

Exclusionary Urbanization and Changing Migration Pattern in India:

Is commuting by workers a feasible alternative?

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Extended Abstract

For developing countries including India, United Nations projections of urban population have been on the higher side. Based on such estimates, it was conjectured that India would witness a large migration from rural areas. Yet, during 2001-11, nationally representative surveys did not record large increase in rural-urban migration. Hence, the share of urban population increased marginally from 27.8 to 31.1 percent over 2001-2011. This increase however masks important undercurrents. Two predominantly urban states of India and 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. Since lower total fertility rate cannot explain this phenomenon, two plausible explanations are out-migration from cities and reduced rate of in-migration to cities (Kundu 2012). With cities unwelcoming and anemic employment growth in rural India, an alternative, albeit effective livelihood strategy (where feasible) is commuting daily from rural to urban areas for work. Nearly 12.5 million workers cross the rural-urban boundary for work every day while 12.2 million workers report not having a fixed place of work. Such movement of workers is fast developing as an important and new channel of interaction between the rural and urban economy. This movement also has implications for integration of rural and urban labour markets for skilled and unskilled workers.

The number of commuting workers is expected to increase in this decade on account of three reasons. First, there has been an increase in the number of small towns. Over the census period

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2001-11, India saw the emergence of 2774 new towns, a majority of them census towns, and hence not all of them have a strong economic base. 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. Second, an expansion in construction, manufacturing and the wholesale and retail trade sectors, will drive workers to cross the rural-urban boundaries in search of work. Third, greater transport linkages between rural and urban India will encourage commuting by workers.

One obvious question that arises is why households will not migrate to their place of work rather than commute across the rural-urban boundary. Let us first consider the case of rural households. If the household opts not to move then it will not have to give up the benefits of various government programs meant for rural residents. In rural areas unlike urban areas housing is affordable. If one or more individual of the household decides to commute then it is basically diversification of the source of income for these households. Hence it would make sense for individual members from households to commute. There is credible evidence to support this conjecture.

Under the light of all these evidences 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?

We use the National Sample Survey Organization's (NSSO) survey on employment, unemployment conducted in 2009-10. The 2009-10 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 surveys collect detailed household and individual specific information.

The rationale for estimating a multinomial 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 and 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: place of residence and work are the same, place of residence and work differ and place of residence is urban but individual has no fixed place of work. Each rural or urban resident is assumed to choose the

outcome that gives the highest level of utility (Random Utility Model). 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.

As explanatory variable we include the household characteristics, individual characteristics, labour market factors (unemployment rate, wages), regional indicators (spatial distribution of economic activities by location quotient²). We also control for the level of urbanization and size of the peripheral urban area. These indicators have been calculated as part of the India e-geopolis project (Denis and Kamala 2011).

The larger the share of peri-urban population the more likely the individual is 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. We find that higher (higher) the level of rural (urban) unemployment an individual is more (less) likely to commute to urban areas. This finding is in line with expectation. We find that in districts with concentration of manufacturing and service sector jobs (the corresponding relative risk ratios are greater than one) individuals are more likely to commute from rural-to urban areas. We will discuss this result in conjunction with our findings on how location quotient affects commuting decision of urban workers.

We now turn to the factors affecting decision of urban residents. We find that higher (higher) the level of urban (rural) unemployment an individual is more (less) likely to commute to rural areas. This finding is similar in spirit to what we found in the case of rural areas. The larger the share of peri-urban population the more likely the individual is likely to commute to rural areas. This can be explained by the growth of the city into peri-urban areas (which as mentioned as earlier are officially classified as rural areas) and location manufacturing activity in these regions. We also find that in districts with higher level of clustering of manufacturing activity, workers are more likely to commute to rural areas. Unlike the case of manufacturing activity which is spread across rural and urban areas, the service sector is concentrated more in urban areas (Holmes and Stevens, 2004). Hence it is not surprising that we find 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.

