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**April 2014**

<http://www.igidr.ac.in/pdf/publication/WP-2014-015.pdf>

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## **Abstract**

*Unlike migration, scant attention has been paid to the phenomenon of commuting by workers in developing countries. This paper fills this gap by using a nationally representative data set from India to analyze factors that affect the decision of workers to commute across rural and urban areas daily. Our results suggest that regions with large peripheral urban areas or concentration of secondary sector jobs are more likely to have commuting workers. Regional rural and urban unemployment rates and rural-urban wage differentials are important push and pull factors in the decision to commute.*

**Keywords:** Commuting, Peri-urban areas, Spatial distribution of economic activities, Urbanization, Rural-urban interaction, India

**JEL Code:** R11, R23, J21

## **Acknowledgements:**

This paper is part of a research project “The Commuting Worker: An Overlooked Aspect of Rural-Urban Interaction Evidence from India”<sup>TM</sup>. The activities discussed in this article have been supported by the Global Development Network (GDN) and Ministry of Finance Japan. The views expressed in this article are not necessarily those of GDN and the Ministry of Finance, Japan. We are grateful to Eric Denis and G Venkatasubramanian for sharing with us the database developed as part of the Indian axis of the e-Geopolis research project. We received valuable comments from Sanjoy Chakravorty, Amitabh Kundu, Sripad Motiram, Vijayalakshmi Pandey, C Veeramani and seminar participants at Indira Gandhi Institute of Development Research. Earlier versions of the paper benefited from feedback received at workshop on subaltern urbanization held at Center for Policy Research and the following conferences: European Population Conference 2012, Asian Population Association Conference 2012, and the Asian Meeting of the Econometric Society 2012.

# **Growth of the Urban Shadow, Spatial Distribution of Economic Activities and Commuting by Workers in Rural and Urban India**

## **1. INTRODUCTION**

A large numbers of workers in developing countries commute across rural-urban boundaries every day without changing their place of residence. This phenomenon is evident in a diverse group of developing countries including Bangladesh, India, Indonesia, Nigeria, and Tanzania (Bah et al., 2007; Baker, 2007; Deichmann et al, 2009; Douglass, 2007; Lanjouw et al., 2001). In India, for the year 2009-10, based on a nationwide survey of employment and unemployed conducted by National Sample Survey Organization (NSSO), we estimate that 12.42 million workers engaged in non-agricultural activities crossed the rural-urban boundary everyday (8.05 million rural-urban commuters and 4.37 million urban-rural commuters). In addition, 12.2 million non-agricultural workers reported not having a fixed place of work. In contrast, in 1993-94 only 6.34 million individuals were crossing the rural-urban boundary every day for work. Considering rural-urban, urban-rural commuters and those with no fixed place of work, we observe a nearly four-fold increase (from 6.34 million to 24.62 million) in the number of two-way commuters between rural and urban areas.

While we do observe millions of workers engaged in two-way commuting between rural and urban areas, this issue is relatively under researched. This lacunae needs to be filled since commuting by workers has implications for outcomes in labour markets. Larger magnitudes of commuters will contribute to the integration of rural and urban labour markets, reduce regional unemployment and narrow wage differences between rural and urban areas.

One important question of interest relates to the factors that affect commuting by workers. How do labour market conditions, as reflected by the unemployment rate in rural and urban areas and rural-urban wage differentials affect the decision to commute? In the Indian context, labour market conditions are an important determinant given an employment elasticity close to zero (Government of India, 2011a). Further, jobs are not getting created where people reside thereby necessitating commuting. As we point out later, since the beginning of economic reforms in 1991, there has been a redistribution of activity across rural and urban India. This redistribution and the emerging spatial distribution of jobs in primary, secondary and services sector affects the decision to commute. Finally, regions with a large urban and peri-urban population or what we refer to as the urban shadow are likely to see commuting by workers. In order to address these issues, we use data from a nationally representative survey on employment and unemployment conducted by India's NSSO in 2009-10.

Beyond the issue of outcomes in labour markets, the issue of commuting is also important from a policy perspective for two reasons. First, estimates of size of workforce in rural and urban areas should be generated based on place of work and not place of residence as is the current practice. Second, at a time when many developing countries including India are investing in roads, improved transport connectivity will allow workers to commute from rural areas thereby reducing the pressure on cities to provide migrants with affordable and decent housing.

This paper complements the literature on rural-urban migration, which has been studied in considerable depth. Diversification of workplace, a phenomenon where individuals commute daily across rural and urban areas without changing their place of residence is under researched. Even from a theoretical perspective, Haas and Osland (2014) point out that there exists no

coherent theory that models the complex interactions between commuting, migration, housing and labour markets.

In terms of providing an overall framework for the issues we address, we draw upon different strands in the literature. In the context of globalization and spatial distribution of economic activity, Krugman and Elizondo (1996) developed a theoretical framework to establish that import substituting industrialization policies will lead to the rise of huge central metropolises while open markets discourage them. In the Indian context, the relaxations announced as part of the Industrial Policy of 1991 did lead to dispersal of fresh investments not only across urban areas but also between urban and rural areas (Chakravorty, 2003; Chakravorty and Lall, 2007). This redistribution of economic activity can spur commuting, an issue we return to later in the paper. One insight from the literature on search theoretic and urban economics models is that if transport facilities are available then high moving costs can encourage commuting and deter migration (Zax, 1994; Van Ommeren et al., 1997). The literature in the field of economic geography has established how agglomeration and regional concentration of economic activities affects the mobility of workers (Giuliano and Small, 1991). Drawing a parallel based on the insights of Pissarides and Wadsworth (1989) who sought to understand the relation between unemployment and inter-regional mobility of labour, we can hypothesize that a worker is likely to commute if he or she is unemployed. Further, a region with higher unemployment rate is more likely to have commuting workers. While the above mentioned contributions are from a macro perspective and layout why migration and commuting might be observed, the workhorse model in the literature on commuting examines the location choice of workers in the context of a monocentric city (Alonso, 1964; Muth, 1969; Mills, 1967). In this model, jobs are located in what is often referred to as the city center or central business district and one way commuting is

observed from residence location in the suburban areas to the central business district. This model has been extended to address the scenario of polycentric cities and multiple job locations in order to explain the phenomenon of two-way commuting of workers from central city to suburban areas and vice-versa (White, 1988; Brueckner et al., 1999). These extensions were developed since two-way commuting was observed in reality. These frameworks provide an ideal starting point for understanding a fast growing phenomenon in developing countries i.e. commuting by workers across rural-urban boundaries. The intuition for explaining two-way commuting between the city and the suburbs can be extended to shed light on two-way commuting between rural and urban areas<sup>1</sup>.

There are a handful of studies that focus on how the spatial distribution of economic activities, size of urban and peri-urban area and local labour market conditions affect the decision to commute. Baker (2007) documents that in North-West Tanzania, individuals commute to work from rural to urban areas rather than migrate because of higher cost of living in cities. Lanjouw et al. (2001) suggests that peri-urban areas (in vicinity of large urban agglomeration such as Dar-es-salaam in Tanzania) provide non-farm sector alternative to households and individuals earn more from non-farm activities in this area. They find that peri-urban areas are important in poverty reduction by providing diverse livelihood alternatives to the households. In south-eastern Nigeria efficient and subsidized transport systems has encouraged commuting to the urban centers of Aba and Port Harcourt (Bah et al., 2007). They also document the growth of industries in the peri-urban regions of Aba and Port Harcourt. Based on a field study in Indonesia,

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<sup>1</sup>The theoretical models on location choice of workers where job location is decentralized can be extended (by considering suburban as rural and city as urban) to provide the theoretical basis for the phenomenon of two-way commuting between rural and urban areas. We do not explicitly spell this model out for motivating our empirical work on factors determining the phenomenon of commuting between rural and urban areas.

