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**Patterns of Labour Market Insecurity in  
Rural India: A Multidimensional and  
Multivariate Analysis**

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*Patterns of Labour Market Insecurity in  
Rural India: A Multidimensional and  
Multivariate Analysis*

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# **Patterns of Labour Market Insecurity in Rural India: A Multidimensional and Multivariate Analysis**

**Padmini Desikachar and Brinda Viswanathan**

## **Abstract**

*Labour market insecurity, recognised as pervasive in rural India, is multi-faceted. This study attempts to fill a gap in the research on key dimensions of labour market insecurity by using the National Sample Survey data for the year 2004-2005 for rural India to construct a composite index applying multiple correspondence analysis. In constructing the index, information on key dimensions of labour market insecurity are used, including labour force status according to longer and shorter reference period measures, labour time utilization, and behavioural responses to labour market risks. The index is then used to address the question of how the labour market insecure differ in their socioeconomic, household, and individual characteristics from the labour market secure using a selectivity-corrected ordered probit model.*

*Notwithstanding the limitations of the database, the main results that stand out are: insecurity is more pervasive among women than men; insecurity is prevalent among some self-employed but less severe than among casual labourers; and women who are illiterate, agricultural labourers, and belong to the scheduled caste/tribes are at a heightened risk of labour market insecurity. Factoring in selectivity bias shows that for men, self-selection into higher levels of insecurity is at the cost of human capital acquisition while self-selection of women into different levels of insecurity is affected by their socio-cultural and economic status.*

**Keywords:** *Labour Market Insecurity, Multiple Correspondence Analysis, Selectivity-corrected Order Probit Model, Rural India*

**JEL Codes:** *J40, C25, C43, O12, O18*

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## Table of Abbreviations and Codes

Abbreviation/ Code	Description/Definition
CDS	Current Daily Status
CL	Casual Labour
CWS	Current Weekly Status
EPS	Employed per Principal Status
F	Females
LF	Labour Force
LII	Labour Market Insecurity Index
M	Males
MCA	Multiple Correspondence Analysis
Mn	Millions
MPCE	Monthly Per Capita Expenditure
MW	Manual Work
NILF	Not in Labour Force (by any definition or reference period)
NSS	Not Subsidiary Status worker
OBC	Other Backward Caste
OMA	Outcome Model for ALL
OMM	Outcome Model for Males
OMF	Outcome Model for Females
SC/ST	Scheduled Castes/Scheduled Tribe
SE	Self Employed
SMA	Selection Model for ALL
SMM	Selection Model for Males
SMF	Selection Model for Females
SD	Standard Deviation
SS	Subsidiary Status
UECDS	Unemployed per Current Daily Status
UEPS	Unemployed per Principal Status
UPS	Usual Principal Status
UPSS	Usual Principal and Subsidiary Status
WCDS	Working in Current Daily Status

(Contd...Table of Abbreviations and Codes)

<b>State Codes</b>	<b>State Names</b>
JK	Jammu Kashmir
HP	Himachal Pradesh
PB	Punjab
UK	Uttaranchal
HY	Haryana
RJ	Rajasthan
UP	Uttar Pradesh
BR	Bihar
SK	Sikkim
AR	Arunachal Pradesh
NL	Nagaland
MN	Manipur
MZ	Mizoram
TR	Tripura
ML	Meghalaya
AS	Assam
WB	W.Bengal
JH	Jharkhand
OR	Orissa
CG	Chattisgarh
MP	Madhya Pradesh
GJ	Gujarat
MH	Maharashtra
AP	Andhra Pradesh
KA	Karnataka
GA	Goa
KL	Kerala
TN	Tamil Nadu

## (Contd...Table of Abbreviations and Codes)

<b>Abbreviation/Code</b>	<b>Description/Definition</b>
<b><i>us_eun</i></b>	<b><i>Employment State per Usual Principal and Subsidiary Status</i></b>
A_1	NPS&NSS
A_2	UEPS&SS + UEPS&NSS
A_3	EPS&SS + EPS & NSS
<b><i>new_us_eun</i></b>	<b><i>Employment State per Usual Principal and Subsidiary Status- New</i></b>
A_1~	Not working in principal status
A_2~	Working in principal status
<b><i>avail_wrk</i></b>	<b><i>Number of months reported available for work</i></b>
B_1	Seeking work for more than 3 months
B_2	Seeking work up to 3 months
B_3	Not seeking work
<b><i>new_avail_wrk</i></b>	<b><i>Number of months reported available for work - New</i></b>
B_1~	Available / seeking work $\geq$ 3 months
B_2~	Available / seeking work up to 3 months or not seeking work
<b><i>cws_eun</i></b>	<b><i>Employment states per current weekly status</i></b>
C_1	Not in labour force per CWS
C_2	Unemployed per CWS
C_3	Employed per CWS
<b><i>new_cws_eun</i></b>	<b><i>Employment states per current weekly status - New</i></b>
C_1~	Not working in weekly status
C_2~	Working in weekly status
<b><i>cds_wrk</i></b>	<b><i>Employment states per CDS- Days worked and days looking for work during reference week</i></b>
D_1	Not working & unemployed for at least 0.5 days per CDS
D_2	Not working and not unemployed for even 0.5 days per CDS
D_3	Working for at least 0.5 days & unemployed for at least 0.5 days per CDS
D_4	Working for at least 0.5 days & not unemployed even for 0.5 days per CDS

## (Contd...Table of Abbreviations and Codes)

<b><i>cds_unemp</i></b>	<b><i>Days unemployed during week and whether also unemployed in principal status</i></b>
E_1	At least 3.5 days unemployed per CDS and also unemployed according to usual principal status
E_2	At least 3.5 days unemployed per CDS but not unemployed per UPS
E_3	0.5 to 3 days unemployed per CDS
E_4	0 days unemployed per CDS
<b><i>new_cds_unemp</i></b>	<b><i>Days unemployed during week and whether also unemployed in principal status -New</i></b>
E_1~	Unemployed between 3.5 & 7 days in CDS & unemployed in UPS
E_2~	Unemployed between 3.5 & 7 days in CDS but not unemployed in UPS
E_3~	Unemployed in CDS for less 3 days or less and not unemployed per UPS
<b><i>cds_nilf_avfwrk</i></b>	<b><i>Days not in labour force during week and whether available for work</i></b>
F_1	NILF more 3.5 days per CDS & available for work per US
F_2	NILF more 3.5 days per CDS & available for work per US
F_3	NILF 3 days or less
<b><i>mw_grp</i></b>	<b><i>Manual work</i></b>
G_1	No work per first CDS activity
G_2	Manual work per first CDS activity
G_3	Non-Manual Work per first CDS activity

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## **INTRODUCTION**

The prevalence of labour market insecurity in rural India is well recognized and is currently the policy focus for a flagship labour market intervention program, the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). However academic and policy debates on the subject have tended to treat the labour market insecure and the income poor as synonymous. Moreover, studies linking labour markets, poverty incidence, and anti-poverty programs, have focused on identifying subsets of the rural poor among categories of the rural labour force e.g. agricultural casual labour (Murgai and Ravallion, 2005). These subsets have been used to simulate outcomes of labour market interventions such as MGNREGS. The phenomenon of labour market insecurity however does not lend itself to such easy compartmentalization. Rural labour markets are not static. There is evidence that transitions into and out of different labour market categories within a reference period are significant. A related phenomenon is state-instability among part-time working females and even non-working females. These and other layers of complexity, including labour market segmentation, suggest that single-dimensional indicators will not suffice to gauge the degree of labour market insecurity across different segments of the rural population. Indeed, as far back as 1970, the Report of the Committee of Experts on Unemployment Estimates (the Dantwala Committee) had noted that “in our complex economy, the character of the labour force, employment, and underemployment, is too heterogeneous to justify aggregation into single-dimensional magnitudes”. Yet, to date most studies in the area have focused on single dimensional measures associated with visible underemployment.

Our starting point in this study is that labour market insecurity can be usefully analysed as a composite construct encompassing a number of interrelated constraints. These include

intermittent employment, low remuneration, and traditional labour market entry barriers faced by vulnerable segments of the population. Capturing the multiple dimensions of labour market insecurity in an overall measure can have significant policy applications. One potential application is to improve targeting of labour market programs such as MGNREGS.

The specific aims of the study are to: (i) construct a labour market insecurity index by applying multiple correspondence analysis; and (ii) use this index in an econometric model to show how the severity of labour market insecurity varies across different socio-economic groups. This has been done by drawing on data for individuals' labour market characteristics from the 61st round (2004-05) of the National Sample Survey.

The structure of the paper is as follows. Next section of the paper discusses labour market insecurity patterns as assessed in earlier studies. The following two sections discuss the database and methodology used in this study, and the results of this study along with its policy implications. The final section concludes the study.

## **LABOUR MARKET INSECURITY: CONCEPTS**

### **Definition**

Labour market insecurity can be defined in a manner similar to the commonly understood term for livelihood insecurity: individuals are insecure when their ability to maintain or enhance their capabilities and productive base is impaired due to labour market risks. The sources of insecurity in the context of an individual's labour market status can cover a broad range of areas including that of informal sector worker, unemployed person, underemployed person, person receiving unstable payment, and employed in an unconventional place of work, to name a few. The common thread is a focus on those who have a weak connection to the labour market through

unemployment, underemployment, and other insecure forms of work.

## **Underemployment and Other Manifestations of Labour Market Insecurity**

There is a consensus that in developing countries, open unemployment is low as relatively few labour market participants can afford to remain unemployed for long periods of time. More common is the phenomenon of underemployment, visible and invisible. Visible underemployment is directly measurable and represents time-related insufficiency of employment. Invisible employment is understood as productivity-related misallocation of labour resources. Both visible and invisible underemployment are relevant dimensions of labour market insecurity in rural India.

The NSSO defines and measures underemployment, invisible and visible as follows. Invisible underemployment is when a person appears to be working throughout the year but their income is insufficient and they seek additional or alternative work. In 2004-2005, of the usually employed rural persons, 9.5% sought additional work. Of these, more than half did so only to supplement their income and around a fifth because they did not have enough work (NSSO, 2006). When a usually employed person is found to be out of work during the shorter reference period (i.e. reporting either unemployed or not in labour force) then that person is visibly underemployed. In 2004-2005, the proportion of the usually employed who were out of work during the week preceding the survey (the visible underemployment rate) was significantly higher among rural females compared to rural males, comprising largely of those females who were not in the labour force as per usual status, i.e. females employed per usual status but not in labour force per weekly status.

Krishnamurty and Raveendran (2008) discuss another important dimension of underemployment which gauges underemployment in terms of remuneration. For casual labour, they measure underemployment from the remuneration perspective by comparing the wages of casual and regular workers with the minimum wage. On this basis, they find that 84.4% of the rural casual workers and 41.8% of the rural regular/salaried workers are underemployed, with rural females more severely affected than rural males. There are issues regarding this approach as minimum wages vary across states and across occupations. For the category of self-employed in agriculture or cultivator households the problem is even more acute as the NSSO collects information only on perceptions of their earnings as to whether they consider: (i) the earnings adequately remunerative; and (ii) the amount of earnings (in rupees per month) that they consider remunerative. Despite problems in comparability, Krishnamurty and Raveendran (2008) attempt to measure underemployment among the self-employed as those whose perceptions of remunerative income were lower than the national minimum daily wage and find that 49.4% of the self-employed were underemployed in this sense.

There are also aspects other than underemployment associated with an individual's labour market insecurity including unstable method of payment (paid other than in a form of regular monthly salary or weekly payment), contractual insecurity (no contract), no social security benefits, and working in premises not dedicated to the job. In regard to the last factor, Unni and Raveendran (2007) find that 60% of the rural work force has unconventional work places; among working females, the figure is as high as 70%.

It is clear from the foregoing analysis that there are a variety of indicators that capture different facets of insecurity in rural labour market. What appears to be missing is a composite indicator

that captures the inherent dimensions of labour market insecurity in one measure. In the next sections, we outline the approach taken in the present study to construct such an index.

## **DATABASE AND METHODOLOGY**

### **Dataset**

NSSO collects data on several aspects of individuals' employment status based on Schedule 10.0 of the Employment and Unemployment surveys. The present study is based on the quinquennial thick round for the year 2004-05 (61st round) for individuals of age 15 years and above in the rural areas.

### **Methodology**

The analysis of labour market insecurity in rural India comprises of two parts in this study. The first part uses multiple correspondence analysis to estimate a multi-dimensional labour market insecurity index for all the individuals with at least a modicum of labour force attachment. This estimated index is then used in the second part of the analysis to understand the nature of variations in the severity of labour market insecurity across regional, social and economic aspects for rural India based on a multivariate econometric (Heckman ordered probit) model.

### ***Multiple Correspondence Analysis***

In the first part of the analysis, the objective is to build a labour market insecurity index (LII) capturing different dimensions of employment and unemployment status discussed above. Variables based on selected employment characteristics of individuals are chosen as indicators of labour market insecurity. The selection criteria include the following: whether the variable: (i) is an indicator of labour force status, or (ii) labour time utilization, or (iii) could be considered to represent a behavioural response to labour market risk. A critical consideration for a variable's inclusion is that its

coverage must be for the entire rural population not just for one segment such as wage earners.

To begin with, candidate indicators are screened using exploratory data analysis. At this stage, apart from basic statistics, two-dimensional correspondence analysis biplots are used in which the association between two sets of categorical variables are analysed. The idea is to understand similarities and differences in employment statuses and other labour force characteristics between relevant groupings, e.g. demographic sub-groups (gender, age) of the rural adult population and to interpret the dimensions, i.e. what separates the groupings.

In the second stage, a labour market insecurity index is estimated through multiple correspondence analysis (MCA). The aim is to summarise in a single score or composite index the information contained in multiple categorical data about the phenomenon of interest, viz., the individual's labour market (in)security. The methodology best suited for this purpose is MCA. The brief outline of the MCA method that follows is drawn from Greenacre (2007).

MCA can quantify the categorical data by finding optimal scale values for the categories of all the variables so that the implied scores derived from these scale values for each individual are as close as possible to that individual's particular set of values. The difference between the implied and true scores respectively arises because MCA reduces the dimensionality of the cloud of multidimensional points in order to represent them more easily.

The data set used for MCA is an 'Individuals by Questions' table where the questions are  $Q$  categorical variables ( $x_1, x_2, \dots, x_q$ ) and each variable has  $J_q$  categories. MCA reduces the dimensionality of the cloud of the set of multidimensional points in an ordered way. The first dimension represents the maximum amount of variance

possible in one dimension. The solution gives the standard coordinates of the categories which are coefficients used to construct a linear combination or summated score. The second dimension maximizes the variance subject to the scores being uncorrelated with those on the first dimension, and so on.

Applying the indicator method of MCA<sup>1</sup>, the variables can be re-coded as an indicator matrix with J denoting the total number of categories for Q variables considered for the study. The predicted row score of individual i is given by:

$$r_i = 1/Q * (w_1 * I_{i1} + w_2 * I_{i2} + .. w_J * I_{iJ}) \quad (1)$$

where the coefficients  $w_1... w_J$  are the standard coordinates of the column categories for the first dimension and  $I_j$  is a binary indicator variable that takes the value 1 when the individual has the modality 1 and 0 otherwise. This predicted row score serves as the composite index capturing labour market insecurity in rural India. The MCA solution is subject to the identification condition that the weighted variance (inertia) of the coefficients is 1. To use the predicted row score as a composite index for measuring labour market insecurity, the monotonicity axiom must be satisfied, i.e. the composite indicator must be monotonically increasing in each of the primary indicators (Asselin, 2002).

Both MCA and principal components analysis (PCA) (a more commonly used method to construct composite indices) share the feature that coefficients are calculated to maximise the variance between row scores. The difference is that MCA is applicable to categorical data and does not makes assumptions about the underlying distribution while PCA is suitable for continuous variables and assumes a normal distribution (see Viswanathan and Desikachar, 2011 for results using principal components analysis).

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<sup>1</sup> Other MCA methods include the Burt matrix approach (with and without adjustment of eigen values) and joint correspondence analysis (Greenacre, *op cit*).

### ***Heckman Ordered Probit Model***

We extend the analysis by using a Heckman ordered probit model to examine the main determinants of different levels of labour market insecurity. The methodology is detailed in a later section of this paper and only a brief outline is provided here. Our choice of the Heckman ordered probit model is predicated on the need to factor in the likelihood that the labour market insecurity index is only computed for those who participate in the labour force according to usual status. This implies that unless corrected for, there could be a selection bias in assessing the determinants of different levels of labour market insecurity. In the first stage of the model, we estimate the likelihood of labour force participation as measured by the usual status and also compute the Inverse Mills ratio for each individual. In the second stage, with rank ordered levels of labour market insecurity as the dependent variable, the estimated Inverse Mills ratio is included among other regressors. The Heckman Ordered Probit model specification is given below:

#### *Selection Equation*

The following specification of the probit model is used:

$$INLF_i = \Phi(\mathbf{X}_{1i}\boldsymbol{\beta}_1) + \varepsilon_{1i} \quad (2)$$

where INLF is a dummy variable taking the value 1 if the individual  $i$  belongs to the labour force per usual status and 0 otherwise;  $\Phi$  is the cumulative distribution function of the standard normal distribution,  $\boldsymbol{\beta}_1$  is the parameter vector,  $\mathbf{X}_{1i}$  is the vector of covariates for individual  $i$ , and  $\varepsilon_{1i}$  is the normally distributed error term with mean 0 and variance 1.