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 manufacturing as captured by the location quotient the lower is

² Location Quotient (LQ): We can define LQ as ratio of share of workers employed in an industry in a district to the share of that district in overall employment (all India). Suppose there are N (1,2,..., n) districts and S sectors. The share of industry employment in a district is measured as s_n and share of district employment is measured as x_n . Then LQ can be defined as: $(s_n \setminus x_n)$.

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 is lower in manufacturing.

In contrast, higher (higher) the concentration of service sector jobs the higher (lower) is the probability of a rural (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.

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

We find that workers in higher age group commute less as compared to younger workers. Similar findings are also shown by 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.

Coming to the skill level (I is the lowest and IV is the highest level) of workers affecting their commuting decision, we find that, as compared to skill level I, workers in skill level II and III are less likely to commute from rural to urban but workers in skill IV 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.

We also control for social group, religion, household size, land owned and seasonality in the labour market in our estimation for determinants of commuting choice of workers.

1. Introduction

The issue of commuting by workers across rural urban boundaries is a relatively under researched issue in the context of developing countries. Unlike the issue of rural-urban migration, which has been studied in considerable depth, the issue of diversification of workplace, a phenomenon where individuals commute daily across rural and urban areas is not well documented. In fact the literature on commuting workers is more focused on the developed countries where workers travel daily between the city center and the suburbs. The workhorse model in this literature examines the location choice of workers in the context of a monocentric city (Alonso 1964, Muth 1969 and 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.

The above framework provides 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 is easily extended to shed light on two-way commuting between rural and urban areas.

For 2009-10, it is estimated that 12.42 million workers engaged in non-agricultural activities crossed the rural-urban boundary in India 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 individuals were crossing the rural-urban boundary everyday in context of work. Commuting has increased on account of the jobless growth experienced in agriculture and manufacturing which has been partially offset by increases in non-manufacturing, construction, and services (Government of India 2012b). Commuting has also increased because of exclusionary urbanization which has dampened the incentive to migrate to the cities (Kundu 2011)

In this paper we use the nationally representative dataset from India's National Sample Survey Organization's (NSSO) survey on employment and unemployment 2009-10 to address three issues. First, how does the spatial distribution of economic activities affect commuting by workers across rural and urban areas? Second, how far does the size of urban and peri-urban area explain commuting by workers? Third, how do labour market conditions, as reflected by the unemployment rate, in rural and urban areas affect the decision to commute?

The daily movement of millions of individuals across rural-urban boundaries can be attributed to three reasons. The first reason is the unequal spatial development and the apparent worsening of socio-economic indicators as one moves from the core (city) to the periphery (the rural areas). This has been documented by Kundu et al. (2002) who establish that wages and incomes 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. 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 second reason is the change in spatial distribution of economic activities and improvement in transport facilities. 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. The decision to do away with industrial licensing policies in most industries, freeing of constraints on location and announcement of measures to attract foreign direct investment has led to a change in the top 25 districts of India that attract investments (Chakravorty and Lall, 2007). These changes have influenced the nature of jobs created in 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 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. The third reason is the large size of the peripheral urban (peri-urban) area, i.e. rural areas in close proximity of the city or urban agglomeration. While there is no official estimate of the population living in peri-urban areas in India, Denis and Kamala (2011) do provide estimates of peri-urban population around urban agglomerations by using the built up area criteria. They analyze the extent of urban growth by relaxing the urban area criteria adopted by Census of India. They consider any settlement with population of at least 10000 to be an urban settlement. They find that using population and built up area criteria, the urban share of population is around 37 percent for 2001 as compared to official figure of 27.8 percent by Census of India. The differences between Census numbers and their estimates provide the size of peri-urban area in India. These areas act as links between rural and urban settlements and have become centre 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. These three factors coupled with improved transport facilities have contributed to the phenomenon of rising numbers of two-way commuters across rural-urban areas.