Douglass (2007) finds large number of commuters from villages within the 60 kilometers periphery of industrialized cities. Deichmann et al. (2009) find that household living in the proximity of urban centers in Bangladesh and with better connectivity are more likely to be involved in non-farm employment. Their paper clearly highlights that access to urban centers is desirable for the growth of non-farm sector as well as to provide diversified alternatives for livelihood strategy. Fafchamps and Shilpi (2003) show that migration and commuting, act as two strategies for diversification of workplace and increase the income or consumption of households. They argue that people will diversify their economic activities either in the vicinity of the cities where there is growth of non-farm sector or in distant or isolated areas where non-farm production becomes essential for sustainability. In the Indian context, Kundu et al. (2002) established that wages and income decline as distance from the city increases. The decline in average per capita income of a village is steep up to a distance of 15 kilometers from the city while male and female wages decline sharply up to a distance of 20 kilometers<sup>2</sup>. Individuals living closer to the city and with transport connectivity will try to take advantage of the wage gradient and miniscule rents in rural areas by commuting to the nearby urban areas. The various initiatives taken by the Indian government to increase rural-urban connectivity through construction of rural roads (under Prime Minister's Village Roads Scheme), the Delhi-Mumbai Industrial Corridor, the Golden Quadrilateral (Roads) Project connecting the large metros, offers the option of commuting as an alternative to migration. In the context of workers engaged in non-agricultural activities and commuting across rural-urban boundaries on a daily basis in India, Mohanan (2008) writes, "... movement of rural workers to urban areas is somewhat reinforced

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<sup>2</sup> This finding is in line with the existing literature. McMillen and Singell (1992) find a negatively sloped wage gradient indicating decreasing wage with distance away from Central Business District (city centre).

by the daily picture of overcrowded trains and buses bringing people to the cities and towns from the surrounding areas, sometimes called the floating population” (p 61).

The main finding of this paper is that the spatial distribution of economic activity as reflected by the location quotient is an important determinant of decision to commute and can help explain both urban to rural and rural to urban commuting in India. We also find that regions with large peri-urban population are likely to have more commuting workers. Finally, the unemployment rate is also a significant determinant of the decision to commute.

## 2. BACKGROUND

As mentioned earlier, over the period 1993-94 and 2009-10, there has been a nearly four-fold increase in the number of two-way commuters between rural and urban areas. Before we address the factors that have contributed to this increase, we need to understand the changing distribution of population and economic activities in rural, urban and peri-urban India.

During the intercensal period 2001-11 the share of India's population living in urban areas increased from 27.81 percent to 31.16 percent. The urbanization numbers do not reflect the increase in the population living in the urban shadow just beyond the administrative boundary of the cities. These areas act as links between rural and urban settlements and have become centres of economic activities because they share selected characteristics of both rural and urban areas: cheap land, better connectivity, ease of transport, basic amenities, affordable housing etc. While there is no official estimate of the population living in the urban shadow in India, based on the work of Denis and Kamala (2011) we can estimate the population living in peri-urban area based on continuity in the built up area that extend beyond the official urban boundaries.

Employment opportunities have also arisen just outside city boundaries. India's Industrial Policy of 1991, which coincided with the onset of the reform process, required the polluting industries to move out from the million plus cities while non-polluting industries could remain within the cities. In cities like Delhi organized manufacturing has relocated outside the city thereby leading to a large number of new jobs in the urban shadow. One pattern uncovered by Chakravorty (2003) who analyzed the distribution of investment activity in India in the pre and post reform period is the rise of non-metropolitan areas. He finds that some suburban districts have attracted large investments – Chengaianna (surrounding Madras), and Raigarh and Thane (around Bombay). He establishes "the emergence of India's new industrial core – a leading edge of non-metropolitan, coastal districts that are relatively proximate to metropolitan areas" (p.135). The distribution of fresh investments implies that non-farm jobs are being created in the urban shadow which for official purposes is classified as rural<sup>3</sup>. One reason is that these regions might not meet the criteria of 75 percent of the male working population being engaged in non-agricultural activities<sup>4</sup>.

There has also been a churning in the distribution of activities across rural and urban India. Based on analysis of data from Annual Survey of Industries, Ghani et al. (2012) find that while there has been a shift in the location of formal manufacturing sector from urban to rural India, the informal sector has moved from rural to urban India. The share of manufacturing sector in

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<sup>3</sup> It is true that some of the rural areas in proximity of large cities have been classified as urban areas under the category of Census Towns. However, as Pradhan (2013) points out settlements declared as census towns continue to be administered as rural areas.

<sup>4</sup> The definition of urban has remained unchanged since Census of India 1961. As per official definition, a settlement is defined as urban if a) it has a minimum population of 5,000; b) at least 75 per cent of the main working population is engaged in non-agricultural pursuits; and c) has density of population of at least 400 persons per sq. km.

urban employment reduced from 69 percent to 57 percent between 1989 and 2005 while the share of unorganized sector has risen from 25 to 37 percent in the same period.

While the churn in the distribution of jobs across rural and urban areas can indeed drive the decision to commute, there also exist other push and pull factors. During the five year period beginning 2004-05, the number of people employed in agriculture and manufacturing declined by 23.33 million and 4.02 million respectively. These losses were offset by an increase in 25.89 million jobs in non-manufacturing (primarily in construction) and 2.7 million jobs in services. These numbers are also borne out by the corresponding (negative) employment elasticity in agriculture and manufacturing. In effect, only 1.74 million jobs were created over the period 2004-05 and 2009-10 (Government of India, 2011a).

Would individuals prefer to migrate to cities given the extent of job losses in the rural areas? The answer is not necessarily. During the period 2001-11, nationally representative surveys did not record large increase in rural-urban migration. Two predominantly urban states of India and a few important urban agglomerations reported their lowest ever population growth rate over the period 2001-11 while Mumbai recorded an absolute decline in its population. The change in the population in a city is driven by three factors: birth, death, and net migration rates. Kundu (2011) has pointed out that lower total fertility rate cannot explain the decline in population in the major urban agglomerations. So he narrows the reason down to the net migration rate. There are two plausible explanations. First, there is large out-migration from cities (larger number of people moving out of the city) and second, there is reduced rate of in-migration to cities (fewer people coming into the city). While the migration tables are yet to be released as part of Census of India 2011, indirect estimates suggest that net migration rate into the cities has declined. In light of the reduced rate of in-migration into the cities, Kundu and Saraswati (2012) have discussed the

nature of exclusionary urbanization in India. In their view, exclusionary urban growth is a result of the process of ‘sanitisation and formalisation’ of cities thereby discouraging inflow of rural poor into cities. This phenomenon is not specific to India. Writing in the State of World Population Report 2011, Osotimehin observes that “(some countries) are seeing waves of migration from city centre to peri-urban areas where the cost of living may be lower but basic services and jobs may be in short supply” (UNFPA, 2011, p. ii–iii). Feler and Henderson (2011), while discussing exclusionary policies in urban development in Brazil, point out that in developing countries regulations and restrictions in cities contribute to the emergence of informal housing sectors. In the context of Brazil, they find that in order to “to deter low-income migrants, localities in developing countries withhold public services to the informal housing sector” (p. 253).

In light of emerging evidence supporting the conjecture of exclusionary urbanization, for those seeking work and living in rural India, an alternative, albeit effective livelihood strategy (where feasible) is commuting daily from rural to urban areas for work. Depending on the context, the commuting workers have also been referred to as footloose labour<sup>5</sup>, floating population etc<sup>6</sup>. Barring the fact that cities are not welcoming of migrants, there are other reasons why households will not migrate to their place of work and prefer to have one or more of its members commute across the rural-urban boundary. If the rural household opts not to move then it will not

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<sup>5</sup> Jan Breman, who studied the transition in the rural economy of southern Gujarat over a span of 30 years, not only documented the changing importance of non-agricultural activities in rural India, but also highlighted the mobility of workers in search of work. He finds that on account of slow growth and stagnation in job creation in agriculture, rural workers are moving towards urban economy (Breman, 1996).

<sup>6</sup> Sainath has written about the hundreds of women in Gondia district of Maharashtra “who spend just four hours a day at home and travel over 1,000 km each week (by train) — to earn Rs.30 daily”, (Sainath, 2007)

have to give up the benefits of various government programs meant for rural residents. The Government of India also announced a scheme called 'Provision of Urban Amenities in Rural Areas' in order to bridge the rural-urban divide and achieve balanced socio-economic development. In rural areas, unlike urban areas, housing is affordable. The city development plans prepared as part of the national urban renewal mission are providing amenities for residents in peripheral areas of the city which are rural in nature. If one or more individual of the household decides to commute then it is effectively a diversification of place of work and hence source of income for these households. This suggests why it would make sense for members from rural households to commute.