#### *Inverse Mills Ratio*

$$\hat{\lambda} = \frac{\phi(\hat{\boldsymbol{\beta}}_1)}{\Phi(\hat{\boldsymbol{\beta}}_1)} \text{ where } \hat{\boldsymbol{\beta}}_1 \text{ is the vector of parameter estimates from the}$$

selection model above and  $\phi$  and  $\Phi$  are respectively the density and

distribution function of the standard normal variable and are dependent on the set of covariates  $\mathbf{X}_1$ . Thus, as the values of  $\mathbf{X}_1$  vary from one individual to other, the Inverse Mills ratio also varies.

### *Outcome Equation*

In the second stage, we estimate the determinants of the labour market insecurity index:

$$LII_i^* = \mathbf{X}_{2i}\beta_2 + \varepsilon_{2i} \quad (3)$$

where  $LII_i^* = LII$ , a continuous variable, can be estimated only if  $INLF_i^* > 0$  for individual  $i$ , and  $(\varepsilon_{1i}, \varepsilon_{2i})$  follows a bivariate normal distribution with parameters  $[0,0,1, \sigma_{\varepsilon_2}, \rho]$ .  $\hat{\lambda}_i$ , the Inverse Mills ratio (*invmills*) from the first stage is included among the vector of explanatory variables  $\mathbf{X}_{2i}$  in this stage. Since the variable  $LII^*$  is the unobserved latent variable capturing labour market insecurity, it is replaced by the observed ordinal variable  $LII\_C$  as defined below.

The ordinal variable  $LII\_C$  is set to take the value  $j$ , where  $j = 1, 2$ , or  $3$ , as indicated below:

$LII\_C = 1$  if  $0 < LII^* < \mu_1$  (low insecurity with the LII index value falling within the bottom 20% of the LII distribution)

$LII\_C = 2$  if  $\mu_1 < LII^* < \mu_2$  (mid-level insecurity)

$LII\_C = 3$  if  $LII^* > \mu_2$  (high insecurity with the LII index value falling within the top 20% of the LII distribution)

where the  $\mu_j$ 's represent thresholds to be estimated along with  $\beta_2$ .

## **Variables**

Seven variables representing different facets of labour market insecurity and that are available across all individuals in the rural labour force aged 15 years and above are chosen for inclusion in the proposed composite index as detailed below.

## ***Employment State per Usual Principal and Subsidiary Status***

- us\_eun

A person is classified as belonging to the labour force according to usual principal and subsidiary status (UPSS) if that person had been working or looking for work during the longer part of the 365 days preceding the survey. This part of the UPSS definition is the same as the usual principal status measure. In addition, the UPSS measure includes persons who have worked at least 30 days during the reference year as subsidiary status workers even if these persons had been outside the labour force according to the majority time criterion. Thus the UPSS measure accords priority to the work criterion.

### *Rationale for Variable Selection*

- The UPSS measure can be used as a basis for measuring the phenomenon of labour market (in)security because it captures the extent of labour force attachment from strongest (working) to weakest (not in labour force) during the reference year.
- The UPSS measure is relatively inclusive as it captures economic activity pursued both for a relatively shorter reference period (30 days) or a longer one (one year).
- The longer time horizon that it spans (one year) provides a reasonably stable picture of whether an individual is able to access available employment opportunities.
- The unit of measure, the count of persons in different usual statuses, can be readily aggregated in a meaningful way.

### *Limitation*

The limitation of the UPSS measure is that while it can capture chronic unemployment or non-participation in the labour force during the major reference period, it cannot reflect intermittent unemployment or non-participation during shorter reference periods.

### *Categorization*

The UPSS variable (referred to as *new\_upss* in Figure 1) comprises 6 categories that represent a crossing of the two variables Usual Principal Status (UPS) and Subsidiary Status (SS): (i) employed per principal status and also subsidiary status worker (EPS & SS); (ii) employed in principal status only (EPS & NSS); (iii) unemployed per principal status but subsidiary status worker (UEPS & SS); (iv) unemployed per principal status and not subsidiary status worker (UEPS & NSS); (v) not in labour force per principal status but subsidiary status worker (NPS & SS); and (vi) not in labour force per principal status and not subsidiary status worker (NPS & NSS).

In determining the categories for this first variable, the prior step was taken of examining the distribution of the persons above 15 years of age according to UPSS (Figure A.1). The chart shows that the unemployed categories (UEPS& SS and UEPS&NSS), account for only a small share of rural adult population. Also, the subsidiary worker labour market segment (UEPS&SS and NPS&SS) is dominated by females.

The findings of the simple correspondence analysis biplots of UPSS and the crossed demographic variable (gender and age) represented as points in a 2-dimensional space (Figure 1) are as follows:

- ✧ Dimension 1 represents the extent of labour force attachment, with the left-hand side representing weaker labour force attachment, and the right-hand side stronger labour force attachment. Dimension 2 appears to separate persons according to prime working age of 20-59 years (upper part of biplot) and off-prime (young adults and the elderly) age groups (lower part of biplot).
- ✧ For rural adult males, the 2 points represented by ▲1/2 and ▲1/3 are close together, indicating that the males in the age-group 20-24 and 25-59 years have similar profiles. Further,

these two points are close to ●1 (EPS&SS) and ●2 (EPS&NSS) indicating that the age-groups 20-59 are associated with workers in the principal status. Points ▲1/4 (males in the age group 60 plus) and ▲1/1 (15-19 years) are closer to the point ●4 (UEPS&NSS). The elderly can afford to be openly unemployed because they are past the prime working age while the young adults may be completing their studies along side looking for work.

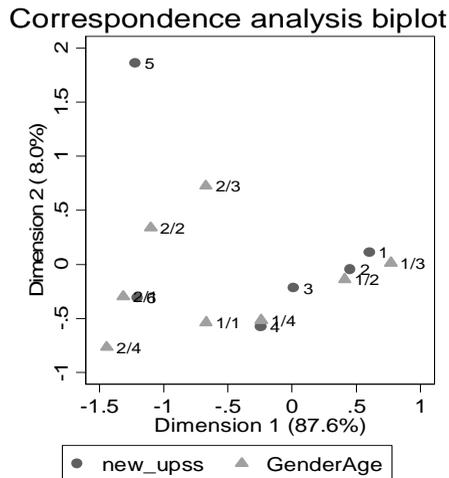
- ☞ For rural adult females, the points ▲2/2 and ▲2/3 are close to each other but quite distant from ●1 and ●2, indicating that females in the age group 20-24 years as also age-group 25-59 years tend not to be strongly associated with workers in principal status. Point ▲2/3 is also somewhat close to ●5 (NPS&SS) indicating that females in the age-group 25-59 years are associated with subsidiary status workers.

To increase interpretability of the composite index to be constructed from the original usual status variable (*new\_upss*), the number of categories can be streamlined and the levels assigned such that the direction of movement from lower to higher levels represents an improvement in labour market security. This yields 3 categories and the newer variable culled out of *new\_upss* is known as **us\_eun**: (i) NPS&SS (category A\_1); (ii) UEPS&SS + UEPS&NSS (category A\_2); and (iii) EPS&SS + EPS&NSS (category A\_3). The category of persons in the NPS & NSS group will be excluded when constructing the composite index<sup>2</sup> as this group's attachment to the labour force does not lend itself to an unambiguous interpretation.

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<sup>2</sup> A person who is working in principal status or unemployed but available for work is clearly revealed to have the strongest labour force attachment followed by the subsidiary status worker category. With regard to the NPS&NSS category, it is much more difficult to draw inferences about the degree of their labour force attachment.

**Figure 1: Correspondence Analysis biplot of Usual Status Data with Gender-Age Crossed Supplementary Variable for Rural Adult Population**



- Note:**
1. new\_upss: 1=EPS&SS; 2=EPS&NSS; 3=UEPS&SS; 4=UEPS&NSS; 5=NPS&SS; 6=NPS&NSS
  2. GenderAge: Crossed Supplementary Variable between gender and age; Gender: 1=Male; 2=Female; Age (in years): 1=15-19; 2=20-24; 3=25-59; 4=60+

***Number of Months Reported Available for Work*** -avail\_wrk

The second variable concerns rural persons who are (or are not) available for/ seeking work during the previous 365 days classified according to job search period in months. The source of the data is the response under column 16 of Block 5.1 of Schedule 10 asked to all surveyed persons above the age of 5 years, including not only those whose usual principal status is unemployed but also the employed, and not in labour force.<sup>3</sup>

<sup>3</sup> Column 16 Block 5.1 of schedule 10.0 by NSSO asks all persons above the age of 5 years the period of seeking/available for work during last 365 days: sought/available for: less than 1 month -1, 1 to 2 months -2, 3 to 6 months -3, 7 to 9 months -4, 10 to 12 months -5; did not seek/ not available -6

### *Rationale for Variable Selection*

- We assume that if a person gives an affirmative answer to the question of availability for work, then that person faces employment vulnerability even if already employed. It is therefore a broader measure of employment vulnerability than the unemployment indicator which is restricted to non-workers who are available/seeking work.
- By categorizing persons seeking work according to the period for which they have been seeking or have been available for work, the indicator captures the degree of insecurity of persons from those not available for work to available for work for 9-12 months during reference year.

### *Limitation*

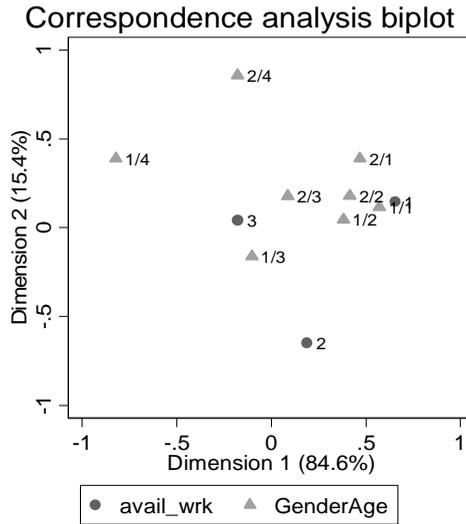
Depending on how prevalent the 'discouraged worker' effect is (and we conjecture that the phenomenon is more prevalent among females than males), persons may report themselves as not available for work even though they experience labour market insecurity.

### *Categorization*

The distribution of the rural adult population according to whether they reported themselves as seeking or available for work, and if yes, the period for which they sought or were available for work is shown in Figure A.2. The bulk of the rural adult population report themselves as not seeking work, followed by those seeking or available for work for at least 3-6 months, and 1 to 2 months respectively. A small percentage had not responded to the question.

Streamlining the number of categories for composite index construction, yields 3 levels for **avail\_wrk**: (i) seeking work for more than 3 months (B\_1); (ii) seeking work upto 3 months (B\_2), and (iii) not seeking work (B\_3).

**Figure 2: Correspondence Analysis biplot of Availability for Work with Crossed Variable Gender-Age for Rural Adult Population**



**Note:**1. *avail\_wrk*: 1= More than 3 months; 2= Less than 3 months; 3=Not available for work  
 2. Same as in Figure 1.

The findings of the simple correspondence analysis biplots (Figure 2) are as follows.

- ☞ Dimension 1 appears to separate those who are not available for work from those who are available for work. Dimension 2 appears to separate individuals according to the length of the time they have been available for work.
- ☞ The point ●1 (available for work for more than 3 months) has the maximum number of gender-age points clustered around it. For males, the points close to ●1 are ▲1/1 and ▲1/2, indicating that males in the age groups 15-24 typically report themselves as looking for work.
- ☞ For females, the point closest to ●1 is ▲2/2 while ▲2/2 and ▲2/3 are somewhat close, indicating that females in the age groups less than 60 years report themselves as being available

for work for periods above 3 months during the reference year.

- ☞ The point ●3 (not available for work) is close to point ▲1/3 indicating that males in the prime working age 25-59 are likely to report themselves as not being available for work while responding to question under column 16 of block 5.1 of schedule 10 of NSSO.

### ***Employment State per Current Weekly Status - cws\_eun***

The NSS classifies a person as employed by the current weekly status (CWS) if that person has worked for at least one hour during the reference period of one week preceding the date of survey. To be classified as unemployed under CWS, the person should have been unemployed on all the days in which the person has been in the labour force.

#### *Rationale for Variable Selection*

The CWS measure reinforces some of the advantages of the UPSS measure while compensating for some of the latter's limitations.

- Like the UPSS measure, CWS can be aggregated in a meaningful way to persons in different employment statuses.
- The advantage of the current weekly status over the UPSS measure is that its shorter reference period of one week compared to the UPSS' 365 days is likely to result in more accurate recall by survey respondents.
- Seasonal patterns can be discerned over sub-rounds.

#### *Limitation*

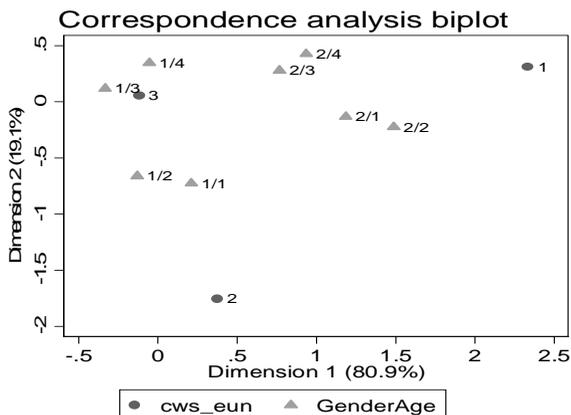
The CWS measure tends to overestimate the number of persons gainfully employed because it classifies persons who have worked for as short a period as one hour during the reference week as working.

### *Categorization*

As shown in Figure A.3, the shares of CWS unemployed and 'not in CWS labour force' categories are higher according to the CWS measure than the corresponding UPSS measures. Also, the share of employed females to total females is higher under CWS than under UPSS.

For index construction, the same three categories, i.e. employed, unemployed, and not in labour force according to CWS can be retained. An issue arises in regard to categorization of those who are not in the labour force according to CWS: should they be excluded in the same way that the sub-population 'not in the labour force per usual status' or should they be included provided they are in the labour force per usual status? We have opted for the latter, i.e. to include persons in the UPSS labour force (either working or looking for work) but not in the CWS labour force. The categories assigned to the variable ***cws\_eun*** are (i) not in labour force per CWS (category C\_1); (ii) Unemployed per CWS (category C\_2); and (iii) Employed per CWS (category C\_3).

**Figure 3: Correspondence Analysis biplot of Current Weekly Status Data with Gender-Age Crossed Supplementary Variable for Rural Adult Population**



**Note** 1. cws\_eun: 1=not in LF per CWS; 2= unemployed; 3=working per CWS  
 2. Same as in Figure 1.

A correspondence analysis biplot (Figure 3) of persons classified as employed, unemployed, and not in labour force according to CWS and of the crossed variable gender/age shows the following:

- ☞ Dimension 1 can be interpreted as representing the extent of labour force participation with the left-side showing the greatest participation and the right side the least participation. Dimension 2 on the other hand could be interpreted as separating the younger non-working population (15-29 years) from the rest.
- ☞ The points ●3 (employed per CWS) and▲1/3, and ▲1/4 are close together indicating that males above the age of 30 years and above are likely to be employed according to CWS.
- ☞ The pair of points ▲2/1 and ▲2/2 are together and similarly the pair ▲2/3 and ▲2/4 are together indicating that females aged 15-29 years share similar characteristics on current weekly status measure and likewise with females in the group above 30 years. The cluster ▲2/1, ▲2/2, ▲2/3, and ▲2/4 is midway between the points ●1 (not in CWS labour force) and ●3

(employed per CWS) and quite distant from ●2 (unemployed per CWS) indicating that females are more likely than males to not participate in the labour force per current weekly status and not to report themselves as unemployed.

### ***Employment States per Current Daily Status - Days Worked and Days Looking for Work During Reference Week-*** cds\_wrk

The NSS measure of current daily status (CDS) captures time utilisation during each half day of the preceding seven days of the reference week. For each individual, the triplet of days spent in each of the three states during the reference week is computed across activities that the individual has spent 0.5 days or more in<sup>4</sup>: (i) days worked; (ii) days looking/available for work; and (iii) days not in labour force, subject to the constraint that for an individual the sum of days spent in the three states during the reference week is equal to 7. We go further and construct 'combination variables' according to the dimension of labour market insecurity that we seek to capture. Thus, for the next three variables to be discussed, while our base variable is the number of days worked / looking for work/ not in labour force per CDS, we combine this variable with other relevant coexisting states for the individual depending on the dimension we wish to capture.

In the case of this variable, to better capture underemployment, we combine the number of days worked by an individual during the reference week with the number of days that the same person is looking for or available for work during that week and name this variable as **cds\_wrk**.

#### *Rationale for Variable Selection*

- The CDS measures bring to the index to be constructed a different dimension of labour market insecurity than that

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<sup>4</sup> Included are activities for that individual where time utilisation is shown as at least 0.5 days under column 14 of Block 5.3, Schedule 10 allowing for individuals engaged in multiple activities during the reference week.

brought by the UPSS and CWS measures. Whereas the UPSS and CWS measures determine an individual's activity status based on majority time and work priority during the relevant reference period, CDS provides a more disaggregated picture using half-days during the reference week as the unit. As such, it is able to reflect individuals' intermittent spells of work, unemployment, and dropping out of the labour force.

- With respect to **cds\_wrk**, the reason for crossing the days worked variable with the days unemployed variable is that the combination can help gauge the extent of underemployment experienced by an individual: if a person is working for part of the week but is also unemployed and looking for work for part of the week, then the person is underemployed.

### *Limitation*

The major limitation of the CDS unit of measure that has been highlighted in some studies (e.g. Sundaram, 2008) is that it is measured in person-days rather than persons. This concern is addressed in the present study because each person can be identified by a triplet of days that person spends working, looking for work, and out of labour force during the reference week.