2. Background

For developing countries including India, United Nations projections of urban population have been on the higher side. Based on such estimates, it was conjectured that India would witness large migration from rural areas. Yet, during 2001-11, nationally representative surveys did not record large increase in rural-urban migration. Hence, the share of urban population increased marginally from 27.8 to 31.1 percent over 2001-2011. This increase however masks important undercurrents. Two predominantly urban states of India and 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. Since lower total fertility rate cannot explain this phenomenon, two plausible explanations are out-migration from cities and reduced rate of in-migration to cities (Kundu 2011). With cities unwelcoming and anemic employment growth in rural India, an alternative, albeit effective livelihood strategy (where feasible) is commuting daily from rural to urban areas for work. Nearly 12.5 million workers cross the rural-urban boundary for work every day while 12.2 million workers report not having a fixed place of work. Such movement of workers is fast developing as an important and new channel of interaction between the rural and urban economy. This movement also has implications for integration of rural and urban labour markets for skilled and unskilled workers.

Depending on the context, the commuting workers have also been referred to as footloose labour³, floating population etc⁴ In the context of workers engaged in non-agricultural activities and commuting across rural-urban boundaries on a daily basis, Mohanan (2008) writes, “ ... movement of rural workers to urban areas is somewhat reinforced 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 number of commuting workers is expected to increase in this decade on account of three reasons. First, there has been an increase in the number of small towns. Over the census period 2001-11, India saw the emergence of 2774 new towns, a majority of them census towns, and not all of them have a strong economic base. 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

³ 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. Much of what he talked about in his book - seasonal migrants and foot loose labour (workers commuting daily for work) - has become extremely relevant today in the context of understanding mobility of India's workforce (Breman 1996).

⁴ 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”P Sainath (2007) It's been a hard day's night, The Hindu, Jan 24, 2007

Accessed: <http://www.hindu.com/2007/01/24/stories/2007012404621300.htm>

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. Second, an expansion in construction, manufacturing and the wholesale and retail trade sectors, will drive workers to cross the rural-urban boundaries in search of work. Third, greater transport linkages between rural and urban India will encourage commuting by workers.

One obvious question that arises is why households will not migrate to their place of work rather than commute across the rural-urban boundary. If the rural household opts not to move then it will not have to give up the benefits of various government programs meant for rural residents. In rural areas unlike urban areas housing is affordable. We have already mentioned the improvements in transport connectivity. 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. Hence it would make sense for members from households to commute. 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 the National Sample Survey Organization's (NSSO) survey on employment, unemployment conducted in 2009-10. This nationally representative 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 2009-10 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 (2011a). The surveys collect detailed household and individual specific information. 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. There is an additional category on workers who do not have a fixed place of work. The size of rural-urban commuting workforce is 8.1 million, which constitute 8.2 percent of rural workforce. The size of urban-rural commuting workforce is 4.4 million comprising 5 percent of urban workforce (Table 1).

Within India, 12 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 have 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.

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

4.1 Empirical Model

The rationale for estimating a multinomial 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 and 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 no 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. Each rural or urban resident is assumed to choose the outcome that gives the highest level of utility. 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.

As explanatory variable we include the household characteristics: household type⁵ (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 household⁶. The individual characteristics that we include are the 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 skill⁷ based on the National Classification of Occupation 2004).

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 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 are living below the poverty line. In urban India, 34.1 percent of scheduled castes and 30.4 percent of scheduled tribes are living 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 laborers and 40 percent of other labourers are poor while in urban areas 47.1 percent of casual laborers are living below the poverty line (Government of India 2012). Hence social group, religion and household type are important determinants of household well-being.

In order to control for labour market conditions⁸, we and include the rural and urban unemployment rate calculated at the level of the NSS-region⁹. The unemployment rate is calculated

⁵ A household's type is determined based on the source that accounts for at least 50 percent of its income.

⁶ We do not include rent as an explanatory variable. There are three reasons why we do not include rent. First, the proportion of households that changed their place of residence is small. Only 1.3 percent and 3.3 percent of rural and urban households respectively reported moving their residence. Hence it is reasonable to assume that households fix their place of residence and then look for job opportunities. Specifically 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, though, 33 percent report paying rent.