From the perspective of households residing in urban areas, they commute to rural areas since formal manufacturing is moving from urban to rural areas (Ghani et al., 2012). Further, over the census period 2001-11, India saw the emergence of 2,774 new towns; a majority of them being census towns and not all of them having a strong economic base. The small towns do not attract their fair share of grants from the government prompting India's Vice President Mohammad Hamid Ansari to argue that, "Our urban spaces and governance mechanisms have become the theatres for political conflicts and economic struggles. Exclusionary urbanization is benefitting certain social groups to the detriment of others, and directing resources to large metropolises depriving small and medium towns of funds needed for infrastructure and essential services" (Ansari, 2011). In light of this, one could observe two-way commuting among residents of these towns and nearby villages if the smaller towns do not have a strong economic base to employ all its residents. Of course, the dynamics between the rural and urban areas will be different between towns and villages and between urban agglomerations and their peripheral regions.

Spatial differences in job opportunities and local unemployment rates can drive the phenomenon of individuals with no fixed place of work. Basu and Kashyap (1992), argue that the nature of rural non-farm employment attract casual and seasonal workers with inadequate land holding, who keep on shifting between agricultural and non-agricultural jobs between crop seasons and off seasons to supplement their household income. They call it “distress diversification”. Distress diversification would once again drive the phenomenon of increase in individuals with no fixed place of work.

In light of the evidence pointing towards the importance of commuting in the present context, it seems natural to understand, what are the driving forces behind commuting by workers across rural- urban boundary?

### 3. DATA

We use NSSO’s survey on employment and unemployment conducted in 2009-10. The survey collected information on 100,957 households (59,129 in rural and 41,828 in urban areas) comprising of 281,327 individuals in rural and 178,457 individuals in urban areas. Each household is given a sampling weight and the estimated number of households using the weights is equal to number of households in India and estimated number of individuals equals India’s population. The details of the sampling procedure are available in the report published by Government of India (2011b).

The nationally representative survey canvassed detailed household information, demographic, and activity particulars of household members. This survey is the primary source of information

on place of residence (rural or urban) and work (rural, urban, or no fixed place) for individuals engaged in non-agricultural activities. The classification of an individual with no fixed place of work is based on the following criteria: “For the working members, if the enterprise in which they are working does not have a fixed premises or in other words if these enterprises do not have fixed workplace (as in the case of a hawker or an artisan like carpenter, cobbler, knife-grinder, own-account carpenters, etc., who moves from place to place and goes to the customers), code 99 (no fixed place) will be assigned, irrespective of whether the enterprise is operational in rural or urban areas.”

We discuss the specific household and individuals variables of interest to this study in the section on empirical model. The data documents both rural to urban as well as urban to rural commuting and workers who do not have a fixed place of work. The size of rural-urban commuting workforce is 8.1 million, constituting 8.2 percent of rural workforce. The size of urban-rural commuting workforce is 4.4 million accounting for 5 percent of urban workforce. A total of 12.2 million workers are without a fixed place of work (Table 1). An important input in India’s five year plans is the size of the labour force. Typically, the size of the rural (urban) workforce is set equal to the number of workers living in rural (urban) areas. Hence, there is a need for adjusting the size of rural and urban workforce to reflect the commuting workers.

-Insert Table 1 Here-

Within India, 11 states, viz. Uttar Pradesh, Haryana, Punjab, Rajasthan, West Bengal, Gujarat, Maharashtra and four southern states of Andhra Pradesh, Kerala, Tamil Nadu and Karnataka account for 79.5 percent of total rural-urban commuters. These states are also some of the most urbanized states and have large urban agglomerations or cities which are part of the 14 cities that

constitute the National Capital Region of Delhi. The states of Uttar Pradesh, Delhi, Rajasthan, Bihar, Gujarat, Madhya Pradesh, Maharashtra, West Bengal and four southern states of Andhra Pradesh, Kerala, Tamil Nadu and Karnataka account for 70 percent of urban-rural commuters. Rural workers with no fixed place of work are concentrated in Uttar Pradesh, West Bengal, Jharkhand, Bihar, four southern states- Andhra Pradesh, Karnataka, Kerala and Tamil Nadu, Rajasthan (75 percent of total rural no fixed place workers). States of Uttar Pradesh, Maharashtra, Tamil Nadu, West Bengal, Karnataka, Andhra Pradesh and Gujarat account for 65 percent of urban workers with no fixed place of work.

-Insert Table 2 Here-

Rural to urban commuters are mainly employed in construction (31 percent), manufacturing (21 percent), transport communication and storage (10 percent), and public administration (8 percent). On the other hand, urban to rural commuters are primarily employed in wholesale retail trade (28 percent), manufacturing (24 percent) and construction industry (15 percent) (Table 2). No fixed place workers in both rural and urban areas are mainly employed in wholesale and retail trade and transport and storage, communication industries.

#### 4. EMPIRICAL MODEL AND RESULTS

##### (a) Empirical Model

We observe that individuals engaged in non-agricultural activities in rural and urban areas work in their place of residence or commute or have no fixed place of work. Each rural or urban resident is assumed to have chosen the outcome that gives the highest level of utility. We model

their choice by estimating a multinomial logit model. The rationale for estimating a multinomial logit model to understand factors determining the place of residence and work is clearly outlined in the literature (Artis et al., 2000; So et al., 2001; Ebertz, 2009). We estimate the model separately for rural and urban residents. In case of rural residents the dependent variable, choice of workplace, is one of the following unordered outcomes: resides and works in rural area, resides in rural area and works in urban area, and resides in rural areas and has not fixed place of work. For urban residents, the dependent variable is similarly defined in terms of residence and work location pairs: urban-urban, urban-rural, and urban-no fixed place. Our construction of the dependent variable is in line with the empirical literature where authors have defined the outcome in terms of pairs of residence and workplace location<sup>7</sup>.

As explanatory variables, we include the household characteristics: household type<sup>8</sup> (rural: self-employed in non-agriculture, agricultural labour, other labour, self-employed in agriculture, others; urban: self-employed, regular wage/salary earning, casual labour, others), social group (scheduled tribe, scheduled caste, other backward class and others), religion (Hindu, Muslim, Christian, others), and size of household. The individual characteristics that we include are the

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<sup>7</sup> The context in which we address questions relating to commuting is one where we observe diversification of work place by members of the household. This is clearly different from a situation where a household chooses its place of residence and location of work simultaneously. In the context of developing countries including India it is a reasonable assumption that households have already chosen their place of residence following which its members opt to diversify their location of workplace depending on job opportunities. Hence in this paper we do not address the issue of how rents affect the decision to commute by including rent as an explanatory variable. Further, data from migration surveys reveals that the proportion of households that change their place of residence is miniscule. In rural areas, nearly 97 percent of households do not pay any rent and the average rent paid by the remaining 3 percent of households is very low. In urban areas, however, 33 percent report paying rent.

<sup>8</sup> A household's type is determined based on the source that accounts for at least 50 percent of its income.

following: gender (male, female), age, education (uneducated, below primary, primary, middle, secondary, higher secondary / diploma, graduate and above), marital status (unmarried, married, others), skill (defined in terms of an ordered variable capturing four levels of skill based on the National Classification of Occupation, 2004<sup>9</sup>).

Before proceeding further, it is important to understand the relevance of some of the independent variables since they are specific to the Indian context. Historically, there are variations in the incidence of poverty within social groups, religious groups and household types and these variations continue to persist. In 2009-10, in rural India, 47.4 percent of scheduled tribes and 42.3 percent of scheduled castes and 31.9 percent of other backward castes lived below the poverty line. In urban India, 34.1 percent of scheduled castes and 30.4 percent of scheduled tribes were below the poverty line. The rural and urban poverty rates are 33.8 percent and 20.9 percent respectively. Hence poverty is concentrated among the scheduled castes and scheduled tribes. The head count ratio of poverty is higher among Muslims as compared to other religious groups. An examination of poverty among households of various types reveals that nearly 50 percent of agricultural labourers and 40 percent of other labourers are poor while in urban areas 47.1 percent of casual labourers are living below the poverty line (Government of India, 2012). Since poverty levels vary across households from social group, religion and household type we need to include these household characteristics as explanatory variables.