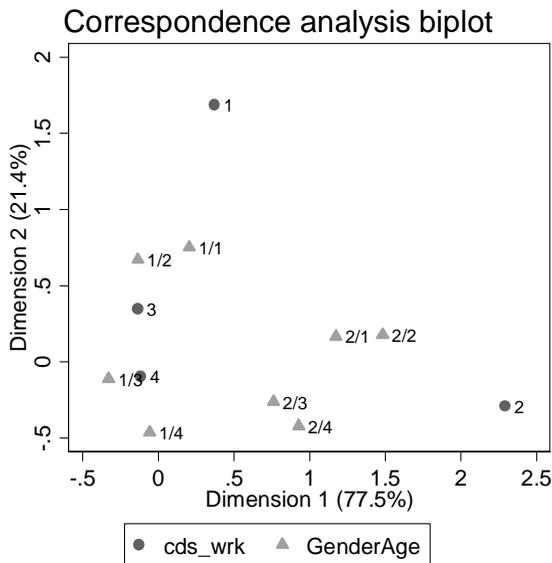
### *Categorization*

The first area of focus using the CDS measure is the time spent working during the reference week. The pattern of working time during the reference week shows 'clumping' of the distribution at 0 days and 7 days (Figure A.4). For individuals who have worked less than 7 days, time utilisation during the reference week includes, in addition to the number of days worked, the days in a state of unemployment or days not in the labour force or both.

For index construction, the variable **cds\_wrk** is categorised as (i) 0 days worked in CDS but in the UPSS labour force and unemployed for at least 0.5 days in CDS (category D\_1), (ii) 0 days worked in CDS, in the UPSS labour force, but not unemployed for

even 0.5 days in CDS, (category D\_2), (iii) at least 0.5 days worked in CDS and at least 0.5 days unemployed in CDS (category D3); and (iv) at least 0.5 days worked in CDS and not unemployed even for 0.5 days in CDS (category D4). If a person is not in the labour force in either UPSS (level 0), then that person is not counted when constructing the composite index.

**Figure 4: Correspondence Analysis biplot of Days Worked Data with Gender-Age Crossed Supplementary Variable for Rural Adult Population**



**Note** 1. cds\_wrk: 1=0 days worked + at least 0.5 days unemployed; 2= 0 days worked + 0 days unemployed; 3= at least 0.5 days worked + at least 0.5 days unemployed; and 4= at least 0.5 days worked + 0 days unemployed.

2. Same as in Figure 1.

The simple correspondence analysis biplots (Figure 4) of cds\_wrk and the crossed demographic variable (gender and age) shows the following:

- ☞ The point ▲1/3 close to ●4 (at least 0.5 days worked + 0 days unemployed) indicating that males in the prime working age group 30-59 years are closely associated with work and absence of unemployment spells. The proximity of ▲1/1 and ▲1/2 to ●3 (at least 0.5 days worked + at least 0.5 days unemployed) suggests that males in the age-groups 15-29 are likely to combine spells of work with unemployment during the reference week.
- ☞ For females, the points ▲2/3 and ▲2/4 are midway between ●4 and ●2 (0 days worked in CDS, in the UPSS labour force, but not unemployed for even 0.5 days in CDS), indicating that females in the age-groups spanning 30 years and above are unlikely to report any days spent unemployed.

***Days Unemployed During Week and Whether also Unemployed in Principal Status- cds\_unemp***

The second area of focus using the CDS measure is the time unemployed, i.e. the time spent looking for or available for work, during the reference week. The number of days unemployed according to CDS is combined with whether or not the person is unemployed according to usual principal status during the past year.

*Rationale for Variable Selection*

- As an indicator of labour market insecurity, the advantage of the CDS unemployment measure is that it captures intermittent spells of unemployment within a reference week that is not picked up by the UPSS or the CWS measures. It has the added advantage of being able to pick up the degree of insecurity reflected in the number of days unemployed from 0 to 7.
- Combining the number of days unemployed with the indicator of whether the individual is also unemployed per usual principal status provides an indication of whether the severity of the unemployment problem for the individual. If a person is unemployed in principal status and also unemployed for a major part of the reference week, then the person suffers from severe unemployment. If the person is not unemployed in

principal status and is unemployed for 3 days or less during the reference week, then the degree of severity of the unemployment problem is much less.

### *Categorization*

The distribution of persons unemployed for 0.5 days or more (Figure A.5) shows that around 28% (18.4 million) of those unemployed have been so for between 0.5 and 3 days; 21% (7.9 million) have been unemployed for between 3.5 and 6.5 days; and 29.7% (11.1 million) have been unemployed for all 7 days.

For index construction, the fifth variable, **cds\_unemp**, categorises persons according to days unemployed and also whether unemployed as per principal status: (i) at least 3.5 days unemployed per CDS and also unemployed according to usual principal status (category E\_1), (ii) at least 3.5 days unemployed but not unemployed per UPS (category E\_2), (iii) 0.5 to 3 days unemployed per CDS (category E\_3), and (iv) 0 days unemployed per CDS (category E\_4).

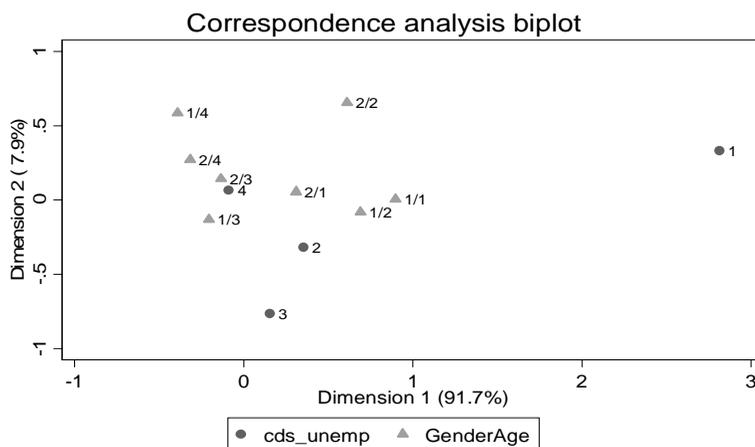
The simple correspondence analysis biplots (Figure 5) of **cds\_unemp** and the crossed demographic variable (gender and age) shows the following:

- ☞ The direction of spread from left to right is from less severe unemployment to more severe unemployment.
- ☞ A cluster comprising points ▲1/3, ▲2/3, and ▲2/4 is close to ●4 (0 days unemployed per CDS + not unemployed per UPS) indicating that males in the age-group 30-59 years and females in the age groups 30 years and above do not report themselves as being unemployed in either the longer or shorter reference periods. At first glance, the result for females appears to be a somewhat surprising result given that females appear to work less intensively than men. The finding may be due to the fact that females are less likely to report themselves as unemployed and looking for work compared to males. As we shall see when discussing the next variable, the more typical behavioural

response of females is to move into and out of the labour force even within the reference week while males tend to remain in the labour force.

- ☞ For males, the point ▲1/1 (close) and ▲1/2 (less close) near ●2 (3.5-7 days unemployed per CDS + not unemployed per UPS) indicates that males in the age-group 25-29 are closely associated with at least 3.5 days of unemployment during the work week. This finding could reflect seasonal unemployment.
- ☞ The point ●1 (3.5-7 days unemployed per CDS + unemployed per UPS) is at the periphery of the map and not close to any gender-age point consistent with the finding that the share of the rural adult population reporting themselves as unemployed according to UPS is low.

**Figure 5: Correspondence Analysis biplot of Unemployed per CDS and Unemployed per UPS Data with Gender-Age Crossed Supplementary Variable for Rural Adult Population**



- Note** 1. cds\_unemp: 1=3.5-7 days unemployed per cds + unemployed per UPS; 2= 3.5-7 days unemployed per cds + not unemployed per UPS; 3= 0.5-3 days days unemployed per cds; and 4=0 days unemployed per cds + not unemployed per UPS
2. Same as in Figure 1.

### ***Days not in Labour Force During Week and Whether Available for Work*** - *cds\_nilf\_avfwrk*

The third area of focus using the CDS measure is the count of individuals by their number of days not in the labour force (these individuals would need to be in the UPSS LF to be included in the estimation of the index) combined with the indicator for whether the response to survey question on availability for work under column 16 Block 5.1 (in schedule 10.0 of NSSO) was positive.

#### *Rationale for Variable Selection*

The measure is important for capturing labour market (in)security as some persons may be out of CDS labour force (but in the labour force per usual status) due to lack of employment opportunities as indicated by their positive response to the question on availability for work. This is the reasoning behind combining the not-in-labour force per CDS measure with availability for work asked of all respondents in Block 5.1 of Schedule 10. Although a version of the **avail\_fwrk** discussed earlier is used for part of the **cds\_nilf\_avfwrk** variable, here we are not concerned about the period for which the individual has been seeking work under the UPSS measure but simply whether the individual responded positively to question of looking for work or not.

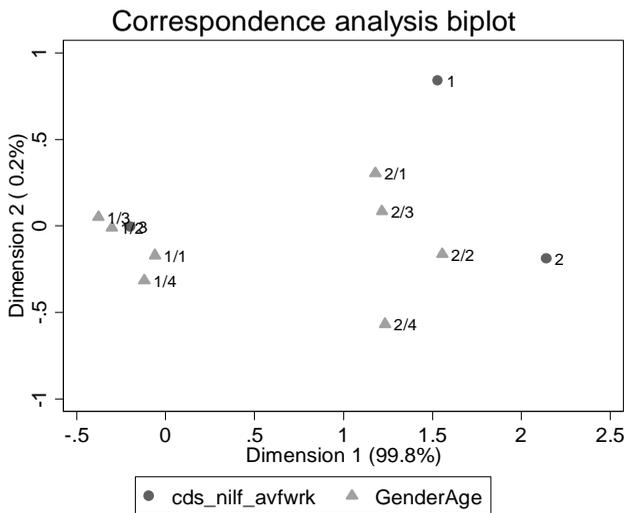
#### *Categorization*

Among the rural adult male population who have not worked for even a single day in the week, 17% are seeking or available for work and 45% are students as per their first activity status (Figure A.6). Among the rural adult female population who have not worked any day, while only 3% are seeking/available for work and 8.5% are students, around 78% are engaged in domestic duties.

For index construction, the sixth variable, **cds\_nilf\_avfwrk** categorises persons according to days not in labour force and by classification according to availability for work (per block 5.1 of

schedule 10.0): (i) NILF $\geq$ 3.5 days and available for work (category F\_1); (ii) NILF $\geq$ 3.5 days, and not available for work (category F\_2); (iii) NILF $\leq$ 3 days (category F\_3); NILF refers to not in labour force.

**Figure 6: Correspondence Analysis biplot of Days not in Labour Force with Gender-Age Crossed Variable for Rural Adult Population**



**Note** 1. cds\_nilf\_avfwrk: 1=3.5 days not in labour force per cds + available for work; 2= 3.5 days or more not in labour force but not available for work; 3= 3 days or less out of the labour force.

2. Same as in Figure 1.

The simple correspondence analysis biplots (Figure 6) of **cds\_nilf\_avfwrk** and the crossed demographic variable (gender and age) shows a cluster comprising ▲1/1, ▲1/2, ▲1/3 and ▲1/4 close to ●3 (3 days or less out of the labour force per CDS) indicating that males in the age-groups 15 years and above are closely associated with 3 days or less in the status not in labour force during the reference week. For females, the points ▲2/2, ▲2/3 and ▲2/1 are moderately close to ●2 (3.5 days or more not

in labour force but not available for work), indicating that females particularly those in the age-groups 20-24 years, are likely to drop out of the labour force for some part of the week and be unavailable for work in the larger reference period do not exhibit the expected pattern for discouraged workers. The point ●1 (3.5 days or more not in labour force and available for work) is an outlier.

### ***Manual Work - mw\_grp***

The seventh variable is based on the notion that non-manual workers are more labour market secure than others. The related response under Column 6 in Block 5.3 of Schedule 10.0 which details the type of operation engaged in by the respondent is applicable to rural areas only.

### *Rationale for Variable Selection*

The chosen variable's link with the phenomenon of labour market security is that it is the relatively unskilled and labour market insecure who would opt for low wage manual labour. Indeed, this is the premise of MNREGS which guarantees a specified minimum wage for manual labour.

### *Limitation*

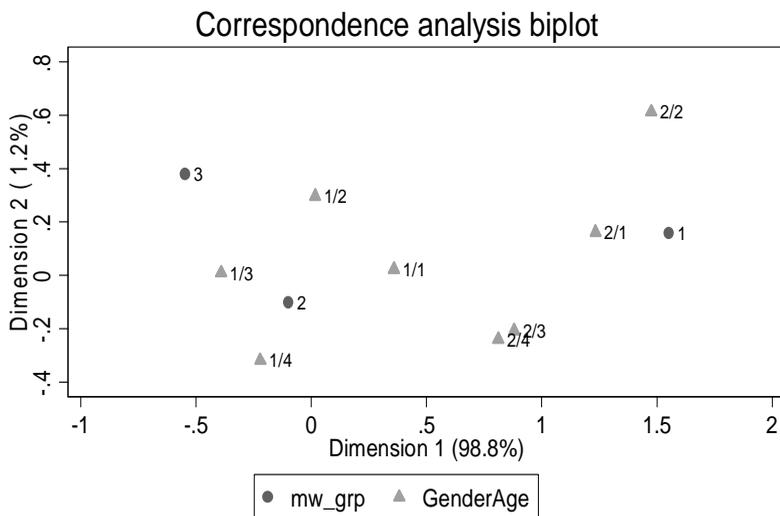
The discriminating power of the variable is limited because the vast majority of the rural adult population is engaged in manual work.

### *Categorization*

The distribution of the rural adult population by the type of work is shown in Figure A.7. For index construction purposes, the 3 manual categories are grouped together; likewise with the 2 non-manual categories. The categories of **mw\_grp** are as follows: (i) not working per first activity listed in CDS (category G\_1); (ii) manual work (category G\_2) per first activity; and (iii) non-manual work (category G\_3) per first activity.

The correspondence analysis biplot (Figure 7) shows ▲1/3 and ▲1/4 are close to ●2 (manual labour in first activity) indicating that rural adult males in age groups 30 years and above are associated with manual labour category. The points ▲2/3 and ▲2/4 are closer to ●1 (not working in first activity) than was the case for males indicating that females in the age-group 30 years and above could be out of the labour force in their first activity but possibly associated with manual work in their second activity. The point ●3 (non-manual work) is at the periphery, but closer to the points associated with males compared with females.

**Figure 7: Correspondence Analysis of Engagement in Manual/non-Manual Work Data with Gender-Age Crossed Variable for Rural Adult Population**



**Note** 1.mw\_grp: 1=not working in 1st activity per CDS; 2= working as manual labour in 1st activity per CDS; 3= working in 1st activity as non-manual labour.  
 2. Same as in Figure 1.

In this section, we have identified 7 variables to be included in the composite index, each of which contains multiple categories: (i) employment state per usual status (*us\_eun*) — 3 categories; (ii)

number of months reported available for work (*avail\_wrk*) — 3 categories; (iii) employment state per current weekly status (*cws\_eun*) — 3 categories; (iv) days worked and whether also looking for work during reference week (*cds\_wrk*) — 4 categories; (v) days unemployed per CDS and whether also unemployed per usual principal status (*cds\_unemp*) — 4 categories; (vi) days not in labour force per CDS and whether or not also responding as available for work under column 16 of block 5.1 (*cds\_nilf\_avfwrk*) — 3 categories; (vii) whether engaged in manual or non-manual work per cds (*mw\_grp*) — 3 categories. Descriptive statistics of labour market insecurity indicators to be included in the composite index are given in Table A.1.

## RESULTS

### Multiple Correspondence Analysis

#### ***MCA Round 1***

To check whether the primary indicators included in the composite index satisfy the monotonicity requirement, we run a first MCA (round 1). If the monotonicity is not satisfied, then adjustments to the set of indicators will need to be made. The MCA projection plot (Figure A.8) of the first dimension enables us to check this.

#### ***MCA Round 2***

After adjustments to the subset of indicators that do not follow the monotonicity requirement for using the summated score as a composite index (Asselin, *op cit*), the re-grouped variable categories are as follows: (i) new\_us\_eun (reduced from 3 to 2 categories); (ii) new\_avail\_wrk (from 3 to 2 categories); (iii) new\_cws\_eun (from 3 to 2 categories); (iv) cds\_wrk (no change in categories); (v) new\_cds\_unemp (from 4 to 3 categories); (vi) cds\_nilf\_avfwrk (no change in categories); and (vii) mw\_grp (no change in categories).