⁷ The four levels are based on the grouping of one digit division of national classification of occupation which are 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.

⁸ Ideally we need to include the differential in the rural-urban wages, rural-no fixed workplace wages as an explanatory variable. After all it is the wage differentials that would induce the decision to commute. At the same time if a large number workers commute to take advantage of the differentials then the differentials in turn will narrow. In the literature using cross section data authors have not been able to address this problem. One would need longitudinal data to address the issue of how wage differentials affect commuting decision and vice versa. We argue that the unemployment rate can act as a proxy for wage differentials and accurately reflect the labour market conditions. Hence the fact that we do not include wage differentials as an explanatory variable should not affect our results.

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 rate will capture the push and pull factors influencing the decision to commute by individuals. 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 of rural areas workers one observes temporary migration to urban areas where individuals engage in construction industry or doing menial jobs (Government of India 2011b).

At the outset we had mentioned the spatial distribution of economic activity, in particular that of manufacturing and services, will affect the location of jobs. A standard measure of spatial distribution of economic activity is the Location Quotient¹⁰. We construct this measure for each district in order to quantify the localisation or specialization of jobs in secondary and service sector. The Location Quotient for secondary sector is calculated as the ratio of share of workers employed in this sector in the district to the share of that district in overall employment (all India). Similarly the Location Quotient for the service sector is calculated. Recognising that the clustering of industries may extend to more than one district, the location quotient for a particular district should be calculated by including the information for all districts adjacent to this district (Holmes 1999). This way we can capture the effect of districts adjoining a district from a neighbouring 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 urban boundaries.

For official purposes population living in the peri-urban area is counted as part of rural areas. From the official statistics 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

⁹ NSS regions: NSS regions are geographical units of the size between district and state in the hierarchy. In NSSO surveys every state is divided into different NSS regions which is combination of districts with similar characteristics/adjacent to each other.

¹⁰ Location Quotient (LQ): We can define LQ as ratio of share of workers employed in an industry in a district to the share of that district in overall employment (all India). Suppose there are N (1,2,..., n) districts and S sectors. The share of industry employment in a district is measured as s_n and share of district employment is measured as x_n . Then LQ can be defined as: $(s_n \setminus x_n)$.

each district. In order to control for ease of transport connectivity in rural areas we include as an explanatory variable the proportion of rural population residing without access to bus service, with bus service within the village, with bus service accessible within 0-5 kilometers and over 5 kilometers from the village. The population weighted measure is more meaningful than including the proportion of villages with or without bus service. The village specific information is sourced from Census of India 2001 village directory.

4.2 Results

We now turn to the discussion of results. In the Tables 5 and 6, we have reported the relative risk ratios. We begin with a discussion on how the share of peri-urban population, unemployment rate, and location quotient of secondary and service sector affect the decision of rural residents. The relative risk ratios should be interpreted with respect to base category - individuals who live and work in the same areas (rural-rural or urban-urban) and where relevant with respect to the reference group if the explanatory variable is a dummy variable.

The larger the share of peri-urban population the more likely the individual is 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. Writing in the State of World Population Report 2011, Osotimehin observes that “while some countries are attracting more people to emerging mega-cities where jobs are plentiful and the cost of living is high, others are seeing waves of migration from to city centre to peri-urban areas where the cost of living may be lower but basic services and jobs may be in short supply” (p. ii–iii UNFPA 2011).

We find that higher the share of rural population closer to the city the more likely it is that we will observe rural-urban commuting. An important related issue is that of connectivity. In districts with larger share of population with no bus service, individuals are less likely to commute to urban areas. On the other hand, if bus service is accessible within 5 kilometers or more, then individuals are more likely to commute for work.

Unemployment rate affects the decision to commute. Higher (higher) the level of rural (urban) unemployment an individual is more (less) likely to commute to urban areas. This finding is in line with expectation. We find that in districts with concentration of manufacturing 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 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 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. We find that larger the size of land holding of the household, individuals are less likely to be either rural-urban commuters or without fixed place of work.