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<sup>9</sup> The one digit division of national classification of occupation is as follows: legislators, senior officials and managers; professionals; technicians and associate professionals; clerks; service workers and shop & market sales workers; skilled agricultural and fishery workers; craft and related trades workers; plant and machine operators and assemblers; elementary occupations; workers not classified by occupations.

Labour market conditions are an important determinant of decision to commute. Considering the place of residence and location of work pairs i.e. rural-rural, rural-urban and rural-no fixed place, we find that the average wage of rural-urban worker is the highest followed by rural-rural worker and rural-no fixed place worker. We also find that the average wage of urban-urban worker is the highest followed by urban-rural worker and urban-no fixed place worker (Table 3).

-Insert Table 3 Here-

It is debatable whether we should include the wage differentials as an explanatory factor<sup>10</sup>. In light of the anemic growth in job opportunities one can argue that the unemployment rate is more important than the wage differential. Artis et al. (2000) in their analysis of commuting in Catalonia, Spain do not include the wage rate but include the unemployment rate. We too include the rural and urban unemployment rate calculated at the level of the National Sample Survey (NSS) region<sup>11</sup>. The unemployment rate is calculated using current weekly activity status of individuals. As the term suggests, the unemployment rate is determined on the basis of a reference period of one week preceding the date of interview of the survey of the household. The unemployment rates in rural and urban areas capture the push and pull factors influencing the decision to commute by individuals. Drawing upon the work by Pissarides and Wadsworth (1989) we believe that a worker is likely to commute if he or she is unemployed. Further, a region with higher unemployment rate is more likely to see commuting workers. While there is no denying that unemployment rate is an important determinant of the decision to commute, in

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<sup>10</sup> One would however need longitudinal data to address the issue of how wage differentials affect commuting decision and vice-versa.

<sup>11</sup> NSS regions are geographical units of the size between district and state in the hierarchy. Every state is divided into different NSS regions which are a combination of districts with similar characteristics and adjoining each other. The NSS regions are also administrative regions within a state and are homogenous.

our analysis, we do include average wage differential between rural and urban regions as an explanatory variable in the model.

Given the seasonality in labour demand in rural areas we include the sub round (July- September, October- December, January- March and April- June) in which the household was surveyed. It is a well-known fact that, during the lean season in rural areas, one would observe temporary migration to urban areas where individuals engage in construction industry or doing menial jobs (Government of India, 2011a).

At the outset, we had mentioned the spatial distribution of economic activity, in particular that of secondary and services, will affect the location of jobs. A standard measure of spatial distribution of economic activity is the Location Quotient (Holmes and Stevens, 2004). We construct this measure for each district in order to quantify the localization of jobs in secondary and service sector<sup>12</sup>. Suppose  $X_{ns}$  denotes employment in district 'n' ( $n = 1, 2, \dots, N$ ) and sector of work s ( $s = 1, 2, \dots, S$ ) then the Location Quotient is defined as follows:

$$LQ_{ns} = \left( \frac{X_{ns}}{\sum_1^S X_{ns}} / \frac{\sum_1^N X_{ns}}{\sum_1^S \sum_1^N X_{ns}} \right)$$

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<sup>12</sup> The secondary sector comprises of manufacturing and construction while the service sector comprises of wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods; transport, storage and communication; real estate, renting and business activities; public administration and defence; compulsory social security, education; health and social work; other community, social and personal service activities.

In our case we have two sectors. A district is said to have a concentration of workers in a particular sector if the LQ, which is the ratio of share of the district's employment in that sector to the share of the sector's employment in the nation's employment, takes the value greater than one. The current value of LQ is on account of three factors: the initial distribution of employment across the sectors in the district; employment growth in that sector in that district; and the overall distribution of employment across the sectors at the aggregate level. It should be borne in mind that LQ provides us with relative rankings.

Recognizing that the clustering of industries may extend to more than one district, the location quotient for a particular district is calculated by including the information for all districts contiguous to this district (Holmes, 1999). This way we can capture the effect of districts adjoining a district from a neighboring state. This is important since in some parts of India, like the National Capital Region of Delhi, one observes commuting across state boundaries.

We also control for the level of urbanization and size of the peripheral urban area in each NSS-region. These indicators have been calculated as part of the India e-geopolis project (Denis and Kamala, 2011). The reason we do not include these indicators at the district level is because the peri-urban area can extend beyond a district. The size of peri-urban area is identified based on continuity in the built up area that extend beyond the official urban boundaries.

For official purposes population living in the peri-urban area is counted as part of rural areas. Using data from Census of India, we include as explanatory variables the proportion of rural population in each district living within 0-7 kilometers, 8-15 kilometers, 16-30 kilometers and over 30 kilometers from the nearest city. Note that unlike the measure reflecting size of peri-urban area which is estimated at the NSS region level, the distribution of village population by

distance to the city is constructed for each district. The introduction of these variables in the analysis partially offsets an important data limitation which is that we do not have the distance travelled by the individual or distance from the village in which the household resides to the nearest urban center. The absence of such information does not compromise our analysis since these variables are crucial only if we had sought to understand time spent and distance travelled by commuting workers.

-Insert Table 4 Here-

-Insert Table 5 Here-

The summary statistics of the variables used in the regression analysis are reported in Table 4 (rural) and Table 5 (urban).

## (b) Results

We now turn to the discussion of results<sup>13</sup>. We did find that the assumption of independence of irrelevant alternatives holds thereby implying that we can estimate a multinomial logit model. In Tables 6 and 7, we have reported the relative risk ratios corresponding to the specification for rural and urban residents respectively. We begin with a discussion on how the share of peri-urban population, unemployment rate, wage differentials and location quotient of secondary and servicesectors affect the decision of rural residents. The relative risk ratios should be interpreted with respect to the base category – i.e. individuals who live and work in the same areas (rural-

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<sup>13</sup> This specification explicitly ignores the decision to work. As suggested by one of the reviewers, we also estimated the model after accounting for the selection problem (decision to work), following which we included the inverse mills ratio in the second stage equation (multinomial logit model). Our results are unchanged.

rural or urban-urban) - and where relevant with respect to the reference group if the explanatory variable is a dummy variable.

-Insert Table 6 Here-

We begin with a discussion on rural-urban commuters. The larger the share of peri-urban population the individual is more likely to commute. Given their proximity to cities, individuals living in the peri-urban areas are more likely to have better access to urban job market. Higher the share of urban population in a region higher is the likelihood of the individual commuting from rural to urban areas. We find that higher the share of rural population living farther from a city (beyond 7 kilometers) the less likely it is that we will observe rural-urban commuting.

Unemployment rate affects the decision to commute. Higher the level of urban unemployment an individual is less likely to commute to urban areas. This result is in line with expectation and also with findings in the literature (Artis et al., 2000). The higher the average wage differential between urban and rural areas, the higher is the probability of observing rural-urban commuters or rural individuals without a fixed place of work.

We find that in districts with concentration of secondary and service sector jobs individuals are more likely to commute from rural to urban areas (the corresponding relative risk ratios are greater than one). We will discuss this result later in conjunction with our findings on how location quotient affects commuting decision of urban workers.

Of particular interest is the type of household from which individuals commute across rural-urban boundaries or have no fixed place of work. The household type is determined based on the source of income during the last 365 days preceding the date of survey. We find that individuals from households classified as agricultural labour, other labour, self-employed in agriculture

(reference group is households self-employed in non-agriculture) are more likely to commute across rural-urban areas. It is an established fact that the concentration of the poor is highest among households classified as agricultural labour and other labour. One plausible explanation for this result is that for these households having an individual commute to urban areas and work in non-agricultural activities leads to not only diversification of place of work, but also source of income and thereby augments household income. Households classified as agricultural labour, other labour do not possess land either by way of ownership or by way of leasing in.

As mentioned earlier, poverty is higher among scheduled tribes, scheduled castes and individuals from these households are more likely to commute or have no fixed place of work. Similarly, individuals from Muslim households are more likely to commute or have no fixed place of work.

