	.0151871	-0.91	0.364	-.043703	.0160761
Yrs_ED_Fem	-.1045401	.0410272	-2.55	0.011	-.1852856	-.0237946
V						
Others	-.4501715	1.237883	-0.36	0.716	-2.886441	1.986099
_cons	-.4570406	1.777745	-0.26	0.797	-3.95581	3.041728

T(Non-wage)Female 2014

Source	SS	df	MS			
				Number of obs	=	311
				F(17, 293)	=	12.98
Model	53.1151618	17	3.12442128	Prob > F	=	0.0000
Residual	70.5539957	293	.24079862	R-squared	=	0.4295
				Adj R-squared	=	0.3964
Total	123.669157	310	.398932766	Root MSE	=	.49071

TNWagefem	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NFIMhat14	-.0651376	.0767028	-0.85	0.396	-.2160958	.0858207
FIMhat14	.0069421	.259351	0.03	0.979	-.503485	.5173691
NWIMhat14	.6743886	.4993196	1.35	0.178	-.3083191	1.657096
Landholding	-.009987	.0214384	-0.47	0.642	-.0521799	.0322058
LandholdingSQ	.0001059	.0004721	0.22	0.823	-.0008232	.001035
Caste_Group						
BC	-.2751318	.1448394	-1.90	0.058	-.5601892	.0099256
FC	-.0194799	.100894	-0.19	0.847	-.2180486	.1790889
Caste_Group#c.Landholding						
BC	.0412952	.0158738	2.60	0.010	.0100541	.0725363
FC	.0019426	.0100722	0.19	0.847	-.0178803	.0217656
Oth_Wage_Wks	.01511	.0417909	0.36	0.718	-.0671384	.0973584
Fa_WR_Fem	.0013235	.0013362	0.99	0.323	-.0013063	.0039533
NFa_WR_Fem	.0015062	.0005593	2.69	0.007	.0004055	.0026069
WDist_fem	.0000176	.0053217	0.00	0.997	-.010456	.0104912
Family_Size	-.0898057	.015718	-5.71	0.000	-.1207403	-.0588712
AGE_Fem	-.0133895	.0036098	-3.71	0.000	-.0204939	-.0062852
Yrs_ED_Fem	.0166734	.0097516	1.71	0.088	-.0025187	.0358654
V						
Others	.3361718	.2942277	1.14	0.254	-.2428958	.9152393
_cons	-1.096182	.4225454	-2.59	0.010	-1.927791	-.2645732

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CHAPTER 5

CONCLUSIONS

Summary of Main Findings:

The socio-economic dynamics around men's and women's economic roles vary widely across the rural Indian landscape. In this dissertation, I draw on the theoretical debates between feminization and de-feminization of the rural labor market to examine the interdependency of change in economic activities between the spouses living in rural Indian households. In addition, my research is shaped and guided by the concept of household livelihood strategies as elaborated in sociological research (Brown and Kulcsar, 2001; Mingione,1991 and others). This perspective describes how households pool income from a variety of sources contributed by multiple household members. Rather than a *survival strategy* of the worst off, livelihood strategies are deployed by households with relatively greater resources. I use data collected and compiled by ICRISAT from six different villages located in central India. Although many rural Indians hold more than one job, I first examine only primary occupations which serve as a point of departure to understand the changing employment scenario in rural India. Not surprisingly, I found that gender is a key factor that determines labor participation and type of employment in rural India. My findings also suggest that caste moderates the relationship between social class (measured by landholding category) and rural labor participation, particularly for the upper castes. I found that women's employment while generally advancing with class tends to decline among the highest caste. Women's employment among upper caste rural households seems to be stigmatized. To a limited

extend, this finding is consistent with Vaid (2012) and others that show a close correspondence between class and caste.

Subsequently, I aggregated a combination of primary and secondary occupations to examine the complexity of livelihood diversification at the individual level within rural Indian households. My research shows that most men and women in rural India rely on multiple job holding. This multiple job holding can be within a sector (e.g. a farmer working on his own land for a part of the time and then working on other's farm as a worker for the rest) or across sectors (e.g. a laborer partly working on the farm and partly at a construction site in his or another village). Though it is not the key focus of my research, multiple job holding in the ICRISAT villages is stretched across space and time. In other words, my dataset consisted of the entire spectrum of the rural working population: those who work in their own village or who commute daily to nearby worksites, or who migrate further away seasonally or permanently. Importantly, I found that multiple job holding is a livelihood strategy for most people in rural India, particularly for the poor. This finding is somewhat at odds with scholarly research from some other countries where holding more than one job provides additional income for people who are relatively economically secure.

Finally, using panel data on time allocation between 2009 and 2014, I examined if changes in householders[49] economic activities affect changes in spouses' economic activities after controlling for individual and household characteristics including the labor supply of other working members in the household. My research is not conclusive on this matter. The two stage structural equation models show no bi-directional

[49]Householders in rural India are almost always males

relationship amongst the respective spouses' employment between 2009 and 2014. This is at variance with the literature, and with my hypothesis that changes in male spouses' economic activities would drive changes in their wives' economic activities.