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 likely to commute to rural areas. This can be explained by the growth of the city into peri-urban areas (which are officially classified as rural areas) and location of manufacturing activity in these regions. We find that higher (higher) the level of urban (rural) unemployment an individual is more (less) likely to commute to rural areas. This finding is similar in spirit to what we found in the case of rural areas. We find that in districts with higher level of clustering of manufacturing 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 manufacturing activities we are likely to observe both rural-urban and urban-rural commuting. Chakravarty and Lall (2007) establish that 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, using data from annual survey of industries, (on organized and unorganized manufacturing) have established that manufacturing activity is situated in both rural and urban areas. In light of the patterns described by these two studies our finding that higher the concentration of manufacturing 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 manufacturing activity which is spread across rural and urban areas, the service sector is concentrated more in urban areas. Hence it is not surprising that we find 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 that

it is unlikely to be concentrated in any location. At best one might find that it is concentrated in urban areas. This point is made by Holmes and Stevens (2004) in their discussion on spatial distribution of economic activities in North America.

We next present the interesting results pertaining to rural and urban workers with no fixed place of work. 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. It is important here to note that India's economic growth has not translated into creation of more jobs across all sectors. The employment elasticity is negative in agriculture. Over the period 2004-10, there has been a loss of 23.33 million jobs in agriculture and 4.02 million jobs in manufacturing while there was an increase in 25.89 million jobs in non-manufacturing and 2.7 million jobs in services (Government of India 2011b). 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 manufacturing 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 is lower in manufacturing.

In contrast, higher (higher) the concentration of service sector jobs the higher (lower) is the probability of a rural (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 focused more on district or NSS-region level economic variables that affect the decision to commute. Now we turn to individual specific factors.

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 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 studies the issue of commuting choice of workers across rural-urban boundary through the lenses of changing urban scenario and relocation of economic activities in rural and urban areas in the Indian context. The paper sheds light on the diversification of workplace by individuals in rural and urban India, by opting to commute instead of possibly migrating. We conjecture that the unwelcoming nature of cities along with higher cost of living in urban areas could act as a catalyst for the phenomenon of commuting between rural-urban areas.

We provide empirical evidences on how level of urbanization and size of peri-urban population along with the concentration of economic activities in secondary and tertiary sector explains the commuting choice of workers in both rural and urban areas. We also show that rural and urban labour market conditions in terms of unemployment rate induce workers to commute for better job opportunities. We also explain how the urban proximity and transport connectivity enhances the commuting of workers.

This study can help policy makers, urban planners and academicians to understand the process of rural- urban interaction through the mobility of workers in term of commuting choice. One direct input this study provides is the estimate of mobile workforce (including footloose/ no fixed place workers). 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. There is a need for adjusting the size of rural and urban workforce to reflect the commuting worker. If one were to ignore the workers with no fixed place of work, then for the year 2009-10, the urban workforce needs to be adjusted upwards by 3.68 million (8.05 million rural-urban commuters less 4.37 million urban rural commuters) and the rural workforce will have to be adjusted downwards by a similar magnitude.

Another important issue highlighted in our study is the how changing spatial location of jobs can have important implications for the nature of mobility of workers. Due to constant shift of the manufacturing to rural areas, there is flow of commuters towards rural areas (between 1993-94 and 2009-10, urban rural commuters quadrupled from 1.1 million to 4.4 million). So the relocation of industries is helping rural areas in development and in realizing their potential.

The various initiatives taken by 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. Due to data limitations we are unable to address the issue of workers who travel long distances within rural areas or within urban areas. Nor are we able to quantify the economic output attributable to the commuting workers. However, given the large number of commuters their contribution will be significant.