-Insert Table 7 Here-

We now turn to the factors affecting decision of urban residents. The larger the share of peri-urban population the more likely the individual is to commute to rural areas. This can be explained by the outgrowth of the city into peri-urban areas (which are officially classified as rural areas) and location of secondary activity in these regions. Higher the share of urban population in a region lower is the likelihood of the individual commuting from urban to rural areas. We find that higher the level of urban unemployment an individual is more likely to commute to rural areas. If the rural unemployment rate is higher, an individual is less likely to commute from urban to rural areas. This finding is similar in spirit to what we found in the case of rural areas.

Coming to the issue of spatial distribution of activity, we find that in districts with higher level of clustering of secondary sector activity, workers are more likely to commute to rural areas. If this

result is interpreted in conjunction with our findings in the case of rural residents it implies that in districts with higher concentration of secondary sector activities we are likely to observe both rural-urban and urban-rural commuting. Chakravarty and Lall (2007) establish that there was a churn in the ranking of districts in terms of industrial investment. They make the following observations. First, the share of individual metropolitan districts (i.e. cities that are districts) declined in the post reform period, i.e. since 1991. Second, the share of urban districts (i.e. districts with at least 50 percent urban population) also declined. Third, the share of suburban, non-metropolitan, and non-urban districts in investments increased. In a recent paper, Ghani et al. (2012) have established that manufacturing activity is situated in both rural and urban areas. Hence our finding that higher the concentration of secondary activity in a district the more likely it is that one would observe rural-urban and urban-rural commuting is consistent with observed investment patterns.

Unlike the case of secondary sector, which is spread across rural and urban areas, the service sector is concentrated more in urban areas. Hence it is not surprising that higher the concentration of service sector, higher is probability of observing rural-urban commuting and lower is the probability of observing urban-rural commuting. One characteristic of the service sector is that it is unlikely to be concentrated in any location, a point also made by Holmes and Stevens (2004) in their discussion on spatial distribution of economic activities in North America. At best one might find that it is concentrated in urban areas.

We next present the interesting results pertaining to rural and urban workers with no fixed place of work. It is important here to note that India's economic growth has not translated into creation of more jobs across all sectors. In line with intuition, we find that if the urban unemployment rate is higher the probability of a rural or urban worker having no fixed place of work is higher. We

also find that higher the level of rural unemployment the lower is the probability of a rural or urban worker having no fixed place of work. Higher the concentration of secondary sector employment as captured by the location quotient the lower is the probability of a rural or urban worker having no fixed place of work. This is because the size of floating workers or daily workers with no fixed place of work should be lower in districts with concentration of secondary sector. In contrast, we find that higher the concentration of service sector jobs the higher is the probability of a rural worker having no fixed place of work. However, higher the concentration of service sector jobs the lower is the probability of a urban worker having no fixed place of work. This is because service sector jobs are likely to be in the cities rather than in the rural areas. Most workers with no fixed place of work are likely to be in the service sector engaged in activities including hawker or an artisan like carpenter, cobbler, knife-grinder, own-account carpenters, etc., who move from place to place and go to the customers.

Given the focus of this paper, our discussion of the results has more been on district or NSS-region level economic variables that affect the decision to commute. Now we turn to individual specific factors that affect the decision to commute.

Coming to the skill level of workers, we find that, as compared to skill level I (i.e. those engaged in elementary occupations), workers in skill level II (clerks, service workers and shop & market sales workers, skilled agricultural and fishery workers, craft and related trades workers, plant and machine operators and assemblers) and III (associate professionals) are less likely to commute from rural to urban but workers in skill IV (professionals) are more likely to commute to urban areas. For urban residents, workers with skill II, III and IV are less likely to commute to rural areas for work, as compared to base category: skill level I. These findings are in line with expectations.

In both rural and urban areas, women are less likely to commute or have no fixed place of work. Additionally, married women are less likely to commute or have no fixed place of work. Lee and McDonald (2003) find a similar result in case of women workers in Seoul, South Korea. A standard explanation for this finding is the women have to bear household responsibilities.

We find that workers in higher age groups commute less as compared to younger workers. Similar finding are also shown by Van Ommeren et al.(1999) and Artis et al. (2000) in context of Netherlands and Catalonia, Spain respectively.

We observe that higher is the level of education, an individual is more likely to commute from rural to urban areas. For urban residents, individuals with secondary education are more likely to commute to rural areas but individuals with graduate or above degree are less likely to commute to rural areas because of the job profiles available in rural areas.

## 5. CONCLUSION

This paper establishes that the size of commuting workers in India is large and hence an important channel of interaction between the rural and urban labour markets in India. The contribution of this paper is that it examines the extent to which the spatial distribution of economic activities as reflected by location quotient, level of urbanization, size of peri-urban area, local unemployment rates and rural-urban wage differential affect the decision to commute by workers engaged in non-agricultural work.

We find that in districts with concentration of secondary sector jobs one is likely to observe two-way commuting between rural and urban areas. As we pointed out this result is driven by the fact that manufacturing jobs are located in rural and urban areas. Unlike the secondary sector

since the service sector is concentrated more in urban areas one is more likely to observe rural-urban commuting rather than urban-rural commuting in such regions. Large investments in transport infrastructure have led to population growth in the vicinity of the cities. We find that in peripheral urban areas one is more likely to observe commuting. Finally, akin to the case of migration, we find that rural-urban differences in wages and local unemployment rates are important push and pull factors that determine the decision to commute. What this suggests is that commuting by workers can help reduce regional unemployment and narrow wage differences between rural and urban areas.

The findings of this paper provide a basis for the argument that the discussion in the Indian context needs to move away from being migration centric to one of labour mobility. There are valid concerns that India is witness to ‘exclusionary urbanisation’ where the poor are discouraged from migration to the cities. Commuting allows the rural-urban poor to overcome such barriers to migration. At the same time from a policy perspective, commuting should be encouraged since it cities have failed to provide decent temporary housing or migrant workers. It is also important to quantify the economic output attributable to the commuting workers. While such estimates are not available, given the large number of commuters their contribution is likely to be significant. In terms of future research, one needs to understand the welfare implications of commuting. Can commuting by workers help in poverty reduction? Are there significant differences in well-being of households without commuters, with commuters or workers with no fixed place of work? Finally, another area where additional work is needed is on the impact of commuting on the labour market outcomes in receiving regions.

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Table 1: Estimated size of non-agricultural workforce by sector of residence and place of work  
All India

| Sector of Residence | Place of Work          |                       |                      | Total                |
|---------------------|------------------------|-----------------------|----------------------|----------------------|
|                     | Rural                  | Urban                 | Not Fixed            |                      |
| Rural               | 85,556,220*<br>(86.73) | 8,050,036<br>(8.16)   | 5,035,493<br>(5.1)   | 98,641,749<br>(100)  |
| Urban               | 4,370,678<br>(4.94)    | 76,947,337<br>(86.95) | 7,177,731<br>(8.11)  | 88,495,746<br>(100)  |
| Total               | 89,926,898<br>(48.05)  | 84,997,373<br>(45.42) | 12,213,224<br>(6.53) | 187,137,495<br>(100) |

\* Number and percentage of workers living in rural areas and working in rural areas. Similarly for others.