The total number of categories has fallen from 23 in the first round of the MCA to 20 in the second round. The re-grouped variables with "weights", i.e. the standard coordinates of the column categories the first dimension, are given below. The first dimension explains 32.6% of the principal inertia while the second dimension explains 17.6%. The direction of the index along the first dimension from left to right is from low labour market insecurity to high labour market insecurity. The variables and weights in MCA Round 2 are given in Table 1 below:

**Table 1: MCA Variables and Estimated Weights**

<b>Active Variables (Codes#)</b>	<b>Weights</b>
<b><i>new_us_eun</i></b>	
Not working in principal status (A_1~)	2.506
Working in principal status (A_2~)	-0.374
<b><i>new_avail_wrk</i></b>	
Available / seeking work >= 3 months (B_1~)	1.205
Available / seeking work up to 3 months or not seeking work (B_2~)	-0.197
<b><i>new_cws_eun</i></b>	
Not working in weekly status (C_1~)	3.736
Working in weekly status (C_2~)	-0.402
<b><i>cds_wrk</i></b>	
Not working & unemployed for at least 0.5 days (D_1)	4.303
Not working and not unemployed for even 0.5 days (D_2)	3.405
Working for at least 0.5 days & unemployed for at least 0.5 days (D_3)	-0.180
Working for at least 0.5 days & not unemployed even for 0.5 days (D_4)	-0.418
<b><i>new_cds_unemp</i></b>	
Unemployed between 3.5 & 7 days in cds & unemployed in UPS (E_1~)	4.761
Unemployed between 3.5 & 7 days in cds but not unemployed in UPS (E_2~)	1.492
Unemployed in cds for 3 days or less (E_3~)	-0.159
<b><i>cds_nilf_avfwrk</i></b>	
NILF more 3.5 days per CDS & available for work per US(F_1)	2.459
NILF more 3.5 days per CDS & available for work per US (F_2)	1.820
NILF 3 days or less (F_3)	-0.347
<b><i>Mw_grp</i></b>	
No work per first CDS activity (G_1)	3.085
Manual work per first CDS activity (G_2)	-0.465
Non-Manual Work per first CDS activity (G_3)	-0.587

**Source:** Authors' own estimates

**Note:** # The different MCA variables described in the tables are referred by the codes given in brackets.

## **Supplementary Crossed Variables**

### ***Age and Gender***

A particularly useful feature of MCA is that it is possible to include crossed supplementary variables in the MCA, e.g. include demographic characteristics that do not form part of the index, to obtain their standard coordinates. We present the estimated standard coordinates of the crossed supplementary variable - *GenderAge* - that we have extracted from the results table of MCA (Table A.2) and note the following points. The values of the standard coordinates along the first dimension show that males in all age-groups are to the left of females in all age-groups signifying lesser insecurity. This follows because males are associated with the least insecure category in respect of 6 variables included in the index while females across the age-groups are associated with the most insecure category across variables constituting the index. Within the sub-population of rural adult males, the age-groups in ascending order of insecurity based on the results of MCA are 25-59 years, 60+ years, 20-24 years, and 15-19 years in that order.<sup>5</sup> The association of males in the age group 15-19 years with higher insecurity is likely because this group may be experiencing temporary spells of unemployment and may not yet have committed themselves to full time work.

Among rural adult females, the age-groups in ascending order of insecurity are (i) 60+ years; (ii) 25-59 years; (iii) 15-19 years; and (iv) 20-24 years. Labour market insecurity of females, especially those in the age group 20-24 years stems from working as subsidiary status workers but not in principal status according to the longer reference period combined with intermittent spells of dropping out of the labour force during the shorter period of the

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<sup>5</sup> Results from the simple correspondence biplots discussed in the previous subsection had shown that males in the age groups 30-59 years were associated with being employed as per the principal status, current weekly status, and current daily status, as well as engaged in manual labour. At the same time, younger males in the age-group 15-29 years were likely to combine spells of work with unemployment within the reference week.

reference week; rather than remain in the labour force and actively seek work. The time-utilisation patterns of females who report themselves as not being in the labour force does however include an array of expenditure-saving albeit non-market activities which distinguished them from their male counterparts.<sup>6</sup>

## **Labour Insecurity Patterns at Individual Level**

### ***Rescaling the Index***

Since any linear transformation of the index does not change the relative positions of the points we redefine the scale according to the formula

$$\text{new} = [ (\text{old} - \text{old lower limit}) * (\text{new range}/\text{old range}) ] \\ + \text{new lower limit}$$

Old and new refers to the values before and after scaling respectively. In the present case, the new minimum value (lowest insecurity) is set at 0 and the new maximum value (highest insecurity) is set at 100. This new rescaled index is then grouped into five quintiles of increasing labour market insecurity.

### ***Discriminating Power of Index***

The number of unique values taken by the index in each quintile, an indicator of the discriminating power of the index, is shown in Table A.3. The discriminating power of the index is strongest in the fifth quintile (the 20% that is most labour market insecure) for rural males and in the fourth and fifth quintiles for rural females.

### ***Composition of Key Index Values***

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<sup>6</sup> Mukhopadhyay and Tendulkar (2006) define the term extended work participation to include those who report themselves to be at work on UPSS basis plus those who report themselves under code 93 which includes non-market expenditure-saving activities undertaken primarily by females. The authors critique the NSS survey methodology for only asking this question of those who are not in the labour force and therefore not recognising that female labour force participants undertake such activities in addition to being active in the labour market.

The scores on each component of the composite index for selected index values in the 1st and 5th quintile of the index for males and females is shown in Table A.4. For males, the distinguishing factors between typical persons in the 1st and 5th quintile respectively are as follows. Compared to males in the first quintile, males in the fifth quintile (most insecure) are (i) available for / seeking work for 3 months or more; (ii) working for at least 0.5 days but also unemployed in CDS; (iii) while not unemployed in UPS, they are unemployed between 3.5 and 7 days in CDS; and (iv) are engaged in manual work in the first CDS activity. In respect of the remaining components, the two groups of rural adult males are similar.

Compared to females in the first quintile, those in the fifth quintile are (i) not working in principal status; and (ii) and not working per first activity listed under current daily status (females in the first quintile are engaged in manual labour in their first activity). It should be noted however that for the **cds\_wrk** component, they come under the category D\_4. This indicates that in their second/third CDS activity, they are working for at least 0.5 days in the reference week. This pattern is consistent with findings that females are typically engaged as subsidiary status workers. The discouraged worker effect is a likely important factor for the female rural adult population but NSS data does not as yet allow us to measure it.

### ***Self-employed vs. Casual Labour***

A comparison of the mean index values of the self-employed and casual labour (Figure A.9) shows that while the values for these two categories are very close in the first quintile, the values for casual labour are significantly higher than that for self-employed for the fifth quintile. The differences arise because the self-employed in quintile 5 typically report that they are not available for work when responding under column 16 of Block 5.1 under Schedule 10, work between 3.5-7 days during reference week with 0 days unemployed, and do not report themselves as unemployed according

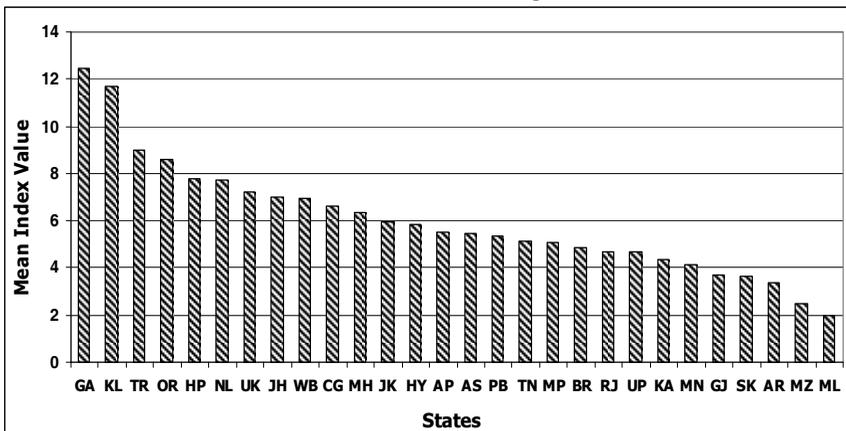
to principal status. Further, the gender gap in the fifth quintile is more severe for casual labour than for self-employed as indicated by the difference in the mean index value for males and females for the two categories. The bigger gender gap in the case of casual labour arises because female casual labourers spend fewer days working and more days out of the labour force during the reference week even though they are less likely to report themselves as unemployed than their male counterparts.

### ***State-wise Mean Composite Indicator***

A note of caution is in order before analyzing State rankings in terms of the labour market insecurity index: the index excludes those rural adults who do not participate in the labour force according to usual status. States vary widely in terms of the share of the rural adult female population that is not participating in the labour force according to usual status (Table A.5). For example, 76% of rural adult females in Bihar do not participate in the labour force according to usual status; at the other end, 28.7% of rural adult females in Chattisgarh do not participate in the labour force per usual status.

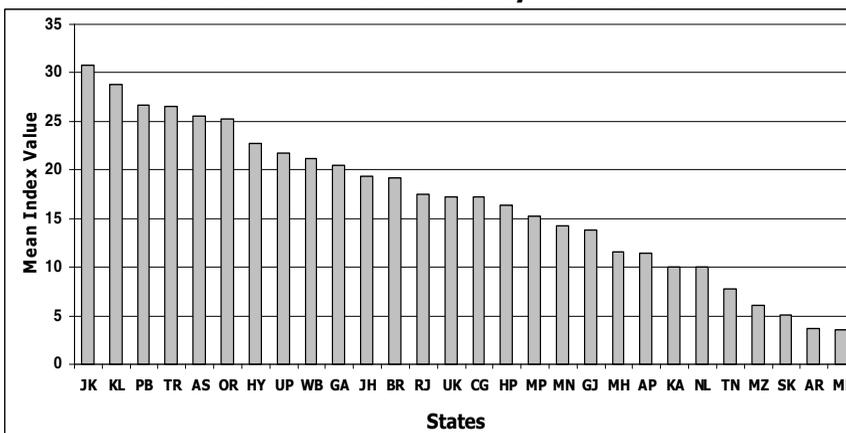
The top three states in terms of the mean composite indicator of labour market insecurity for males are, Goa (GA), Kerala (KL), and Tripura (TR) in that order while for females they are Jammu and Kashmir (JK), Kerala (KL), and Punjab (PB) as shown in Figures 8.A and 8.B. The lowest ranked states in terms of insecurity for males are Meghalaya (ML), Mizoram (MZ) and Arunachal Pradesh (AR), and for females are Meghalaya (ML), Arunachal Pradesh (AR), and Sikkim (SK).

**Figure 8.A: State-wise Mean Composite Indicator of Labour Market Insecurity: Males**



**Note:** See Table on Abbreviations and Codes for names of the States.

**Figure 8.B: State-wise Mean Composite Indicator of Labour Market Insecurity: Females**



**Note:** See Table on Abbreviations and Codes for names of the States.

That Kerala features as the state with one of the highest average index values in the country for both males and females, while Tamil Nadu, a neighbouring state, is at the other end of the spectrum, merits further investigation. The share of the rural adult male population that is not participating in the labour force according

to usual status in Kerala and Tamil Nadu are 19.1% and 14.7% respectively. For females, the corresponding figures are 58.1% and 38%. Among the striking factors that distinguish labour market insecurity for females in Kerala from Tamil Nadu and other states are the salience of the female sub-population reporting themselves as (i) 'available for work for at least 3 months', a category under the **new\_avail\_wrk** variable, and (ii) working for at least 0.5 days but also unemployed for at least 0.5 days during reference week, a category under the **cds\_wrk** variable.

Comparison of the mean index values for quintile 1 and quintile 5 (of the distribution of insecurity index values) of rural adults participating in the labour force in Kerala and Tamil Nadu shows that while the values for these two categories are very close in the first quintile, the values for Kerala are significantly higher than that for Tamil Nadu for the fifth quintile (Figure A. 10). Further, the gender gap in the fifth quintile is larger for Kerala than for Tamil Nadu as indicated by the difference in the mean index value for males and females for the two states. For the selected index values falling within quintile 5, in six of the 7 variables (Table A.6) constituting index, Kerala females are found to be more insecure than Tamil Nadu females. The pattern for Kerala males compared with Tamil Nadu males in quintile 5 is similar, except that the 'typical' Tamil Nadu male in the fifth quintile works for at least 0.5 days and is unemployed for 3 days or less.

### **Association between Labour Market Insecurity Index & Monthly per Capita Expenditure (MPCE)**

To examine the association between the insecurity index and MPCE, we first assign rural adults who are in the labour force per usual status into three categories: (i) those not participating in the labour force (index not computed for this group) and who are not students

currently attending an educational institution<sup>7</sup>; and (ii) for those participating in the labour force including students for whom the index is computed<sup>8</sup>: (a) least insecure (bottom 20% on the LII index for those in the labour force per usual status), and (b) most insecure (top 20%). For rural adult males, the largest mean MPCE is for the least insecure labour market group (Table 2); for rural adult females, the largest MPCE is for the group which does not participate in the labour force per usual status although the differences across the three cases for females are relatively small. At the other end, for both rural males and rural females, the smallest MPCE is for the most labour market insecure.

**Table 2: Mean Monthly Per Capita Expenditure by Labour Market Insecurity Category & Gender for Rural Adult Population**

<b>Labour Market Insecurity Category &amp; Gender</b>	<b>Mean MPCE (Rs.)</b>	
	<b>Males</b>	<b>Females</b>
Not in LF <sup>#</sup> per US <sup>#</sup> and excluding students	589	612
In LF <sup>#</sup> per US <sup>#</sup> & least insecure (lowest 20% of index values) including students	709	581
In LF <sup>#</sup> per US <sup>#</sup> and most insecure (highest 20% of index values) including students	508	590

**Source:** Authors' own estimates

**Note:** # See Table of Abbreviations and Codes

<sup>7</sup> Typically students (code=91 in usual principal status) in the age group 15-20 years are not in the labour force because they have deferred participation to acquire qualifications that will yield higher future earnings when they enter the labour market. This characteristic sets them apart from other rural adults and justifies the exclusion of students not participating in the labour force from the sub-population not in the labour force for whom the mean MPCE is being calculated.

<sup>8</sup> Rural adults attending an educational institution but who are labour force participants per usual status are included as they have a modicum of labour force attachment. Males in this subgroup number 1.84 million and all belong to the most insecure labour market category. In contrast, the number of female student workers labour force participants is only 0.22 million of whom around two-thirds belong to the most insecure category

Pair-wise classifications (Table A.7) of individuals as secure/insecure according to the labour market index and poor (bottom 20% of MPCE distribution) and non-poor according to household consumption show only a moderate degree of overlap between the classifications. Among rural adult males 29.3% of the consumption poor are livelihood insecure. The corresponding figures for females and all (males and females together) rural adults is 12.5%, and 24.3% respectively. The relatively modest degree of overlap between the poor as measured by the MPCE yardstick and the labour market insecure as measured by the composite index is likely due to mediating effects. In the next subsection where we estimate a multivariate model, will enable us to control for such factors.

Using kernel density curves, Figure A.11 shows that attachment to labour market or otherwise appears to be spread evenly (and more so for women) across the MPCE distribution. Figure A.12 shows that among those males in the labour force for whom an index value has been estimated, the MPCE density for the most insecure is to the left of those who are moderately secure, and the MPCE density for least insecure is to the right. In contrast, for females, the differences between MPCE densities of those who are most insecure and least insecure are marginal. This perhaps indicates that for females, the underlying causes of labour market insecurity at the two ends of the MPCE spectrum are inherently different.

### **Application of Heckman (Selectivity Corrected) Ordered Probit Model**

So far, analysis of variations in the pattern of labour market insecurity has been based on one or two group-specific characteristics at a time, e.g. self-employed versus casual labour, the consumption poor versus the better-off. We now assess the factors that influence the level (low / middle / high) of labour market insecurity index using an ordered probit model. The labour market

insecurity index is grouped into three ordinal categories—the least insecure (bottom 20% of the insecure), the moderately insecure (those between bottom 20% and top 20% of the index values), and the most insecure (top 20% of the insecure). This three-part categorization of the dependent variable which has a natural order lends itself to estimating an ordered probit or ordered logit model. We note however that the underlying composite index measure is characterized by clumping and has limited discriminating power as indicated in the last sub-section.

Before estimating the ordered probit model, it will be necessary to assess whether there is a bias in the parameter estimates because persons not in the labour force per usual status have not been included when estimating the index. Therefore a two-stage Heckman selection ordered probit model is estimated. In the first stage, a probit model (stage 1) is estimated and used to calculate the Inverse Mills ratio for each individual above 15 years of age in the sample. In the second stage where an ordered probit model (stage 2) is estimated for those in the labour market per usual status, the variable *invmills* is used as one of the control variables along with several other relevant variables. In this manner the selection bias is captured as an omitted variable bias. Its presence (or absence) can be tested by the significance (or insignificance) of the coefficient for *invmills* in the second stage regression. If the coefficient of the *invmills* is significant, then this may indicate selection bias.

Key independent variables selected for inclusion are based on factors shown in earlier studies to influence a person's labour market experience: (i) individual demographic factors (sex, age, marital status, relationship to household head); (ii) social / cultural type (caste, religion); (iii) individual educational attainment levels and whether currently attending educational institution); (iv) household demographic characteristics (number of dependents by

category (dependent children less than 6 years and those between 6-15 years), dependent adults, working members and household size); (v) household economic characteristics (number of working adults, monthly per capita expenditure<sup>9</sup>, land owned, and an interaction term constructed by linking land cultivated with log MPCE<sup>10</sup>). The variables included in the models are defined in Table A.8 and descriptive statistics are provided in Table A.9.

For the expected signs of the explanatory variables, we may draw on previous studies, especially those of Mukhopadhyay and Tendulkar (2006) and Bordia Das (2006). These studies analyse the determinants of female labour force participation. Both of these earlier studies find that the likelihood of labour force participation increases (i) with age but at a decreasing rate; (ii) for females who are less educated; and (iii) for persons belonging to the SC/ST/OBC categories. For females who are currently married, the husband's income has a depressing effect on labour force participation. For males, higher education is positively associated with participation. Also, Mukhopadhyay and Tendulkar (2006) find a negative association between monthly per capita expenditure and labour force participation. Bordia Das (2006) finds that land possessed has an insignificant effect on participation. Overall, these studies suggest that demographic and marital status variables matter for females' participation but not for males.