The phenomenon of workers commuting across the rural-urban boundaries is not unique to India. The State of World Population 2011 published by United Nations Population Fund dwells at length on the quality of urbanization. It hints at the rapid change in the quality of life in the cities and alludes to the phenomenon of exclusionary urbanization. Further it notes in the Indian context that it is not uncommon for residents to commute to Mumbai daily for work from areas as far as 163 kilometers. India's five year plans also strive for balanced regional development but this objective has not been achieved. Comparison of the outcomes in the core (city) and the periphery (rural areas) reveals that the wage gradient is not only negatively sloped but is also steep as distance from the city increases up to 15-20 kilometers. It is unlikely that this wage gradient is likely to become less pronounced over time. This fact coupled with changing spatial distribution of economic activity across rural and urban areas implies that the phenomenon of workers commuting across rural and urban areas will persist and continue to grow.

6. References

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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* (86.73)	8,050,036 (8.16)	5,035,493 (5.1)	98,641,749 (100)
Urban	4,370,678 (4.94)	76,947,337 (86.95)	7,177,731 (8.11)	88,495,746 (100)
Total	89,926,898 (48.05)	84,997,373 (45.42)	12,213,224 (6.53)	187,137,495 (100)

(values in bracket are in percentage),

(Workers in NIC div. 02-99, industry group 012,014,015)

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

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

Table 2: Distribution of non agricultural workers based on industrial classification, residence location and workplace location

NIC group	Rural-Rural	Rural-Urban	Rural-NF	Urban-Rural	Urban-Urban	Urban-NF
D	22.5	20.5	5.3	23.7	26	5.3
F	27.7	30.7	30.5	14.7	10.5	15.6
G	16.3	12	15	27.7	20.9	21.4
I	8.1	9.9	29.8	7.2	7.1	37.2
K	0.6	1.3	0.7	3.1	3.7	2.1
L	3.4	7.9	0.1	4.3	7.7	0.5
M	5.6	4.9	0.5	6.9	6.1	0.5
N	1.2	2	0.8	1.5	2.4	0.3
O	4	2.5	5.8	3.4	3.8	5
others	10.7	8.2	11.5	7.4	11.8	12.2
Total	100	100	100	100	100	100

(all values are in percentage)

(workers in NIC div. 02-99, industry group 012,014,015)

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: Summary Statistics for Rural Residents

Variables	Mean	Standard Deviation	Min.	Max.
Workplace	1.17	0.47	1	3
Share of rural population (0-7 km from town)	0.17	0.13	0.000	0.700
8--15 km from town	0.31	0.14	0.027	0.705
16-30 km from town	0.29	0.12	0.075	0.530
30+ km from town	0.22	0.21	0.001	0.883
Share of village population with bus service (within village)	0.58	0.34	0.09	1
not available/no info	0.01	0.02	0	0.12
1-5 km from village	0.19	0.14	0	0.46
5+ km from village	0.22	0.21	0	0.71
Unemployment rate: rural	3.74	2.21	0.03	13.28
Unemployment rate: urban	4.83	2.36	0	17.3
Share of peri-urban population	20.01	16.65	0	72.19
Share of urban population	24.50	11.86	1.52	75.11
Location quotient: manufacturing	1.03	0.29	0.28	1.6
Location quotient: services	0.93	0.26	0.38	1.98
Skill Level (Level I)	0.31	-	0	1
Level II	0.58	-	0	1
Level III	0.05	-	0	1
Level IV	0.05	-	0	1
Household type (self employed in non- agriculture)	0.31	-	0	1
Agriculture labour	0.06	-	0	1
Other labour	0.38	-	0	1
Self employed in agriculture	0.11	-	0	1
Others	0.15	-	0	1
Education Level (uneducated)	0.26	-	0	1
Below Primary	0.10	-	0	1
Primary	0.16	-	0	1
Middle	0.20	-	0	1
Secondary	0.12	-	0	1
Higher Secondary	0.08	-	0	1
Graduation or above	0.07	-	0	1
Gender (male)	0.81	-	0	1
Female	0.19	-	0	1
Marital Status (Unmarried)	0.20	-	0	1
Married	0.75	-	0	1
Widowed/divorced	0.04	-	0	1
Age group (15-24 yrs.)	0.21	-	0	1
25-34	0.29	-	0	1
35-44	0.28	-	0	1
45-59	0.22	-	0	1
Social group (Scheduled Tribe)	0.08	-	0	1
Scheduled Caste	0.25	-	0	1
Other Backward Class	0.44	-	0	1
Others	0.23	-	0	1
Religion (Hindu)	0.83	-	0	1
Muslim	0.12	-	0	1
Christian	0.03	-	0	1
Others	0.02	-	0	1
Household size (0-2)	0.08	-	0	1
3-5	0.55	-	0	1
6-10	0.34	-	0	1
More than 10	0.03	-	0	1
Sub round (October- December)	0.25	-	0	1
July- September	0.25	-	0	1
January- March	0.25	-	0	1
April- June	0.25	-	0	1
Observations	36947			