<sup>a</sup> Values in bracket are in percentage

<sup>b</sup> Workers in NIC div. 02-99, industry group 012,014,015

Source: Author's calculation based on NSSO Employment and Unemployment Survey, 2009-10

| Table 2: Distribution of non-agricultural workers based on national industrial classification, residence location and workplace location |             |             |             |             |                      |                      |       |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|----------------------|----------------------|-------|
| NIC Group                                                                                                                                | Rural-Urban | Urban-Rural | Rural-Rural | Urban-Urban | Rural-No Fixed Place | Urban-No Fixed Place | Total |
| D                                                                                                                                        | 3.98        | 2.51        | 43.39       | 48.58       | 0.62                 | 0.93                 | 100   |
|                                                                                                                                          | 20.51       | 23.74       | 22.48       | 25.99       | 5.28                 | 5.28                 | 22.78 |
| F                                                                                                                                        | 6.87        | 1.79        | 61.59       | 22.51       | 4.09                 | 3.14                 | 100   |
|                                                                                                                                          | 30.75       | 14.69       | 27.73       | 10.47       | 30.52                | 15.59                | 19.79 |
| G                                                                                                                                        | 2.87        | 3.61        | 38.62       | 48.13       | 2.15                 | 4.62                 | 100   |
|                                                                                                                                          | 12          | 27.73       | 16.25       | 20.91       | 15                   | 21.4                 | 18.5  |
| I                                                                                                                                        | 4.64        | 1.84        | 37.44       | 32.01       | 8.37                 | 15.7                 | 100   |
|                                                                                                                                          | 9.92        | 7.24        | 8.05        | 7.11        | 29.82                | 37.18                | 9.46  |
| K                                                                                                                                        | 2.78        | 3.61        | 12.63       | 76.08       | 0.89                 | 4.02                 | 100   |
|                                                                                                                                          | 1.31        | 3.14        | 0.6         | 3.74        | 0.7                  | 2.11                 | 2.09  |
| L                                                                                                                                        | 6.69        | 1.97        | 28.46       | 62.48       | 0.04                 | 0.36                 | 100   |
|                                                                                                                                          | 7.88        | 4.27        | 3.38        | 7.65        | 0.07                 | 0.47                 | 5.21  |
| M                                                                                                                                        | 3.95        | 3.04        | 45.11       | 47.32       | 0.24                 | 0.34                 | 100   |
|                                                                                                                                          | 4.87        | 6.88        | 5.59        | 6.05        | 0.49                 | 0.47                 | 5.45  |
| N                                                                                                                                        | 5.17        | 2.16        | 30.49       | 60.27       | 1.28                 | 0.63                 | 100   |
|                                                                                                                                          | 2           | 1.54        | 1.18        | 2.42        | 0.82                 | 0.27                 | 1.71  |
| O                                                                                                                                        | 2.84        | 2.09        | 45.02       | 41.06       | 3.93                 | 5.06                 | 100   |
|                                                                                                                                          | 2.53        | 3.42        | 4.04        | 3.8         | 5.85                 | 5                    | 3.94  |
| others                                                                                                                                   | 3.29        | 1.6         | 42.43       | 45.52       | 2.74                 | 4.42                 | 100   |
|                                                                                                                                          | 8.23        | 7.37        | 10.69       | 11.84       | 11.45                | 12.25                | 11.07 |
| Total                                                                                                                                    | 4.42        | 2.41        | 43.96       | 42.57       | 2.65                 | 3.99                 | 100   |
|                                                                                                                                          | 100         | 100         | 100         | 100         | 100                  | 100                  | 100   |

D: Manufacturing, F: Construction, G: Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, I: Transport, storage and communication, K: Real estate, renting and business activities, L: Public administration and defence; compulsory social security, M: Education, N: Health and social work, O: Other community, social and personal service activities.

Source: Author's calculation based on NSSO Employment and Unemployment Survey, 2009-10

| Table 3: Average Daily Wage (in Rupees) by Residence and Location of Workplace         |        |        |
|----------------------------------------------------------------------------------------|--------|--------|
| Residence-Workplace                                                                    | Mean   | Median |
| <b>Rural</b>                                                                           |        |        |
| Rural-Rural                                                                            | 161.31 | 107.14 |
| Rural-Urban                                                                            | 193.85 | 121.43 |
| Rural-No fixed place                                                                   | 123.06 | 107.14 |
| <b>Urban</b>                                                                           |        |        |
| Urban-Urban                                                                            | 312.17 | 175    |
| Urban-Rural                                                                            | 250.80 | 150    |
| Urban-No fixed place                                                                   | 156.47 | 125    |
| Source: Author's calculation based on NSSO Employment and Unemployment Survey, 2009-10 |        |        |

Table 4: Summary Statistics for Rural Residents

| <b>Variables</b>                              | <b>Mean</b> | <b>Standard Deviation</b> | <b>Min.</b> | <b>Max.</b> |
|-----------------------------------------------|-------------|---------------------------|-------------|-------------|
| Workplace: Rural                              | 0.87        | -                         | 0           | 1           |
| Workplace: Urban                              | 0.08        | -                         | 0           | 1           |
| Workplace: No Fixed Place                     | 0.04        | -                         | 0           | 1           |
| Unemployment rate: rural                      | 4.09        | 2.68                      | 0.03        | 24.65       |
| Unemployment rate: urban                      | 5.23        | 2.94                      | 0.18        | 17.30       |
| Share of peri-urban population                | 18.85       | 16.87                     | 0.00        | 72.19       |
| Share of urban population                     | 24.46       | 11.92                     | 7.26        | 86.87       |
| Location quotient: manufacturing              | 1.01        | 0.33                      | 0.32        | 1.78        |
| Location quotient: services                   | 1.03        | 0.32                      | 0.43        | 1.99        |
| <b>Share of Rural Population</b>              |             |                           |             |             |
| 0-7 km from town                              | 0.19        | 0.16                      | 0           | 1           |
| 8--15 km from town                            | 0.29        | 0.14                      | 0           | 0.71        |
| 16-30 km from town                            | 0.28        | 0.13                      | 0           | 0.53        |
| 30+ km from town                              | 0.24        | 0.22                      | 0           | 0.84        |
| Wage differential: Urban minus Rural (in Rs.) | 102.12      | 101.56                    | 121.74      | 550.02      |
| <b>Skill Level</b>                            |             |                           |             |             |
| Level I                                       | 0.25        | -                         | 0           | 1           |
| Level II                                      | 0.58        | -                         | 0           | 1           |
| Level III                                     | 0.09        | -                         | 0           | 1           |
| Level IV                                      | 0.08        | -                         | 0           | 1           |
| <b>Household Type</b>                         |             |                           |             |             |
| Self-employed in non-agriculture              | 0.35        | -                         | 0           | 1           |
| Agriculture labour                            | 0.03        | -                         | 0           | 1           |
| Other labour                                  | 0.32        | -                         | 0           | 1           |
| Self-employed in agriculture                  | 0.08        | -                         | 0           | 1           |
| Others                                        | 0.22        | -                         | 0           | 1           |
| <b>Education Level</b>                        |             |                           |             |             |
| Uneducated                                    | 0.2         | -                         | 0           | 1           |
| Below Primary                                 | 0.09        | -                         | 0           | 1           |
| Primary                                       | 0.15        | -                         | 0           | 1           |
| Middle                                        | 0.2         | -                         | 0           | 1           |
| Secondary                                     | 0.15        | -                         | 0           | 1           |
| Higher Secondary                              | 0.11        | -                         | 0           | 1           |
| Graduation or above                           | 0.11        | -                         | 0           | 1           |
| <b>Gender</b>                                 |             |                           |             |             |
| Male                                          | 0.82        | -                         | 0           | 1           |
| Female                                        | 0.18        | -                         | 0           | 1           |
| <b>Marital Status</b>                         |             |                           |             |             |
| Unmarried                                     | 0.19        | -                         | 0           | 1           |
| Married                                       | 0.78        | -                         | 0           | 1           |
| Other (Widowed/divorced)                      | 0.04        | -                         | 0           | 1           |
| <b>Age Group (in years)</b>                   |             |                           |             |             |
| 15-24                                         | 0.17        | -                         | 0           | 1           |
| 25-34                                         | 0.29        | -                         | 0           | 1           |
| 35-44                                         | 0.29        | -                         | 0           | 1           |
| 45-59                                         | 0.25        | -                         | 0           | 1           |
| <b>Social Group</b>                           |             |                           |             |             |
| Scheduled Tribe                               | 0.13        | -                         | 0           | 1           |

| Table 4: Summary Statistics for Rural Residents |              |                           |             |             |
|-------------------------------------------------|--------------|---------------------------|-------------|-------------|
| <b>Variables</b>                                | <b>Mean</b>  | <b>Standard Deviation</b> | <b>Min.</b> | <b>Max.</b> |
| Scheduled Caste                                 | 0.21         | -                         | 0           | 1           |
| Other Backward Class                            | 0.40         | -                         | 0           | 1           |
| Others                                          | 0.26         | -                         | 0           | 1           |
| <b>Religion</b>                                 |              |                           |             |             |
| Hindu                                           | 0.78         | -                         | 0           | 1           |
| Muslim                                          | 0.12         | -                         | 0           | 1           |
| Christian                                       | 0.06         | -                         | 0           | 1           |
| Others                                          | 0.04         | -                         | 0           | 1           |
| <b>Household Size</b>                           |              |                           |             |             |
| 1-2                                             | 0.08         | -                         | 0           | 1           |
| 3-5                                             | 0.55         | -                         | 0           | 1           |
| 6-10                                            | 0.33         | -                         | 0           | 1           |
| More than 10                                    | 0.04         | -                         | 0           | 1           |
| <b>Land owned in hectares</b>                   |              |                           |             |             |
| None                                            | 0.01         | -                         | 0           | 1           |
| 0- 0.01                                         | 0.24         | -                         | 0           | 1           |
| 0.01-0.4                                        | 0.42         | -                         | 0           | 1           |
| 0.41-1                                          | 0.14         | -                         | 0           | 1           |
| More than 1                                     | 0.19         | -                         | 0           | 1           |
| <b>Sub Round</b>                                |              |                           |             |             |
| October- December                               | 0.25         | -                         | 0           | 1           |
| July- September                                 | 0.25         | -                         | 0           | 1           |
| January- March                                  | 0.25         | -                         | 0           | 1           |
| April- June                                     | 0.25         | -                         | 0           | 1           |
| <b>Observations</b>                             | <b>38378</b> |                           |             |             |