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<sup>9</sup> The monthly per capita consumption expenditure (MPCE) of the household is considered by researchers to be a good proxy for household well-being. We recognise however that untangling the relationship between the individual's labour market related activities and the wellbeing of the household to which that individual belongs to is not that straightforward. Members of a poor household may have no other recourse but to seek employment in the labour market even at low returns to meet their basic needs. In turn, participation of an individual in a labour market which has low returns could depress the potential pooled income of the household and therefore the household per capita consumption. Extending this logic further to household-level labour force participation, in poorer households multiple adult members work. However, as this constraint eases with higher pooled household income, the number of working adults including females drop out of the labour market.

<sup>10</sup> The purpose of including the interaction variable is to allow for the possibility that household MPCE could depend on land cultivated and the two variables interact to reduce labour market insecurity.

Identification is provided by including a set of variables in the selection model that are associated with labour force participation (stage 1) but are not included in the outcome model (stage 2). These excluded variables are: (i) marital status; (ii) relationship to head of household; (iii) current attendance or not in an educational institution; and (iv) land owned. The rationale for exclusion of marital status at the second stage is that it is a consideration for an individual's decision on whether or not to enter the labour force (for example, an adult female who is not married may be more likely to be a labour force participant than a female who is married) but once the individual makes the decision to enter the labour force, the marital status of that person is not directly relevant to the degree of labour market insecurity that person experiences. For reasons similar to marital status, a person's relationship to the head of a household is relevant for the labour force participation decision but does not directly impact the labour market experience once the participation decision is taken. Again, current attendance at an educational institution is relevant at the time of making the decision to participate only. Land owned was found to be insignificant in the selection equation (confirming findings of earlier studies) and so it has been excluded from the outcome equation but the interaction term involving land cultivated and log MPCE has been retained in the outcome models. The outcome model does not include 7 small Union Territories/ States.

## **Results of Selection Model**

The post-estimation marginal effects of the selection models for males and females together (SMA) and separately (SMM and SMF respectively) are given in Table 3 while the marginal effects of the state dummy variables are given in Table A.10. The estimated coefficients for selection models are given in Table A.11. The signs are generally in the expected directions. Our key findings are as follows:

- **Gender.** The effect of the dummy variable for gender (*dfem*) is negative and significant, consistent with previous studies showing low female labour force participation.
- **Demographic characteristics.** Broadly speaking, demographic variables have a stronger effect on labour force participation for females than for males. Other findings are as under.
  - Females in the age group 25-59 are more likely to participate in the labour force than females in the age groups 15-24. The elderly regardless of gender are negatively associated with labour force participation.
  - The presence of children under the age of 6 is associated with a reduced likelihood of participation for females. For males, the presence of young children is associated with greater likelihood of labour force participation.
  - Being currently unmarried or separated is associated with an increased likelihood of labour force participation for females; for males, these factors are associated with a reduced likelihood of labour force participation.
- **Education.** An illiterate female is more likely to participate in the labour force compared to females with at least secondary education. Males with education levels lower than secondary school are less likely to participate in the labour force. For both males and females, as expected, current attendance in an educational institution lowers the likelihood of participation.
- **Social dimensions.** A person belonging to the SC/ST category is more likely to participate in the labour force. Female Muslims are less likely to participate in the labour force. For males, religion is not a factor in their labour force participation decision.
- **Economic factors.**
  - The negative sign of the coefficient of log MPCE for females and the positive sign for males indicate that the income effect lowers the labour force participation for females only.
  - The type of household, especially the category 'agricultural labour' has a stronger bearing on a female's decision to participate than a male's.

- Land owned and the interaction term of land cultivated and MPCE are both found to be insignificant.

### **Testing for Sample Selection Bias**

The coefficient of the Inverse Mills ratio in the outcome models are significant and positive in all 3 cases (see top row under the OMA, OMM, and OMF columns in Table A.12). We had in fact anticipated that in the case of females there is a selection bias and the finding that the Inverse Mills ratio is significant confirms that it is appropriate to estimate an ordered probit corrected for selectivity. A positive sign implies a positive selection in the chosen category, for example the category of most labour market insecure. Table A.12 also shows the ordered probit models without correction for selection bias (OMAU, OMMU, and OMFU). It may be seen that in the corrected-uncorrected pair of models, there are instances of changes in sign and significance which is yet another indication that the uncorrected model is likely to give erroneous results.

The finding that the coefficient of the *invmills* is also positive and significant in the case of males (see coefficient of *invmills* under OMM column in Table A.12) indicates that males also self-select themselves into labour market insecurity categories. While we had anticipated a selection bias in the case of females, the significance of the coefficient estimate of Inverse Mills ratio in the outcome model for males is less expected. We return to the interpretation of the sign of the coefficient in a later subsection.

**Table 3: Marginal Effects in Selection and Outcome Models**

Variables	Selection Models			Outcome (3) Models		
	SMA	SMM	SMF	OMA	OMM	OMF
dfem <sup>#</sup>	<b>-0.347</b>	na	na	<b>0.084</b>	na	<b>na</b>
dage2~24 <sup>#</sup>	<b>0.060</b>	<b>0.024</b>	<b>0.125</b>	0.005	0.011	<b>0.046</b>
dage2~59 <sup>#</sup>	<b>0.120</b>	<b>0.024</b>	<b>0.239</b>	<b>-0.048</b>	<b>-0.051</b>	-0.004
dage60_plus <sup>#</sup>	<b>-0.206</b>	<b>-0.220</b>	<b>-0.116</b>	<b>-0.142</b>	<b>-0.144</b>	<b>-0.115</b>
dnomar <sup>#</sup>	<b>0.027</b>	<b>-0.033</b>	<b>0.190</b>	na	na	na
dwid <sup>#</sup>	<b>-0.069</b>	<b>-0.081</b>	<b>-0.146</b>	na	na	na
dsep <sup>#</sup>	0.017	-0.058	<b>0.150</b>	na	na	na
dhead <sup>#</sup>	<b>0.103</b>	<b>0.035</b>	<b>0.333</b>	na	na	na
dsपोhead <sup>#</sup>	-0.004	<b>-0.186</b>	<b>0.057</b>	na	na	na
dnonrel <sup>#</sup>	0.034	<b>0.014</b>	<b>0.218</b>	na	na	na
u_6_ch_ratio	-0.021	<b>0.024</b>	<b>-0.117</b>	-0.017	0.001	0.040
o_6_ch_ratio	<b>0.055</b>	<b>0.016</b>	<b>0.129</b>	0.003	-0.020	<b>0.069</b>
adl_dep_ratio	<b>-0.406</b>	<b>-0.125</b>	<b>-1.089</b>	<b>0.028</b>	<b>0.057</b>	<b>0.224</b>
wrkers_ratio	<b>0.359</b>	<b>0.136</b>	<b>0.785</b>	<b>-0.027</b>	<b>-0.041</b>	<b>-0.073</b>
hhsz	<b>-0.004</b>	<b>-0.001</b>	<b>-0.012</b>	<b>-0.007</b>	<b>-0.006</b>	<b>-0.011</b>
dnolit <sup>#</sup>	<b>-0.050</b>	<b>-0.046</b>	<b>0.042</b>	<b>0.087</b>	<b>0.067</b>	<b>0.040</b>
dlit <sup>#</sup>	<b>-0.056</b>	<b>-0.029</b>	<b>-0.034</b>	<b>0.053</b>	<b>0.042</b>	0.021
dprimid <sup>#</sup>	<b>-0.041</b>	<b>-0.015</b>	<b>-0.050</b>	<b>0.052</b>	<b>0.047</b>	0.015
deduattend <sup>#</sup>	<b>-0.739</b>	<b>-0.666</b>	<b>-0.440</b>	na	na	na
dscst <sup>#</sup>	<b>0.033</b>	<b>0.010</b>	<b>0.097</b>	<b>0.027</b>	<b>0.025</b>	<b>0.026</b>
dobc <sup>#</sup>	<b>0.017</b>	<b>0.004</b>	<b>0.059</b>	<b>0.016</b>	<b>0.010</b>	<b>0.021</b>
dmuslim <sup>#</sup>	<b>-0.025</b>	0.007	<b>-0.163</b>	<b>-0.083</b>	<b>-0.061</b>	<b>-0.050</b>
dhindu <sup>#</sup>	-0.007	0.003	<b>-0.045</b>	<b>-0.035</b>	<b>-0.027</b>	0.011
dchrstn <sup>#</sup>	-0.013	0.001	-0.057	<b>-0.061</b>	<b>-0.046</b>	<b>-0.047</b>
lnmpce	-0.004	<b>0.009</b>	<b>-0.054</b>	<b>-0.064</b>	<b>-0.074</b>	-0.002
daglab <sup>#</sup>	<b>0.069</b>	<b>0.022</b>	<b>0.204</b>	<b>0.454</b>	<b>0.507</b>	<b>0.242</b>
dothlab <sup>#</sup>	<b>0.044</b>	<b>0.019</b>	<b>0.092</b>	<b>0.336</b>	<b>0.386</b>	<b>0.160</b>
dsagr <sup>#</sup>	<b>0.071</b>	<b>0.031</b>	<b>0.158</b>	<b>0.309</b>	<b>0.307</b>	<b>0.104</b>
dsena <sup>#</sup>	<b>0.038</b>	<b>0.021</b>	<b>0.047</b>	<b>0.088</b>	<b>0.097</b>	<b>0.075</b>
clandowned	0.002	0.001	0.003	na	na	na
ylnmpce_landcul	-0.001	0.000	-0.001	<b>-0.001</b>	<b>-0.001</b>	-0.001
inv mills	na	na	na	<b>0.387</b>	<b>0.406</b>	<b>0.328</b>

- Notes:** 1. SM: Selection Model; OM: Outcome Model; A: All; M: Males; F: Females; na: not applicable, Outcome (3): 'High' insecure category and refers to top 20% of insecure index values. See Tables A.8 for coding of variables.
2. Marginal effects of dummy variable (indicated by #) represent change from 0 to 1
3. Bold numbers have p-values  $\leq 0.05$ .

## Results of Outcome Models with Correction

The post-estimation marginal effects of the outcome models with focus on outcome 3 for males and females together (OMA) and separately (OMM and OMF respectively) are highlighted in Table 3 above. The rationale for focusing on outcome 3 is that this is the most insecure category and we are particularly interested in the characteristics of this category in order to draw policy implications for active labour market programs aimed at employment vulnerable persons.

The estimated coefficients for all 3 models for outcome 3 are along with the uncorrected models for outcome 3 given in Table A.12. The following points are noteworthy:

- The likelihood of labour force participants being in the more insecure category increases with being female. This is an interesting result because although the labour market insecurity index we have constructed does not include monetary returns to labour, we still find that female labour force participants are at a disadvantage.
- In respect of some key variables, the differences in the sign of the coefficients noted in the selection model between males (SMM) and females (SMF) are no longer present in the outcome models.<sup>11</sup>
- In the selection models, we had noted the negative association between household MPCE and labour force participation for females (SMF) compared with the positive association for males (SMM). We interpreted this result as reflecting the income effect that lowered female labour force participation as household living standards improved. In the outcome models however, for both males (OMM) and females (OMF), the signs of the

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<sup>11</sup> In interpreting the marginal effects, we recognise that a change in an explanatory variable has a compound effect through the selection and the outcome equations. For example, an increase in household MPCE may not only cause those males from better off families who are already in the labour market to gain some cushion against employment vulnerability but it could also result in some males who were previously not participating in the labour market to now participate.

coefficients of *lnmpce* are negative but the coefficient is significant only for males. Thus males from economically stronger households clearly have cushion against labour market insecurity but the position is less clear for females.

- In the selection models, the presence of children under the age of 6 in the household was negatively associated with female labour force participation and positively associated with male labour force participation. In the outcome models, the relevant coefficients for both males and females are positive but insignificant.
- In the selection models, females who were illiterate were more likely to participate in the labour force compared with the base category (secondary school level and above) while the remaining categories (literate and education at primary level respectively) were less likely to participate compared to the base category. In the outcome model, illiterate females were positively associated with outcome 3 (heightened labour market insecurity). This suggests that illiterate females have no choice but to participate in the labour force even though they face a higher risk of labour market insecurity. The situation for males is that all educational categories lower than secondary level education had a higher probability of outcome 3. This finding is consistent with positive and significant returns to education and males who cannot afford to defer labour market entry to acquire higher educational qualifications face the risk of higher labour market insecurity.
- In the selection models, both males and females in the prime working age (25-59 years) were more likely to participate in the labour force. In the outcome model for males, the negative and significant coefficient for the dummy variable indicates male labour force participants in the prime working age are less likely to experience labour market insecurity compared with the reference category.<sup>12</sup> In regard to females, the sign of the coefficient for the age-group (i) 25-59 years is negative but

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<sup>12</sup> This result is expected given the results from the previous sub-section where we found that males in the age groups aged 30-59 years were associated with being employed as per all three employment status measures and were associated with an absence of unemployment spells.

insignificant; (ii) 20-24 years is positive and significant; and (iii) 60 years and above is negative and significant. The sign and significance of the coefficient of the dummy variable 20-24 years for females could indicate that those in this age group are relatively recent entrants to the labour force who are forced to participate because they are required to supplement the family income. Their relatively short labour market experience and familial responsibilities places them in more vulnerable situations in the labour market.

- In the selection models, the coefficients of the interaction term between land cultivated and MPCE were not found to be significant. In the outcome models, this interaction term is significant at the 5% level for males only. The interaction term appears to work in the expected way for males but the same cannot be stated for females.

The following results show the expected signs in both the selection and outcome models (i) the elderly (60 +) are less likely to participate in the labour force and less likely to be labour market insecure; (ii) household size is negatively associated with both labour force participation and higher labour market insecurity; (iii) Muslim females are less likely to participate in the labour market but those that do are also less likely to be labour market insecure; (iv) persons belonging to the SC/ST category are more likely to participate in the labour market but also experience more labour market insecurity as participants; and (v) persons belonging to agricultural labour households are more likely to experience labour market insecurity.

We also computed the probability for labour force participation and outcome 3 for individuals with a particular set of characteristics compared to a fourth *average* individual using the SMA and OMA models respectively (Table 4). Among the individual profiles indicated, as expected, Individual A is most likely to experience labour market insecurity, more than Individual C, a male belonging to a borderline poor household.

**Table 4: Probability of Participation and 'High'<sup>1</sup> Insecurity (Outcome 3) for Individual Profile Types**

<b>Individual</b>	<b>Characteristics</b>	<b>Probability of Participation</b>	<b>Probability of Outcome 3 for LF<sup>2</sup> participants</b>
A	A young (aged 25 years) female who is not literate, belongs to the SC/ST <sup>2</sup> category, and has 3 children under the age of 6 years	0.602	0.390
B.	A mature (aged 35 years) Muslim female who is literate	0.462	0.299
C.	A mature (aged 45 years) male who has primary school education, belongs to the OBC <sup>#</sup> category and belongs to a household whose monthly consumption expenditure is Rs. 455-510 (borderline poor household)	0.949	0.268
D.	An average rural adult	0.904	0.239

**Source:** Authors' own estimates

**Note:** 1. 'High' insecure category and refers to top 20% of insecure index values  
2. See Table of Abbreviations and Codes

## **Policy Implications**

Our findings have several policy implications.

### ***Severity of Labour Market Insecurity Across Socio-Economic Categories***

#### *Findings*

An ordered probit model corrected for selectivity bias can be used to assess the severity of labour market insecurity across different socio-economic groups to provide generally coherent results.

#### *Policy Implications*

The composite index and an understanding of its underlying determinants can enable more accurate identification of vulnerable groups in the population and in turn help improve targeting of interventions.

## ***Self-Selection into Higher Labour Market Insecurity***

### *Findings*

Females who are illiterate or are members of SC/ST or from economically weaker households, cannot afford to stay out of the labour force despite the high risks of labour market insecurity. Better educated females or those that come from economically stronger households however are discouraged by the risk of labour market insecurity and opt not to participate in the labour market or drop out if they can afford to.

### *Policy Implications*

To lower labour market insecurity for a segment of the labour force viz. casual labourers facing seasonal unemployment, policy makers have relied on employment guarantee schemes such as the MGNREGS. However, the same females from weak economic backgrounds who self-select into the labour market are likely to self-select into schemes such as MGNREGS. Indeed MGNREGS is designed for such self-selection given its focus on unskilled labour. Off the policymakers' radar is a pool of discouraged workers who differ in the magnitude and type of labour market insecurity that they would face if they entered the labour market. Policy needs to focus on tapping this pool by better understanding the nature of the risks they face and designing interventions to lower such risks.

## ***Crucial Gaps in Statistical Information on Discouraged Workers and Earnings of Self-Employed***

### *Findings*

The NSS dataset does not capture the extent of the discouraged worker phenomenon despite evidence to suggest that it could be widespread in rural India. Also, we have been unable to incorporate returns to labour in our index because quantitative information on this dimension is not available for self-employed workers.

### *Policy Implications*

Labour force surveys in several countries specifically include questions in their questionnaires to measure the discouraged worker phenomenon. Also, given the relatively large proportion of the rural adult population engaged in self-employment, particularly in agriculture, it is essential that better measures of their earnings are obtained. Future rounds of the NSS should focus on addressing these concerns.

### ***Interpretation of the Sign and Significance of the Inverse Mills Ratio***

#### *Findings*

The coefficients of the Inverse Mills ratios in the models for males and females are positive and significant.