Table 4: Summary Statistics for Urban Residents

Variables	Mean	Standard Deviation	Min.	Max.
Workplace	2.04	0.37	1	3
Unemployment rate: rural	3.28	1.92	0.03	13.28
Unemployment rate: urban	4.38	1.92	0	17.3
Share of peri-urban population	16.05	13.40	0	72.19
Share of urban population	34.70	17.67	1.52	75.11
Location quotient: manufacturing	0.94	0.31	0.31	1.6
Location quotient: services	0.93	0.26	0.41	1.98
Skill Level (Level I)	0.20	-	0	1
Level II	0.59	-	0	1
Level III	0.09	-	0	1
Level IV	0.12	-	0	1
Household type (self employed)	0.34	-	0	1
Regular wage/salary earning	0.47	-	0	1
Casual labour	0.17	-	0	1
Others	0.02	-	0	1
Education Level (uneducated)	0.13	-	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	0.13	-	0	1
Graduation or above	0.21	-	0	1
Gender (male)	0.82	-	0	1
Female	0.18	-	0	1
Marital Status (Unmarried)	0.23	-	0	1
Married	0.73	-	0	1
Widowed/divorced	0.04	-	0	1
Age group (15-24 yrs.)	0.18	-	0	1
25-34	0.31	-	0	1
35-44	0.28	-	0	1
45-59	0.24	-	0	1
Social group (Scheduled Tribe)	0.03	-	0	1
Scheduled Caste	0.16	-	0	1
Other Backward Class	0.40	-	0	1
Others	0.40	-	0	1
Religion (Hindu)	0.79	-	0	1
Muslim	0.14	-	0	1
Christian	0.03	-	0	1
Others	0.03	-	0	1
Household size (0-2)	0.11	-	0	1
3-5	0.60	-	0	1
6-10	0.26	-	0	1
More than 10	0.03	-	0	1
Sub round (October- December)	0.25	-	0	1
July- September	0.25	-	0	1
January- March	0.25	-	0	1
April- June	0.25	-	0	1
Observations	37487			