Table 5: Summary Statistics for Urban Residents

| <b>Variables</b>                              | <b>Mean</b> | <b>Standard Deviation</b> | <b>Min.</b> | <b>Max.</b> |
|-----------------------------------------------|-------------|---------------------------|-------------|-------------|
| Workplace: Urban                              | 0.05        | -                         | 0           | 1           |
| Workplace: Rural                              | 0.87        | -                         | 0           | 1           |
| Workplace: No Fixed Place                     | 0.08        | -                         | 0           | 1           |
| Unemployment rate: rural                      | 3.92        | 3.07                      | 0.03        | 24.65       |
| Unemployment rate: urban                      | 4.83        | 2.44                      | 0.18        | 17.30       |
| Share of peri-urban population                | 17.43       | 14.97                     | 0.00        | 72.19       |
| Share of urban population                     | 31.18       | 15.63                     | 7.26        | 86.87       |
| Location quotient: manufacturing              | 0.99        | 0.33                      | 0.20        | 1.73        |
| Location quotient: services                   | 1.06        | 0.33                      | 0.43        | 1.99        |
| Wage differential: Urban minus Rural (in Rs.) | 92.23       | 89.53                     | -283.62     | 1320.45     |
| <b>Skill Level</b>                            |             |                           |             |             |
| Level I                                       | 0.20        | -                         | 0           | 1           |
| Level II                                      | 0.59        | -                         | 0           | 1           |
| Level III                                     | 0.10        | -                         | 0           | 1           |
| Level IV                                      | 0.12        | -                         | 0           | 1           |
| <b>Household Type</b>                         |             |                           |             |             |
| Self-employed                                 | 0.36        | -                         | 0           | 1           |
| Regular wage/salary earning                   | 0.44        | -                         | 0           | 1           |
| Casual labour                                 | 0.17        | -                         | 0           | 1           |
| Others                                        | 0.02        | -                         | 0           | 1           |
| <b>Education Level</b>                        |             |                           |             |             |
| Uneducated                                    | 0.14        | -                         | 0           | 1           |
| Below Primary                                 | 0.07        | -                         | 0           | 1           |
| Primary                                       | 0.11        | -                         | 0           | 1           |
| Middle                                        | 0.18        | -                         | 0           | 1           |
| Secondary                                     | 0.16        | -                         | 0           | 1           |
| Higher Secondary                              | 0.14        | -                         | 0           | 1           |
| Graduation or above                           | 0.21        | -                         | 0           | 1           |
| <b>Gender</b>                                 |             |                           |             |             |
| Male                                          | 0.82        | -                         | 0           | 1           |
| Female                                        | 0.18        | -                         | 0           | 1           |
| <b>Marital Status</b>                         |             |                           |             |             |
| Unmarried                                     | 0.23        | -                         | 0           | 1           |
| Married                                       | 0.73        | -                         | 0           | 1           |
| Other (Widowed/divorced)                      | 0.04        | -                         | 0           | 1           |
| <b>Age Group (in years)</b>                   |             |                           |             |             |
| 15-24                                         | 0.16        | -                         | 0           | 1           |
| 25-34                                         | 0.30        | -                         | 0           | 1           |
| 35-44                                         | 0.28        | -                         | 0           | 1           |
| 45-59                                         | 0.26        | -                         | 0           | 1           |
| <b>Social Group</b>                           |             |                           |             |             |
| Scheduled Tribe                               | 0.07        | -                         | 0           | 1           |
| Scheduled Caste                               | 0.16        | -                         | 0           | 1           |
| Other Backward Class                          | 0.38        | -                         | 0           | 1           |
| Others                                        | 0.39        | -                         | 0           | 1           |
| <b>Religion</b>                               |             |                           |             |             |
| Hindu                                         | 0.74        | -                         | 0           | 1           |
| Muslim                                        | 0.16        | -                         | 0           | 1           |

Table 5: Summary Statistics for Urban Residents

| <b>Variables</b>      | <b>Mean</b>  | <b>Standard Deviation</b> | <b>Min.</b> | <b>Max.</b> |
|-----------------------|--------------|---------------------------|-------------|-------------|
| Christian             | 0.06         | -                         | 0           | 1           |
| Others                | 0.04         | -                         | 0           | 1           |
| <b>Household Size</b> |              |                           |             |             |
| 1-2                   | 0.11         | -                         | 0           | 1           |
| 3-5                   | 0.56         | -                         | 0           | 1           |
| 6-10                  | 0.29         | -                         | 0           | 1           |
| More than 10          | 0.04         | -                         | 0           | 1           |
| <b>Sub Round</b>      |              |                           |             |             |
| October- December     | 0.25         | -                         | 0           | 1           |
| July- September       | 0.25         | -                         | 0           | 1           |
| January- March        | 0.25         | -                         | 0           | 1           |
| April- June           | 0.25         | -                         | 0           | 1           |
| <b>Observations</b>   | <b>40964</b> |                           |             |             |

Table 6: Relative risk ratio from multinomial model for workplace location choice of rural residents

(Base category: Rural workplace)