#### *Policy implications*

With regard to the sign and significance of the Inverse Mills ratio in the OMF model for females, while recognizing the limitations in attaching an economic interpretation to it, we nonetheless offer the conjecture that female labour market participants self-select themselves into different labour market insecurity levels based on the balancing of family-work-cultural norms although not all these factors are observable. Turning to the positive sign and significance of Inverse Mills ratio in the OMM for males, previous studies have shown that the returns to education are higher for males compared with females. For males in the age groups 15-24 especially, there is a trade-off: (i) postpone entry into the labour market to gain educational qualifications that will yield higher returns in the future; or (ii) enter the labour market earlier but risk higher labour market insecurity because of lower educational qualifications. Around 13% of the male sub-population in the age group 15-24 years did in fact report themselves as currently attending an education institution compared with only around 5% for females. The rest of the males in this age cohort opted to participate in the labour force with

education levels below secondary school. It could plausibly be argued then that a substantial proportion of rural adult males self-selected themselves into more vulnerable employment situations by entering the labour force earlier thus foregoing the opportunity to earn higher returns from education.

### ***Insecurity of Casual Labour Versus Self-Employed***

#### *Findings*

Results of the multiple correspondence analysis show that among rural adults in the most insecure labour market category, insecurity levels of casual labourers are significantly higher and the gender gap wider than for the self-employed.

#### *Policy Implications*

The MGNREGS addresses gender concerns with a view to increasing the participation of females in the scheme by providing for child care facilities at work sites and locating the work sites close to the village of residence. A key policy issue that the methodology we have developed can answer using data from the next NSS quinquennial round (2011-2012) is whether the intervention has resulted in increased time spent working by rural females in the longer and shorter reference periods. Of interest is not just the time spent on MGNREGS but more importantly the change in the total number of days spent working, and the differential impact of the scheme across the functional employment categories.

## **CONCLUDING OBSERVATIONS**

Although the notion of labour market insecurity as having several different elements is well recognised, there have been few previous attempts to capture it in a single index. This paper analyses labour market insecurity using a composite index based on seven indicators drawn from 2004-2005 employment data of NSSO for rural India.

The index is constructed employing multiple correspondence analysis, a methodology that is well-suited to quantifying categorical data and deriving a composite index with data-driven weights. The index values show expected variations in the degree of labour market insecurity by gender, age, occupational status, and MPCE quintiles.

The analysis is extended by using a selectivity-corrected ordered probit model to account for different levels of insecurity among labour market participants. A key insight from this research strategy is that there is a selectivity bias inherent in the degree of labour market insecurity experienced by participants. Females self-select themselves into different labour market insecurity levels based on the balancing of family-work-cultural norms although not all these factors are observable. Males also appear to self-select themselves into more vulnerable employment situations by entering the labour force earlier thus foregoing the opportunity to earn higher returns from education.

The analysis is limited by the fact that the discouraged worker effect is likely to be an important factor for the female rural adult population but NSS data does not allow this to be measured. Also, due to absence of monetary returns to labour for self-employed individuals, it has not been possible to capture income related underemployment in the sense of adequacy or otherwise of earnings, in the construction of the index. Despite these limitations, the results of this study add new insights to the existing literature on rural labour market issues in India.

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**Table A.1: Descriptive Statistics of Labour Market Insecurity Indicators:  
Rural Adult Population (Age>=15 years)**

Code	Definition	Male				Female				All			
		Mn	%	Mean	SD	Mn	%	Mean	SD	Mn	%	Mean	SD
<b>1. us_eun</b>													
<b>0</b>	NPS&NSS	32.9	14.1	2.95	0.26	118.0	51.0	2.48	0.86	151.0	32.3	2.78	0.61
<b>A_1</b>	NPS&SS	2.6	1.1			28.6	12			31.0	6.7		
<b>A_2</b>	UEPS&SS + UEPS&NSS	4.2	1.8			2.7	1.2			6.9	1.5		
<b>A_3</b>	EPS&SS + EPS & NSS	194.0	83.0			83.7	36.0			278.0	59.5		
<b>2. avail_wrk</b>													
<b>0</b>	NPS&NSS	32.9	14.1	2.57	0.76	118.0	51.0	2.55	0.79	151.0	32.3	2.56	0.77
<b>B_1</b>	Seeking work more than 3 months	32.2	13.8			21.0	9.0			53.0	11.4		
<b>B_2</b>	Seeking work up to 3 months	17.8	7.6			8.0	3.4			26.0	5.5		
<b>B_3</b>	Not seeking/ available for work	141.0	60.4			80.9	35.0			222	47.6		
	Missing	9.7	4.1			5.2	2.2			15.0	3.2		
<b>3. cws_eun</b>													
<b>0</b>	NPS & NSS	32.9	14.1	2.93	0.32	118.0	51.0	2.67	0.71	151.0	32.3	2.83	0.52
<b>C_1</b>	NILF in CWS	3.7	1.6			16.8	7.2			21.0	4.4		
<b>C_2</b>	UE in CWS & in UPSS	7.3	3.1			3.9	1.7			11.0	2.4		
<b>C_3</b>	E in CWS & in UPSS	190.0	81.2			94.4	41.0			284.0	60.9		
<b>4. cds_wrk</b>													
<b>0</b>	NPS & NSS	32.9	14.1	3.79	0.66	118.0	51.0	3.57	0.86	151.0	32.3	3.71	0.74
<b>D_1</b>	UECDS≥0.5 & WCDS=0	7.3	3.1			3.9	1.7			11.0	2.4		
<b>D_2</b>	UECDS=0 & WCDS=0	3.9	1.7			16.8	7.2			21.0	4.4		
<b>D_3</b>	UECDS≥0.5 & WCDS>0	18.5	7.9			7.3	3.1			26.0	5.5		
<b>D_4</b>	UECDS=0 & WCDS>0	171.0	73.2			87.0	37.0			258.0	55.3		

(Contd.. Table A1)

Code	Definition	Male				Female				All			
		Mn	%	Mean	SD	Mn	%	Mean	SD	Mn	%	Mean	SD
<b>5. cds_unemp</b>													
<b>0</b>	NPS & NSS	32.9	14.1	3.82	0.6	118.0	51.0	3.85	0.58	151.0	32.3	3.83	0.59
<b>E_1</b>	at least 3.5 days in UECDs and also UEPS	3.7	1.6			2.1	0.9			5.8	1.2		
<b>E_2</b>	at least 3.5 days in UECDs but not UEPS	8.8	3.8			4.0	1.7			13.0	2.7		
<b>E_3</b>	0.5-3 days in UECDs	13.3	5.7			5.1	2.2			18.0	3.9		
<b>E_4</b>	0 days in UECDs	175.0	74.9			104.0	45.0			279.0	59.9		
<b>6. cds_nilf_avfwrk</b>													
<b>0</b>	NPS & NSS	32.9	14.1	2.95	0.26	118.0	51.0	2.58	0.62	151.0	32.3	2.82	0.46
<b>F_1</b>	At least 3.5 days in NILF & available for work	2.2	0.9			7.5	3.2			9.6	2.1		
<b>F_2</b>	At least 3.5 days in NILF & not available for work	4.6	2.0			31.2	13.0			36.0	7.7		
<b>F_3</b>	At most 3 days in NILF	194.0	82.8	74.0	32.0	268.0	57.4						
<b>7. mw_grp</b>													
<b>0</b>	NPS & NSS	32.9	14.1	2.12	0.47	118.0	51.0	1.8	0.55	151.0	32.3	2.0	0.53
<b>G_1</b>	Not working in 1 <sup>st</sup> CDS activity	12.6	5.4			31.7	14.0			44.0	9.5		
<b>G_2</b>	MW in 1 <sup>st</sup> CDS activity	151.0	64.6			74.8	32.0			226.0	48.4		
<b>G_3</b>	Non MW in 1 <sup>st</sup> CDS activity	35.6	15.2			7.8	3.4			43.0	9.3		
	Missing	1.8	0.8	0.7	0.3	2.5.0	0.5						

**Source:** Authors' own estimates.

**Notes:** 1. See Table of Abbreviations and Codes for variable names and expansions

2. Mn: Millions, SD: Standard Deviation, %- Percent.

3. Each variable has a level 0 which denotes not in labour force per UPSS. Other levels for that variable (1-3) denote in labour force per UPSS.

**Table A.2: Estimated Standard Coordinates of Crossed Supplementary Variables - Gender and Age from Results of MCA**

<i>Gender (Age Group in years)</i>	<i>Coordinates</i>	
	<i>Dimension 1</i>	<i>Dimension 2</i>
<b>Males (15-19)</b>	0.52	-0.47
<b>Males (20-24)</b>	0.20	-0.99
<b>Males (25-59)</b>	-0.34	-0.36
<b>Males (60+)</b>	-0.26	0.29
<b>Females (15-19)</b>	1.18	1.53
<b>Females (20-24)</b>	1.29	1.37
<b>Females (25-59)</b>	0.69	1.62
<b>Females (60+)</b>	0.64	1.97

**Source:** Authors' own estimates.

**Table A.3: Discriminating Power of Insecurity Index**

<b>Quintile of Insecurity Index</b>	<b>Unique Values</b>	
	<b>Male</b>	<b>Female</b>
1	5	8
2	4	0
3	0	15
4	4	56
5	>99	36

**Source:** Authors' own estimates.

**Table A.4: Composition of Key Insecurity Index Values in the  
1st and 5th Quintiles by Gender**

Quintile of Index	Index Value <sup>1</sup>	Frequency	<i>Variables<sup>2</sup></i>						
			<i>new_us_eun</i>	<i>new_avail_wrk</i>	<i>new_cws_eun</i>	<i>cds_wrk</i>	<i>new-cds_unemp</i>	<i>cds_nilf_avfwrk</i>	<i>mw_grp</i>
<b>Males</b>									
<b>1st quintile</b>	0.81	23,567	A_2~	B_2~	C_2~	D_4	E_3~	F_3	G_3
<b>5th quintile</b>	6.16	6,496	A_2~	B_1~	C_2~	D_3	E_2~	F_3	G_2
<b>Females</b>									
<b>1st quintile</b>	1.24	10,176	A_2~	B_2~	C_2~	D_4	E_3~	F_3	G_2
<b>5th quintile</b>	31.44	2,083	A_1~	B_2~	C_2~	D_4	E_3	F_3	G_1

**Note:** 1. The most frequently occurring index value in the 1st/5th quintile is reported here.  
 2. For definition of variable names and codes refer to Table of Abbreviations and Codes.

**Table A.5. State-wise Labour Force Non-participation Rates According to Usual Status (Age ≥ 15 Years)**

<b>Males</b>		<b>Females</b>	
<b>States</b>	<b>Non-Participation Rates (%)</b>	<b>States</b>	<b>Non-Participation Rates (%)</b>
MN	23.46	TR	82.99
GA	21.67	BR	76.17
HY	19.84	WB	73.00
AR	19.31	GA	70.04
SK	19.30	AS	68.85
KL	19.11	JK	61.73
JK	18.72	UP	60.34
HP	18.25	KL	58.14
NL	18.25	SK	57.67
UK	17.57	HY	52.64
MH	16.49	PB	52.28
PB	15.64	OR	51.00
RJ	15.22	JH	50.01
TN	14.70	MN	49.06
TR	14.57	MP	44.47
UP	14.56	MZ	39.84
MZ	13.35	TN	38.03
AP	13.30	KA	37.96
AS	13.00	GJ	37.81
WB	13.00	RJ	36.95
CG	12.43	UK	34.31
MP	12.42	AP	34.24
KA	12.32	MH	34.22
BR	12.17	AR	33.97
JH	12.00	HP	28.89
OR	11.77	CG	28.67
GJ	10.57	NL	28.12
ML	10.00	ML	22.65

**Note:** See Table of Abbreviations and Codes for full names of States.

**Table A.6 Composition of Key Index Values in 5<sup>th</sup> Quintile  
For Kerala and Tamil Nadu by Gender**

States	Index Value <sup>1</sup>	Frequency	Variables <sup>2</sup>						
			<i>new_us_eun</i>	<i>new_avail_wrk</i>	<i>new_cws_eun</i>	<i>cds_wrk</i>	<i>new-cds_unemp</i>	<i>cds_nilf_avfwrk</i>	<i>mw_grp</i>
<b>Males</b>									
<b>Kerala</b>	77.16	198	A_1~	B_1~	C_1~	D_1	E_1~	F_3	G_1
<b>Tamil Nadu</b>	2.07	619	A_2~	B_2~	C_2~	D_3	E_3~	F_3	G_2
<b>Females</b>									
<b>Kerala</b>	77.16	218	A_1~	B_1~	C_1~	D_1	E_1~	F_3	G_1
<b>Tamil Nadu</b>	7.87	58	A_2~	B_2~	C_2~	D_3	E_2~	F_3	G_2

**Note:** 1. The most frequently occurring index value in the 1st/5th quintile is reported here.  
2. For definition of variable names and codes refer to Table of Abbreviations and Codes

**Table A.7: Pair-wise Classification of Consumption Poor and Labour Market Insecure (In millions)**

Poverty Status	Not in Labour Force		Level of Insecurity for those in Labour Force			
	Male	Female	High <sup>2</sup>		Not High	
			Male	Female	Male	Female
<b>Poor<sup>1</sup></b>	7.4	12.2	18.8	3.4	38.0	11.5
<b>Non-poor</b>	25.5	35.7	32.0	9.2	112.3	27.0

**Note:** 1. Poor refers to the bottom 20% of the monthly per capita expenditure distribution.  
2. High refers to top 20% of insecurity index values.

**Table A.8. Independent Variables and Coding in Heckman Selection Ordered Probits Models**

<b>Variables</b>	<b>Coding</b>
Gender	<i>dfem</i> =1 for females =0 for males ( <u>reference</u> )
Age groups	4 groups <ul style="list-style-type: none"> <li>• <i>dage15-19</i> (<u>reference</u>)</li> <li>• <i>dage20-24</i></li> <li>• <i>dage25-59</i></li> <li>• <i>dage60_plus</i></li> </ul>
Marital status	4 groups <ul style="list-style-type: none"> <li>• <i>dnonmar</i> (Not married)</li> <li>• <i>dmar</i> (currently married -<u>reference</u>)</li> <li>• <i>dwid</i> (Widowed)</li> <li>• <i>dsep</i> (Separated/divorced)</li> </ul>
Relationship to head of Household	4 groups <ul style="list-style-type: none"> <li>• <i>dhead</i> (Head)</li> <li>• <i>dspohead</i> (Spouse of head)</li> <li>• <i>dothrel</i> (Other relatives of head - <u>reference</u>)</li> <li>• <i>dnorel</i> (No relation)</li> </ul>
Ratio of children age under 6 years to household size	Continuous <i>u_6_ch_ratio</i>
Ratio of children age 6-15 years to household size	Continuous <i>o_6_ch_ratio</i>
Ratio of adult dependents to household size	Continuous <i>adl_dep_ratio</i>
Ratio of working members to household size	Continuous <i>wrkers_ratio</i>

(Contd..Table A8)

<b>Variables</b>	<b>Coding</b>
Household size	Continuous <i>Hhsz</i>
Education	4 groups <i>dnolit</i> (not literate) <i>dlit</i> (literate) <i>dprimid</i> (primary school level) <i>dsecabv</i> (secondary school level and above (reference))
Current attendance in educational institution	<i>Deduattend</i> (Dichotomous Variable) =1 for currently attending educational institution =0 otherwise
Caste	3 groups <i>dscst</i> (Belonging to scheduled caste /scheduled tribe) <i>dobc</i> (belonging to other backward castes) <i>doth</i> (belonging to other castes (reference))
Religion	4 groups <i>dmuslm</i> (muslim) <i>dhindu</i> (hindu) <i>dchrstn</i> (christian) <i>Droth</i> (other religions (reference))
Monthly per capita expenditure of household (MPCE)	Continuous <i>lnmpce</i> (log of MPCE)
Household type	5 groups <i>dsena</i> (self-employed in non-agriculture) <i>dothlab</i> (other labour) <i>daglab</i> (agricultural labour) <i>dsagr</i> (self-employed in agriculture) <i>dhtyoth</i> (other(reference))
Land owned	Continuous (centered) <i>clandowned</i>
Land cultivated by MPCE (interaction term)	Continuous (centered) <i>ylnmpce_landcul</i>

**Table A.9 Descriptive Statistics for Independent Variables**

<b>I. Individual Level Variables</b>	<b>Males (%)</b>	<b>Female (%)</b>
dage15_19	15.9	13.6
dage20_24	12.6	13.1
dage25_59	60.3	61.5
dage60+	11.2	11.7
dmar	68.8	72.9
dnomar	27.0	14.1
dsep	0.3	0.7
dwid	3.7	12.1
dhead	56.4	7.4
dspohead	0.2	52.6
dothrehed	43.2	40.0
dnonrel	0.1	0.0
dnolit	32.1	57.6
dilit	12.5	9.0
dprimid	34.4	22.6
dsecabv	20.3	10.4
deduattend	9.1	5.3
dscst	30.9	30.0
dobc	42.2	43.3
dcoth	26.8	26.8
dmuslm	10.3	9.8
dhindu	84.2	83.8
dchrstn	2.2	2.6
droth	3.3	3.8
dsena	16.5	15.9
dsagr	41.2	38.3
daglab	23.6	24.7
dothlab	10.5	10.9
doth	8.3	10.2
<b>II. Household Level Variables</b>	<b>Mean</b>	<b>SD</b>
U_6_hh_ratio	0.07	0.122
O_6_hh_ratio	0.13	0.172
adl_dep_ratio	0.16	0.208
wrkers_ratio	0.35	0.226