Table: 5 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	1.010***	0.00005	1.007***	0.0001
Share of urban population	1.017***	0.00005	1.006***	0.0001
Unemployment rate: rural	1.008***	0.00032	1.001*	0.0004
Unemployment rate: urban	0.993***	0.00026	1.045***	0.0003
Location quotient: manufacturing	1.228***	0.00242	0.932***	0.0023
Location quotient: services	1.600***	0.00384	1.708***	0.0054
Share of rural population (0-7 km from town)				
8--15 km from town	0.403***	0.00327	0.157***	0.0019
16-30 km from town	0.265***	0.00175	3.198***	0.0297
30+ km from town	0.272***	0.00145	0.287***	0.0023
Share of village population with bus service (within village)				
not available/no info	0.00271***	0.00010	200.7***	8.5170
1-5 km from village	2.436***	0.01760	16.78***	0.1510
5+ km from village	1.139***	0.00535	0.680***	0.0038
Education Level (uneducated)	-		-	
Below Primary	0.852***	0.00151	1.066***	0.0019
Primary	1.024***	0.00148	0.877***	0.0015
Middle	1.031***	0.00147	0.854***	0.0014
Secondary	1.299***	0.00206	0.939***	0.0018
Higher Secondary	1.581***	0.00285	0.461***	0.0014
Graduation or above	1.721***	0.00345	0.233***	0.0010
Skill Level (I)	-		-	
Level II	0.769***	0.00079	0.613***	0.0008
Level III	0.612***	0.00138	0.990***	0.0033
Level IV	0.909***	0.00195	0.879***	0.0025
Age group (15-24 yrs.)	-		-	
25-34	0.924***	0.00132	1.015***	0.0020
35-44	0.836***	0.00135	1.022***	0.0021
45-59	0.837***	0.00144	0.899***	0.0020
Marital status*Gender (unmarried*male)	-		-	
Female	0.716***	0.00194	0.509***	0.0024
Married	0.939***	0.00134	1.284***	0.0026
Other	0.638***	0.00270	1.146***	0.0052
Married female	0.640***	0.00202	0.488***	0.0026
Other female	0.829***	0.00500	0.420***	0.0037
Household type (self employed in non-agriculture)	-		-	
Agriculture labour	1.283***	0.00284	0.838***	0.0022
Other labour	1.870***	0.00231	0.697***	0.0010
Self employed in agriculture	1.137***	0.00212	0.863***	0.0019
Others	2.316***	0.00327	0.687***	0.0014
Land owned (none)	-		-	
0- 0.01	0.663***	0.00385	1.540***	0.0166
0.01-0.4	0.598***	0.00346	1.522***	0.0164
0.41-1	0.778***	0.00457	1.322***	0.0144
More than 1	0.588***	0.00345	1.269***	0.0138
Constant	0.0882***	0.00078	0.0245***	0.0004
N = 36947				

The reference group for the categorical variables mentioned within parenthesis. Level of significance : *** p<0.01, ** p<0.05, * p<0.1

Table 6: 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	SE
Share of peri-urban population	1.003***	0.0000578	1.001***	0.000045
Share of urban population	0.983***	0.0000425	0.999***	0.0000313
Unemployment rate: rural	0.962***	0.000377	0.981***	0.000261
Unemployment rate: urban	1.018***	0.000355	1.063***	0.000279
Location quotient: manufacturing	1.449***	0.0034	0.749***	0.00144
Location quotient: services	0.705***	0.00184	1.347***	0.00254
Education Level (uneducated)	-	-	-	-
Below Primary	1.080***	0.00285	0.785***	0.00138
Primary	0.939***	0.00222	0.791***	0.00117
Middle	1.153***	0.00242	0.794***	0.00111
Secondary	1.135***	0.00251	0.534***	0.00087
Higher Secondary	1.080***	0.0026	0.416***	0.000813
Graduation or above	0.907***	0.00223	0.203***	0.000481
Skill Level (Level I)	-	-	-	-
Level II	0.899***	0.00143	0.494***	0.000514
Level III	0.977***	0.00258	0.722***	0.00169
Level IV	0.873***	0.00215	0.269***	0.000616
Age group (15-24 yrs.)	-	-	-	-
25-34	0.939***	0.00199	1.412***	0.00235
35-44	1.143***	0.00262	1.534***	0.00281
45-59	0.858***	0.00208	1.386***	0.00263
Marital status*Gender (unmarried*male)				
Female	0.804***	0.00309	0.101***	0.000709
Married	1.342***	0.00274	1.024***	0.00158
Other	1.240***	0.00722	0.826***	0.00365
Married female	0.920***	0.00396	2.120***	0.0156
Other female	0.844***	0.00654	2.868***	0.0258
Household type (self employed)	-	-	-	-
Regular wage/salary earning	0.646***	0.000856	0.194***	0.000235
Casual labour	0.814***	0.00142	0.415***	0.000498
Others	1.112***	0.00426	0.668***	0.00215
Constant	0.140***	0.000685	0.596***	0.00223

N=37487

The reference group for the categorical variables mentioned within parenthesis.

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