| Explanatory Variables                                    | Urban Workplace     |          | No fixed place of work |          |
|----------------------------------------------------------|---------------------|----------|------------------------|----------|
|                                                          | Relative risk ratio | S.E.     | Relative risk ratio    | S.E.     |
| Share of peri-urban population                           | 1.007***            | 0.00004  | 0.996***               | 0.00005  |
| Share of urban population                                | 1.018***            | 0.00004  | 0.997***               | 0.00006  |
| Unemployment rate: rural                                 | 1.000**             | 0.0003   | 0.984***               | 0.0004   |
| Unemployment rate: urban                                 | 0.991***            | 0.0002   | 1.068***               | 0.0003   |
| Location quotient: manufacturing                         | 1.588***            | 0.003    | 1.093***               | 0.0024   |
| Location quotient: services                              | 1.291***            | 0.0027   | 1.408***               | 0.0038   |
| Wage Differential: Urban minus Rural (in Rs.)            | 1.002***            | 0.000005 | 1.001***               | 0.000006 |
| <b>Share of rural population (0-7 km from town)</b>      |                     |          |                        |          |
| 8--15 km from town                                       | 0.455***            | 0.0032   | 0.177***               | 0.00164  |
| 16-30 km from town                                       | 0.544***            | 0.00252  | 1.569***               | 0.00925  |
| 30+ km from town                                         | 0.241***            | 0.00111  | 0.172***               | 0.00108  |
| <b>Education Level (uneducated)</b>                      |                     |          |                        |          |
| Below Primary                                            | 0.882***            | 0.00152  | 0.979***               | 0.00174  |
| Primary                                                  | 1.055***            | 0.00149  | 0.920***               | 0.00146  |
| Middle                                                   | 1.052***            | 0.00146  | 0.866***               | 0.00137  |
| Secondary                                                | 1.302***            | 0.002    | 0.933***               | 0.00171  |
| Higher Secondary                                         | 1.598***            | 0.0028   | 0.430***               | 0.00126  |
| Graduation or above                                      | 1.855***            | 0.00363  | 0.230***               | 0.000934 |
| <b>Skill Level (I)</b>                                   |                     |          |                        |          |
| Level II                                                 | 0.826***            | 0.000831 | 0.614***               | 0.000741 |
| Level III                                                | 0.638***            | 0.00142  | 1.036***               | 0.00333  |
| Level IV                                                 | 0.896***            | 0.00188  | 0.847***               | 0.0023   |
| <b>Age group (15-24 yrs.)</b>                            |                     |          |                        |          |
| 25-34                                                    | 0.910***            | 0.00127  | 0.982***               | 0.00184  |
| 35-44                                                    | 0.824***            | 0.0013   | 1.019***               | 0.00203  |
| 45-59                                                    | 0.829***            | 0.00138  | 0.859***               | 0.00182  |
| <b>Gender (Male)</b>                                     |                     |          |                        |          |
| Female                                                   | 0.706***            | 0.00185  | 0.451***               | 0.00211  |
| <b>Marital status (Unmarried)</b>                        |                     |          |                        |          |
| Married                                                  | 0.938***            | 0.00131  | 1.237***               | 0.00236  |
| Other (Widowed/divorced)                                 | 0.714***            | 0.00286  | 1.228***               | 0.00522  |
| Married * Female                                         | 0.641***            | 0.00197  | 0.514***               | 0.00272  |
| Other * Female                                           | 0.724***            | 0.00423  | 0.408***               | 0.00354  |
| <b>Household type (self-employed in non-agriculture)</b> |                     |          |                        |          |
| Agriculture labour                                       | 1.373***            | 0.00294  | 0.769***               | 0.00195  |
| Other labour                                             | 1.852***            | 0.00222  | 0.685***               | 0.0009   |
| Self-employed in agriculture                             | 1.143***            | 0.00206  | 0.780***               | 0.00169  |
| Others                                                   | 2.296***            | 0.00314  | 0.680***               | 0.00135  |
| <b>Social group (Others)</b>                             |                     |          |                        |          |
| Scheduled Tribe                                          | 1.715***            | 0.00304  | 1.443***               | 0.00331  |
| Scheduled Caste                                          | 1.193***            | 0.00155  | 1.193***               | 0.00202  |
| Other Backward Class                                     | 1.121***            | 0.00127  | 1.181***               | 0.00175  |

Table 6: Relative risk ratio from multinomial model for workplace location choice of rural residents

(Base category: Rural workplace)

| Explanatory Variables    | Urban Workplace     |          | No fixed place of work |          |
|--------------------------|---------------------|----------|------------------------|----------|
|                          | Relative risk ratio | S.E.     | Relative risk ratio    | S.E.     |
| <b>Religion (Muslim)</b> |                     |          |                        |          |
| Hindu                    | 0.799***            | 0.00109  | 0.787***               | 0.00125  |
| Christian                | 0.779***            | 0.00222  | 1.555***               | 0.00527  |
| Others                   | 2.076***            | 0.00469  | 0.656***               | 0.00253  |
| <b>Constant</b>          | 0.0480***           | 0.000385 | 0.0740***              | 0.000954 |
| <b>Observations (N)</b>  | 38378               |          |                        |          |

Level of significance : \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

<sup>a</sup> The reference group for the categorical variables mentioned within parenthesis.

<sup>b</sup> We also control for land holding size, household size and seasonality.

<sup>c</sup> Weights are used in the estimation of multinomial logit model.

Table 7: Relative risk ratio from multinomial model for workplace location choice of urban residents

(Base category: Urban workplace)

| Explanatory Variables                         | Rural Workplace     |          | No fixed place of work |          |
|-----------------------------------------------|---------------------|----------|------------------------|----------|
|                                               | Relative risk ratio | S.E.     | Relative risk ratio    | S.E.     |
| Share of peri-urban population                | 1.005***            | 0.00006  | 1.000***               | 0.00005  |
| Share of urban population                     | 0.979***            | 0.00005  | 0.999***               | 0.00003  |
| Unemployment rate: rural                      | 0.976***            | 0.0004   | 0.981***               | 0.0003   |
| Unemployment rate: urban                      | 1.013***            | 0.0004   | 1.065***               | 0.0003   |
| Location quotient: manufacturing              | 1.564***            | 0.0037   | 0.782***               | 0.0015   |
| Location quotient: services                   | 0.463***            | 0.0014   | 1.468***               | 0.0033   |
| Wage Differential: Urban minus Rural (in Rs.) | 1.000***            | 0.000008 | 1.000***               | 0.000006 |
| <b>Education Level (uneducated)</b>           |                     |          |                        |          |
| Below Primary                                 | 1.075***            | 0.0029   | 0.776***               | 0.0014   |
| Primary                                       | 0.926***            | 0.0022   | 0.784***               | 0.0012   |
| Middle                                        | 1.125***            | 0.0024   | 0.779***               | 0.0011   |
| Secondary                                     | 1.133***            | 0.0025   | 0.532***               | 0.0009   |
| Higher Secondary                              | 1.016***            | 0.0025   | 0.417***               | 0.0008   |
| Graduation or above                           | 0.833***            | 0.0021   | 0.198***               | 0.0005   |
| <b>Skill Level (I)</b>                        |                     |          |                        |          |
| Level II                                      | 0.937***            | 0.0015   | 0.496***               | 0.0005   |
| Level III                                     | 1.033***            | 0.0028   | 0.693***               | 0.0017   |
| Level IV                                      | 0.918***            | 0.0024   | 0.260***               | 0.0006   |
| <b>Age group (15-24 yrs.)</b>                 |                     |          |                        |          |
| 25-34                                         | 0.946***            | 0.0021   | 1.447***               | 0.0025   |
| 35-44                                         | 1.138***            | 0.0027   | 1.501***               | 0.0029   |
| 45-59                                         | 0.833***            | 0.0021   | 1.426***               | 0.0028   |
| <b>Gender (Male)</b>                          |                     |          |                        |          |
| Female                                        | 0.858***            | 0.0034   | 0.110***               | 0.0008   |
| <b>Marital status (Unmarried)</b>             |                     |          |                        |          |
| Married                                       | 1.392***            | 0.003    | 1.009***               | 0.0016   |
| Other (Widowed/divorced)                      | 1.127***            | 0.007    | 0.726***               | 0.0034   |
| Married * Female                              | 0.813***            | 0.0036   | 1.916***               | 0.0142   |
| Other * Female                                | 0.881***            | 0.0071   | 3.155***               | 0.0288   |
| <b>Household type (Self-employed)</b>         |                     |          |                        |          |
| Regular wage/salary earning                   | 0.652***            | 0.0009   | 0.207***               | 0.0003   |
| Casual labour                                 | 0.824***            | 0.0015   | 0.425***               | 0.0005   |
| Others                                        | 1.134***            | 0.0044   | 0.676***               | 0.0022   |
| <b>Social group (Others)</b>                  |                     |          |                        |          |
| Scheduled Tribe                               | 1.332***            | 0.0043   | 1.576***               | 0.0042   |
| Scheduled Caste                               | 0.863***            | 0.0017   | 1.270***               | 0.0018   |
| Other Backward Class                          | 0.942***            | 0.0013   | 1.122***               | 0.0013   |
| <b>Religion (Muslim)</b>                      |                     |          |                        |          |
| Hindu                                         | 0.892***            | 0.0015   | 1.010***               | 0.0013   |
| Christian                                     | 0.984***            | 0.0038   | 1.183***               | 0.0036   |
| Others                                        | 0.856***            | 0.0033   | 0.688***               | 0.0022   |
| Constant                                      | 0.164***            | 0.0007   | 0.304***               | 0.0010   |

Table 7: Relative risk ratio from multinomial model for workplace location choice of urban residents

(Base category: Urban workplace)

| Explanatory Variables | Rural Workplace     |      | No fixed place of work |      |
|-----------------------|---------------------|------|------------------------|------|
|                       | Relative risk ratio | S.E. | Relative risk ratio    | S.E. |
| Observations (N)      | 40964               |      |                        |      |

Level of significance : \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

<sup>a</sup> The reference group for the categorical variables mentioned within parenthesis.

<sup>b</sup> We also control for household size and seasonality.

<sup>c</sup> Weights are used in the estimation of multinomial logit model.