**Note:** 1. Please refer to Table A.8 for definition of variables.

**Table A.10 Marginal Effects for States in Selection and Outcome Models**

<i>States</i>	<i>Selection Models<sup>1</sup></i>			<i>Outcome 3 Models<sup>2</sup></i>		
	<i>SMA</i>	<i>SMM</i>	<i>SMF</i>	<i>OMA</i>	<i>OMM</i>	<i>OMF</i>
Jammu Kashmir	<b>0.072</b>	<b>0.019</b>	<b>0.316</b>	<b>0.149</b>	<b>0.071</b>	<b>0.611</b>
Himachal Pradesh	<b>0.088</b>	0.012	<b>0.439</b>	<b>0.309</b>	<b>0.232</b>	<b>0.400</b>
Punjab	<b>0.039</b>	-0.005	<b>0.248</b>	<b>0.166</b>	<b>0.081</b>	<b>0.636</b>
Uttaranchal	<b>0.088</b>	0.019	<b>0.418</b>	<b>0.213</b>	<b>0.149</b>	<b>0.324</b>
Haryana	<b>0.056</b>	-0.006	<b>0.323</b>	<b>0.191</b>	<b>0.120</b>	<b>0.489</b>
Rajasthan	<b>0.073</b>	0.003	<b>0.368</b>	<b>0.122</b>	<b>0.085</b>	<b>0.306</b>
Uttar Pradesh	<b>0.056</b>	0.014	<b>0.208</b>	<b>0.117</b>	<b>0.095</b>	<b>0.360</b>
Bihar	0.019	0.015	-0.048	<b>0.093</b>	<b>0.092</b>	<b>0.183</b>
Sikkim	<b>0.040</b>	0.005	<b>0.200</b>	Base State		
Arunachal Pradesh	0.030	-0.033	<b>0.323</b>	-0.002	0.011	-0.047
Nagaland	<b>0.075</b>	0.007	<b>0.406</b>	<b>0.268</b>	<b>0.250</b>	<b>0.331</b>
Manipur	<b>0.050</b>	-0.001	<b>0.298</b>	<b>0.170</b>	<b>0.153</b>	<b>0.298</b>
Mizoram	<b>0.043</b>	-0.005	<b>0.273</b>	<b>0.149</b>	<b>0.151</b>	<b>0.158</b>
Tripura	0.034	0.018	-0.021	<b>0.073</b>	<b>0.095</b>	0.025
Meghalaya	<b>0.072</b>	0.004	<b>0.377</b>	-0.014	-0.003	-0.052
Assam	<b>0.038</b>	0.011	0.143	<b>0.116</b>	<b>0.113</b>	<b>0.300</b>
West Bengal	0.025	0.003	0.089	<b>0.198</b>	<b>0.204</b>	<b>0.234</b>
Jharkhand	<b>0.057</b>	0.012	0.244	<b>0.194</b>	<b>0.191</b>	<b>0.294</b>
Orissa	<b>0.058</b>	0.009	<b>0.278</b>	<b>0.211</b>	<b>0.179</b>	<b>0.353</b>
Chattisgarh	<b>0.079</b>	0.012	<b>0.394</b>	<b>0.157</b>	<b>0.128</b>	<b>0.262</b>
Madhya Pradesh	<b>0.058</b>	0.010	<b>0.267</b>	<b>0.128</b>	<b>0.117</b>	<b>0.192</b>
Gujarat	<b>0.055</b>	-0.002	<b>0.297</b>	<b>0.110</b>	<b>0.081</b>	<b>0.295</b>
Maharashtra	<b>0.078</b>	-0.002	<b>0.415</b>	<b>0.186</b>	<b>0.173</b>	<b>0.207</b>
Andhra Pradesh	<b>0.069</b>	-0.002	<b>0.363</b>	<b>0.178</b>	<b>0.199</b>	<b>0.200</b>
Karnataka	<b>0.054</b>	-0.003	<b>0.302</b>	<b>0.115</b>	<b>0.140</b>	<b>0.116</b>
Goa	<b>0.066</b>	0.002	<b>0.369</b>	<b>0.100</b>	<b>0.113</b>	0.087
Kerala	<b>0.070</b>	0.004	<b>0.381</b>	<b>0.305</b>	<b>0.318</b>	<b>0.362</b>
Tamil Nadu	<b>0.048</b>	-0.013	<b>0.298</b>	<b>0.165</b>	<b>0.280</b>	<b>0.146</b>

**Notes:** 1. SM: Selection Model; OM: Outcome Model; A: All; M: Males; F: Females  
2. Refers to most insecure category that is top 20% of insecurity index values.  
3. Bold numbers have p-values  $\leq 0.05$ .

**Table A.11 Results of Selection Model:  
Probit Model for Probability of Participation**

Variables <sup>1</sup>	Selection Models <sup>2</sup>		
	SMA	SMM	SMF
Intercept	0.540 *	0.160	-0.730 *
dfem <sup>#</sup>	-1.450 ***	-	-
dage2~24 <sup>#</sup>	0.438 ***	0.565 ***	0.322 ***
dage2~59 <sup>#</sup>	0.638 ***	0.357 ***	0.609 ***
dage60_plus <sup>#</sup>	-0.835 ***	-1.380 ***	-0.293 ***
dnomar <sup>#</sup>	0.170 ***	-0.441 ***	0.497 ***
dwid <sup>#</sup>	-0.338 ***	-0.716 ***	-0.368 ***
dsep <sup>#</sup>	0.107 ***	-0.564 **	0.391 ***
dhead <sup>#</sup>	0.637	0.515 ***	0.967 ***
dspohead <sup>#</sup>	-0.021 ***	-1.141 ***	0.143 ***
dnonrel <sup>#</sup>	0.231	0.297	0.592 *
u_6_ch_ratio	-0.125	0.396 ***	-0.294 ***
o_6_ch_ratio	0.323	0.265 **	0.325 ***
adl_dep_ratio	-2.372 ***	-2.039 ***	-2.739 ***
wrkers_ratio	2.101 ***	2.217 ***	1.974 ***
hhsz	-0.023 ***	-0.023 ***	-0.031 ***
dnolit <sup>#</sup>	-0.279 ***	-0.597 ***	0.105 **
dlit <sup>#</sup>	-0.287 ***	-0.367 ***	-0.086 *
dprimid <sup>#</sup>	-0.228 ***	-0.231 ***	-0.126 ***
deduattend <sup>#</sup>	-2.356 ***	-2.646 ***	-1.329 ***
dscst <sup>#</sup>	0.205 ***	0.171 ***	0.246 ***
dobc <sup>#</sup>	0.098 ***	0.058 *	0.149 ***
dmuslm <sup>#</sup>	-0.138 ***	0.122	-0.413 ***
dhindu <sup>#</sup>	-0.042 *	0.048	-0.113
dchrstn <sup>#</sup>	-0.075	0.013	-0.143
lnmpce	-0.024	0.152 ***	-0.135 ***
daglab <sup>#</sup>	0.476	0.441 ***	0.528 ***
dothlab <sup>#</sup>	0.305 ***	0.419 ***	0.235 ***
dsagr <sup>#</sup>	0.435 ***	0.533 ***	0.402 ***
dsena <sup>#</sup>	0.245 ***	0.449 ***	0.119 **
clandowned	0.011 ***	0.016	0.007
ylmpce_landcul	-0.004	-0.005	-0.002

(Continued Table A.11)

(Contd.. Table A.11)

Variables <sup>1,#</sup>	Selection Models <sup>2</sup>		
	SMA	SMM	SMF
Jammu Kashmir	0.66 ***	0.50	0.94 ***
Himachal Pradesh	1.03 ***	0.25	1.71 ***
Punjab	0.27	-0.07	0.69 *
Uttaranchal	1.04 ***	0.52	1.51 ***
Haryana	0.44 ***	-0.09	0.96 ***
Rajasthan	0.62 ***	0.06	1.13 ***
Uttar Pradesh	0.39 ***	0.28	0.55 *
Bihar	0.12 ***	0.32	-0.12
Sikkim	0.28	0.09	0.54 *
Arunachal Pradesh	0.20	-0.38	0.97 ***
Nagaland	0.71 ***	0.13	1.45 ***
Manipur	0.38 *	-0.01	0.87 **
Mizoram	0.31	-0.08	0.78 **
Tripura	0.23	0.44	-0.05
Meghalaya	0.66	0.07	1.24 ***
Assam	0.26	0.22	0.37
W.Bengal	0.16	0.06	0.23
Jharkhand	0.44 ***	0.25	0.67 **
Orissa	0.45 ***	0.16	0.78 ***
Chattisgarh	0.76 ***	0.24	1.31 ***
Madhya Pradesh	0.44 ***	0.20	0.74 **
Gujarat	0.41 *	-0.03	0.84 **
Maharashtra	0.65 ***	-0.04	1.30 ***
Andhra Pradesh	0.54 ***	-0.03	1.07 ***
Karnataka	0.41 ***	-0.04	0.86
Goa	0.57 ***	0.03	1.20 ***
Kerala	0.60 ***	0.07	1.20 ***
Tamil Nadu	0.34 *	-0.19	0.84 **
Number of Observations	187052	131877	55175
Pseudo R-Square	0.559	0.651	0.395

- Notes:** 1. Descriptions of variables are in Table A.8.  
2. See Equation 2 for the Model Specification.  
3. Marginal effects of dummy variable indicated by # represent change from 0 to 1. The dummy coefficients for Union Territories are not reported here and Lakshdweep is taken as the base state.  
\* p-values<0.05; \*\* p-values<0.01; \*\*\* p-values<0.001.

**Table A.12 Results of Ordered Probit Model for 'High' Level (Outcome 3) of Insecurity<sup>1</sup>**

Variables <sup>2,3</sup>	Corrected for Selection Bias			Uncorrected		
	OMA	OMM	OMF	OMAU	OMMU	OMFU
inv mills	1.250 ***	1.377 ***	1.127 ***			
dfem <sup>#</sup>	0.257 ***	-	-	0.768 ***	-	-
dage2~24 <sup>#</sup>	0.017	0.035	0.151 **	-0.145 ***	-0.170 ***	0.063
dage2~59 <sup>#</sup>	-0.152 ***	-0.169 ***	-0.013	-0.414 ***	-0.439 ***	-0.223 ***
dage60_plus <sup>#</sup>	-0.558 ***	-0.616 ***	-0.477 ***	-0.417 ***	-0.452 ***	-0.212 ***
u_6_ch_ratio	-0.053	0.005	0.137	-0.055	-0.052	0.288 **
o_6_ch_ratio	0.009	-0.068	0.238 **	-0.074 *	-0.100 *	0.084
adl_dep_ratio	0.089 *	0.194 ***	0.769 ***	0.821 ***	0.680 ***	2.341 ***
wrkers_ratio	-0.088 **	-0.140 ***	-0.251 **	-0.489 ***	-0.391 ***	-0.874 ***
hhsz	-0.023 ***	-0.022 ***	-0.037 ***	-0.016 ***	-0.018 ***	-0.016 ***
dnolit <sup>#</sup>	0.275 ***	0.222 ***	0.140 **	0.293 ***	0.252 ***	0.080
dlit <sup>#</sup>	0.164 ***	0.138 ***	0.070	0.177 ***	0.133 ***	0.088
dprimid <sup>#</sup>	0.164 ***	0.158 ***	0.053	0.173 ***	0.143 ***	0.087 *
dscst <sup>#</sup>	0.086 ***	0.084 ***	0.087 **	0.057 ***	0.070 ***	-0.007
dobc <sup>#</sup>	0.050 ***	0.034 **	0.070 *	0.039 ***	0.033 *	0.011
dmuslm <sup>#</sup>	-0.294 ***	-0.221 ***	-0.182 *	-0.268 ***	-0.239 ***	0.021
dhindu <sup>#</sup>	-0.109 ***	-0.089 **	0.038	-0.102 **	-0.092 ***	0.069
dchrstn <sup>#</sup>	-0.214 ***	-0.166 ***	-0.173	-0.196 ***	-0.160 ***	-0.131
lnmpce	-0.207 ***	-0.252 ***	-0.008	-0.189 ***	-0.258 ***	0.055
daglab <sup>#</sup>	1.306 ***	1.485 ***	0.760 ***	1.157 ***	1.374 ***	0.481 ***
dothlab <sup>#</sup>	0.922 ***	1.075 ***	0.484 ***	0.805 ***	0.968 ***	0.313 ***
dsagr <sup>#</sup>	0.964 ***	0.999 ***	0.348 ***	0.826 ***	0.884 ***	0.106 *

(Contd.. Table A.12)

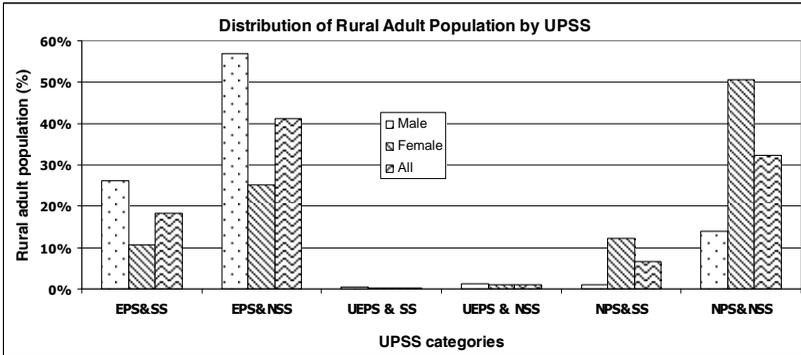
Variables <sup>3</sup>	Corrected for Selection Bias			Uncorrected		
	OMA	OMM	OMF	OMAU	OMMU	OMFU
dsena <sup>#</sup>	0.267 ***	0.307 ***	0.241 ***	0.170 ***	0.204 ***	0.138 **
ylmpce_landcul	-0.002 *	-0.002 *	-0.004	-0.002 *	-0.002 *	-0.004
Jammu Kashmir <sup>#</sup>	0.426 ***	0.221 ***	1.725 ***	0.378 ***	0.194 ***	1.590 ***
Himachal Pradesh	0.832 ***	0.655 ***	1.086 ***	0.711 ***	0.659 ***	0.650 ***
Punjab	0.471 ***	0.252 ***	1.819 ***	0.475 ***	0.274 ***	1.771 ***
Uttaranchal	0.591 ***	0.440 ***	0.891 ***	0.484 ***	0.428 ***	0.559 ***
Haryana	0.536 ***	0.362 ***	1.331 ***	0.523 ***	0.386 ***	1.202 ***
Rajasthan	0.358 ***	0.264 ***	0.859 ***	0.306 ***	0.261 ***	0.674 ***
Uttar Pradesh	0.351 ***	0.300 ***	1.010 ***	0.352 ***	0.288 ***	1.093 ***
Bihar	0.278 ***	0.287 ***	0.536 ***	0.319 ***	0.264 ***	0.976 ***
Arunachal Pradesh	-0.008	0.036	-0.173	0.033	0.132 *	-0.317 *
Nagaland	0.727 ***	0.698 ***	0.906 ***	0.674 ***	0.724 ***	0.550 **
Manipur	0.481 ***	0.450 ***	0.822 ***	0.475 ***	0.477 ***	0.697 ***
Mizoram	0.424 ***	0.444 ***	0.468 **	0.423 ***	0.470 ***	0.340
Tripura	0.220 ***	0.293 ***	0.085	0.245 ***	0.265 ***	0.567 **
Meghalaya	-0.047	-0.009	-0.196	-0.076	0.021	-0.404 *
Assam	0.340 ***	0.345 ***	0.830 ***	0.356 ***	0.346 ***	1.008 ***
West Bengal	0.561 ***	0.594 ***	0.668 ***	0.588 ***	0.595 ***	0.943 ***
Jharkhand	0.544 ***	0.553 ***	0.816 ***	0.524 ***	0.533 ***	0.843 ***

(Contd.. Table A.12)

Variables <sup>3</sup>	Corrected for Selection Bias			Uncorrected		
	OMA	OMM	OMF	OMAU	OMMU	OMFU
Orissa	0.590 ***	0.524 ***	0.972 ***	0.568 ***	0.517 ***	0.928 ***
Chattisgarh	0.449 ***	0.386 ***	0.738 ***	0.394 ***	0.386 ***	0.502 ***
Madhya Pradesh	0.373 ***	0.358 ***	0.564 ***	0.352 ***	0.344 ***	0.541 ***
Gujarat	0.325 ***	0.254 ***	0.830 ***	0.311 ***	0.269 ***	0.745 ***
Maharashtra	0.531 ***	0.510 ***	0.617 ***	0.479 ***	0.529 ***	0.377 **
Andhra Pradesh	0.511 ***	0.582 ***	0.596 ***	0.468 ***	0.593 ***	0.446 ***
Karnataka	0.340 ***	0.420 ***	0.359 **	0.323 ***	0.433 ***	0.267 *
Goa	0.294 **	0.341 **	0.272	0.310 *	0.394 **	0.093
Kerala	0.827 ***	0.877 ***	0.996 ***	0.780 ***	0.888 ***	0.743 ***
Tamil Nadu	0.472 ***	0.785 ***	0.442 **	0.465 ***	0.818 ***	0.360 **
Observations <sup>4</sup>	136015	109668	26401	136015	109668	26401
Pseudo R-Square	0.1405	0.1306	0.1431	0.1226	0.1156	0.1316

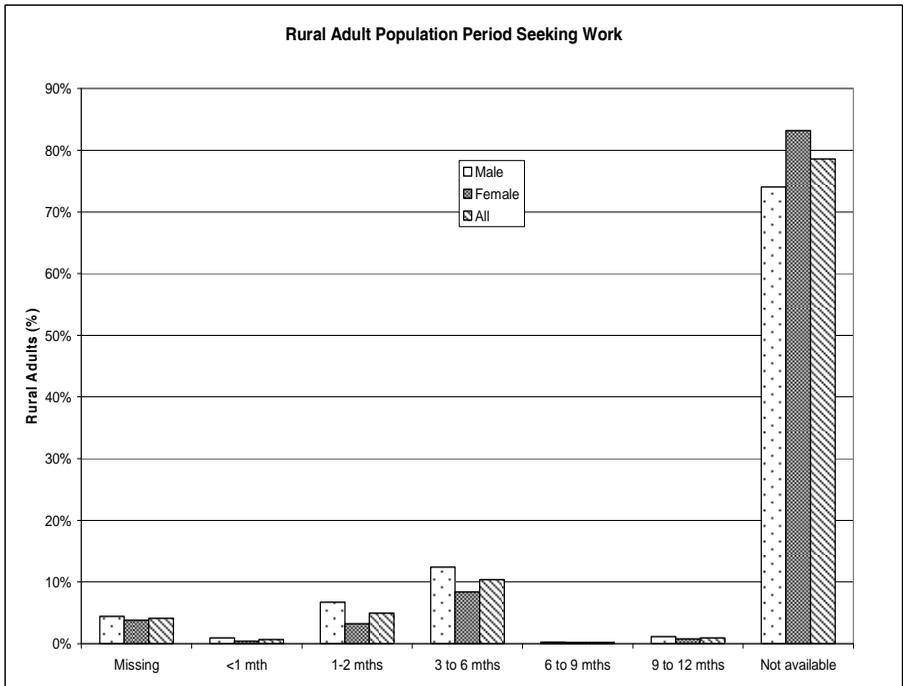
- Notes:** 1. The Ordered Probit Model was estimated for three outcomes of insecurity: 'low', 'medium' and 'high' as shown in Equation 3. However the results are reported only for 'high' and other results can be obtained from the authors. 'High' insecure category refers to top 20% of insecurity index values.
2. Descriptions of variables are in Table A.8.
3. Marginal effects of dummy variable are indicated by # and represents change from 0 to 1. The base state is Sikkim.
4. The number of observations are lesser in outcome model than in selection model as Union Territories are excluded.
- \* p-values<0.05; \*\* p-values<0.01; \*\*\* p-values<0.001.