Significance of the Findings for Social Research and Social Policy:

Rural Indian households have complex economies. Primary occupations alone cannot capture the full extent of employment in the rural Indian economy. Often the secondary (and tertiary occupations) shed considerable light on the work carried out by men and women in the rural households. In particular, women's work in the rural economy is largely underreported since it is perceived to be non-productive as it is a part of non-wage/unpaid work. Hence, it is reported as a secondary or tertiary occupation. Data collection agencies at the state, national and international levels do not typically assign appropriate weight to secondary and tertiary occupations while compiling data on labor statistics. Hence, women's contribution to household economic security is somewhat invisible.

Time allocation studies such as this dissertation provide the ability to capture work in a more comprehensive way and highlight the prevalence of intra-household gender disparities in the distribution of work within the household. For instance, Swaminathan and Usami (2016) document that the bulk of livestock work and cattle rearing in rural India is largely carried out by women. Though it constitutes an important component of household income (e.g. obtained from cattle trading of goats, dairy production from milch cattle like cows and buffaloes, etc.) for a large section of rural households, livestock work is largely undervalued in terms of the economic contribution of women. Management of livestock (i.e. non-wage work in my research) is primarily

a household-based activity and involves the use of women's labor time towards cattle care. Both at the research and policy levels, more reliable techniques need to be developed to measure the detailed non-monetary contribution of women to the family as their work remains outside the formal economy e.g. for time spent on child care. These activities contribute importantly to a household's economic security because they reduce a household's need for cash income. Though in my research I have used imputed values for estimating the monetary contribution of non-wage work, it cannot account for multitasking performed by women based on the available data (e.g. when a woman is cooking and also looking after her children at the same time). On the other hand, even though imputing monetary value to women's unpaid work may mask the qualitative and specific aspects of work, it does provide a starting point to recognize their economic contribution in the household.

My research shows that women's economic contributions are systematically undervalued in rural India. Their contribution via non-wage work cannot be accounted for if policy makers confine their attention to formal employment, and design policies that focus exclusively on wage work which largely involves men. Non-wage employment involves work that does not receive direct remuneration but forms a major component of the rural household economy. Employment policies should be shaped around holistic notions of family livelihood that engage with wage and non-wage work. Similarly, labor policies in rural India typically focus on primary occupations even though my research shows the critical importance of multiple job holding especially for the poorer households.

Directions for Future Research:

One of the major issues for future empirical research is to examine how family composition jointly affects householders' and spouses' time allocation towards wage and non-wage work. One of the basic questions is to determine the actual economic contribution of all the household members, as well as their claims on household resources. This research has exclusively focused on the economic contribution of the marital couple while controlling for additional working members in the household. However, the actual economic contribution of the other household members is not a part of this analysis. The relationship between family composition and time allocation is complex. For example, in countries like China and India, it is well documented that the presence of many infants in the household puts a significant burden on woman's labor time at home (i.e. towards domestic care work). However, this burden is reduced if there are elderly members in the household who can take care of the infants. Similarly, the presence of young adolescents affects woman's labor time in the household differently depending on whether the adolescents are attending school or helping in domestic or own-farm work. Second, not all women in the household can be classified under a single generic category; e.g., they have different roles in the household. For instance, Sidh and Basu (2011) show that daughter-in-laws' in several households carry out most of the backbreaking heavy work of fetching water and fuelwood while daughters' and mother-in-laws' perform lighter tasks. Hence, in addition to time allocated to domestic work, the *type* of domestic work activity carried out by individuals can help us establish the intensity and hierarchy of workload in the household. In addition, it would be useful to examine the association between various economic activities conducted by the

household members and their fertility patterns, the level of educational attainment, and their migratory behavior.

One of the substantive reasons why rural women do not report their primary occupation as workers is closely related to India's patriarchal culture. Such a scenario is particularly evident in upper caste households of rural India. My research shows that upper caste women in rural India are likely to spend more time in non-waged work compared to wage work than their counterparts from the lowest caste i.e. SC/ST group. Future research based on qualitative methods or field-based surveys can provide in-depth explanations behind this finding, and behind the intersectionality of caste and class more generally. For instance, one can ascertain if patriarchal gender ideology restricts women from moving outside the household and underplays their contribution to household income and family care. Another explanation that can support our finding is to observe if women internalize their economic roles as subordinate to that of men, and also perceive wage-work as an indicator of lower social status.

Similarly, future research on detailed economic activity can further delineate the gender division of labor within own-farm work. For example, the share of time and effort spent by men in ploughing v/s. women in harvesting can provide a detailed assessment of farming operations in the rural economy. Such an assessment is quite important for the purposes of policy intervention by the government. For instance, provision of an appropriate technology like mechanization might reduce the time and drudgery in carrying out manual harvesting of cotton. This way men and women could spend their time more productively on other activities. Alternatively, public provision of services by the government like childcare facilities or availability of subsidized

mechanical devises like washing machines might reduce women's time and workload burden in domestic work.

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