**Figure A.1: Distribution of Adult Population by Usual Employment Status**



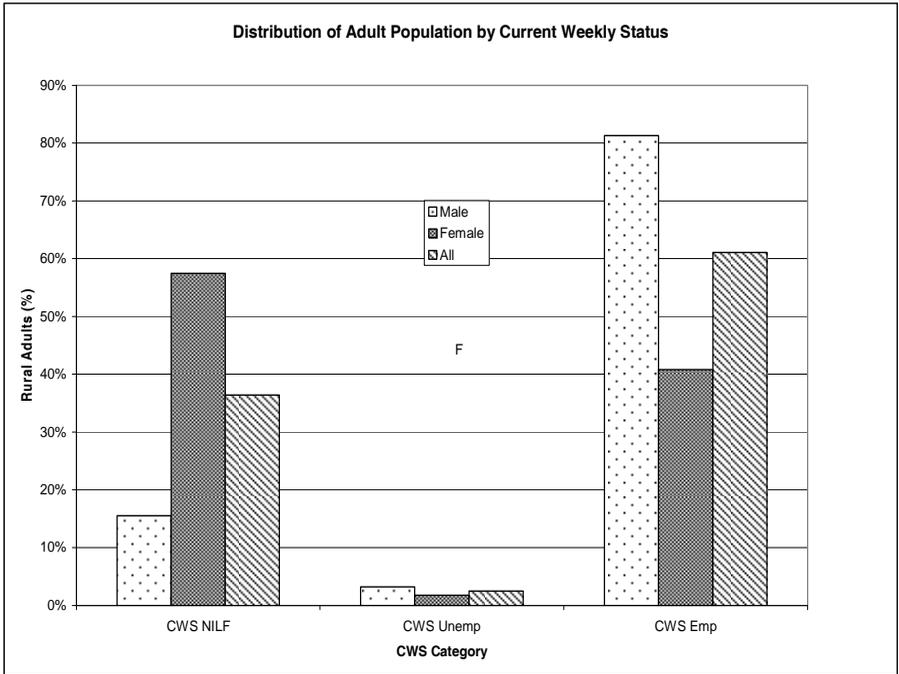
**Note:** See Table of Abbreviations and Codes for variable names.

**Figure A.2: Distribution of Rural Adult Population by Period Available for Work Reported by Respondents<sup>1</sup>**



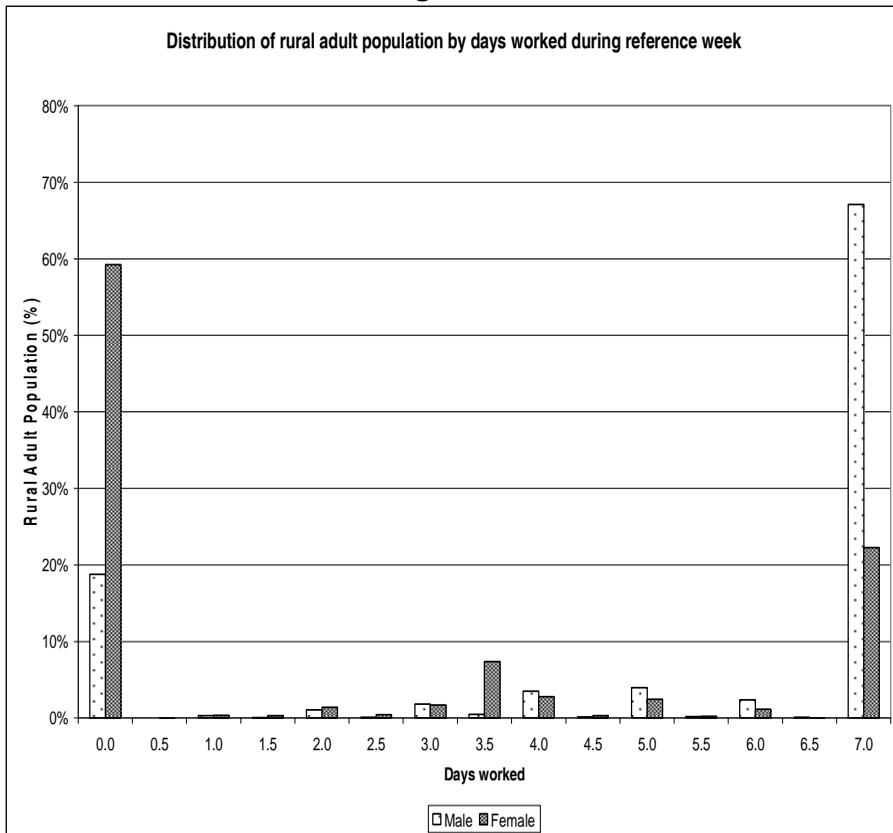
**Note:** 1. In response to question under column 16 of Block 5.1 Schedule 10.

**Figure A.3: Distribution of Adult Population by Current Weekly Status**

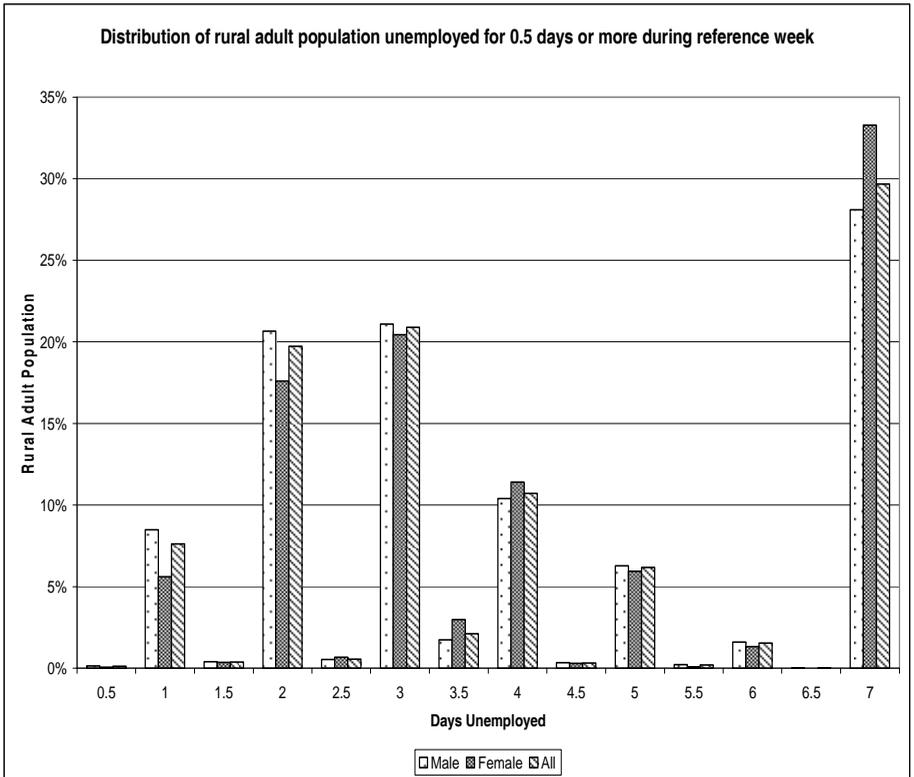


**Note:** See Table of Abbreviations and Codes for variable names.

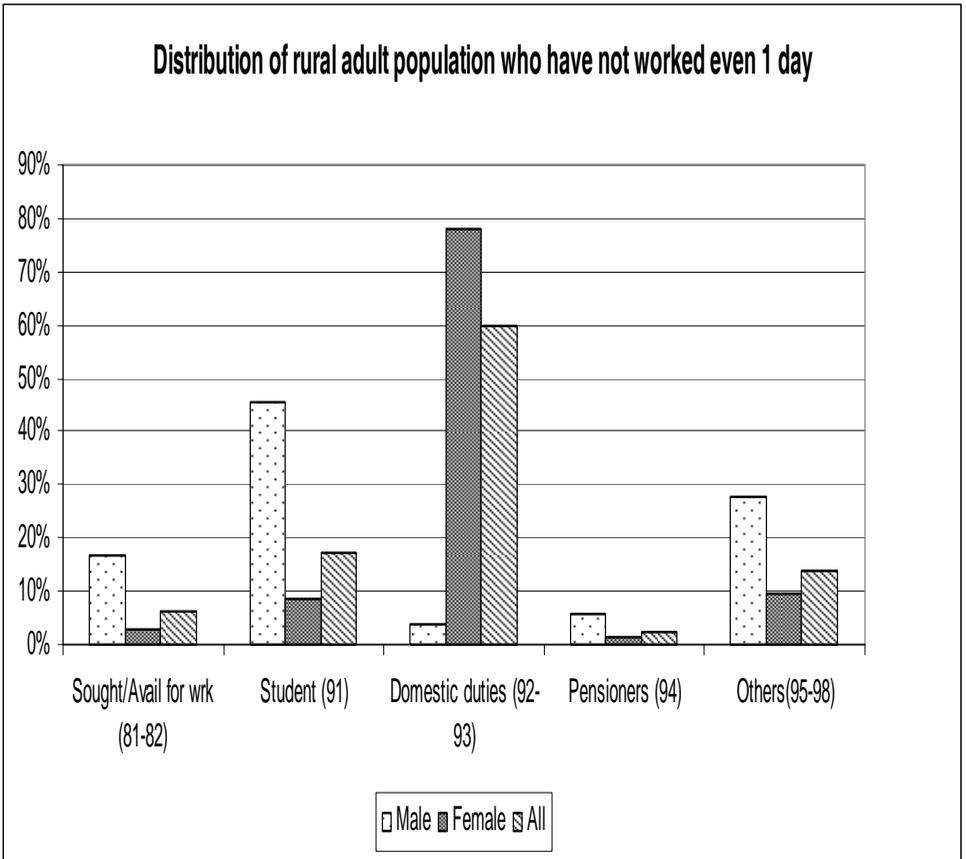
**Figure A.4: Distribution of Rural Adult Population by Days Worked During Reference Week**



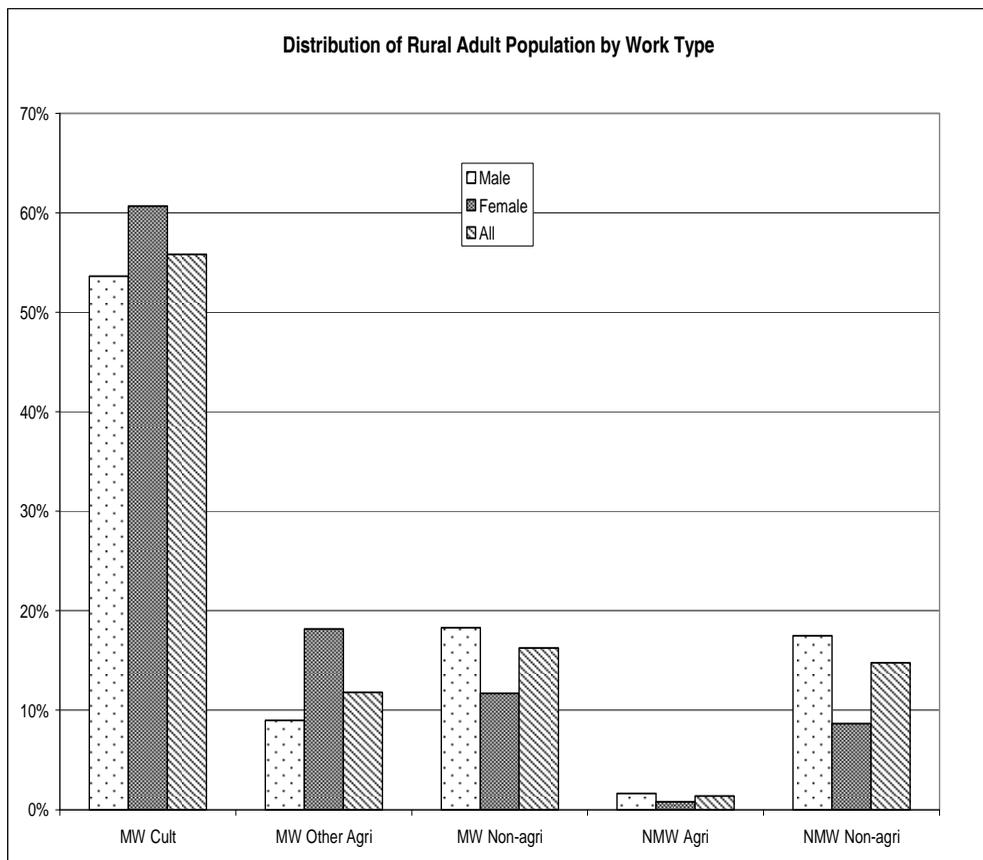
**Figure A.5: Distribution of Rural Adult Population by Days Unemployed**



**Figure A.6: Distribution of Rural Adult Population Who have not Worked Even for a Single Day**



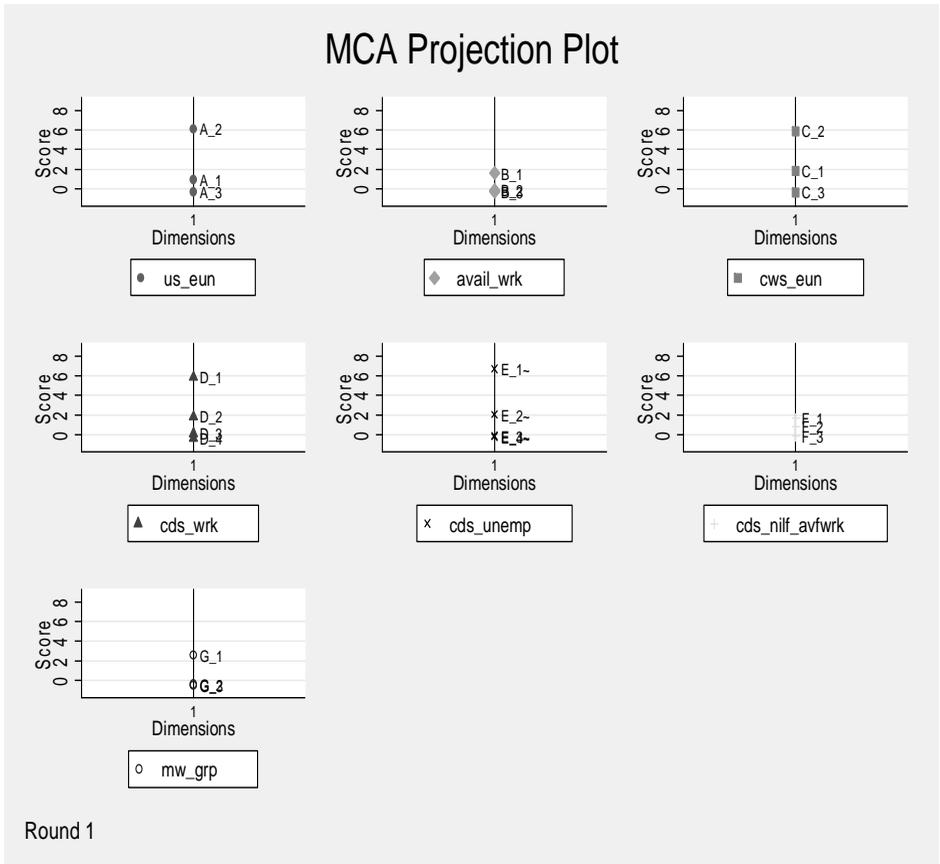
**Figure A.7: Distribution of Rural Adult Population by Engagement in Manual/Non-manual Work**



**Note:** MW - Manual Work, NMW- Non-manual Work, Cult- Cultivators, Agri- Agriculture.

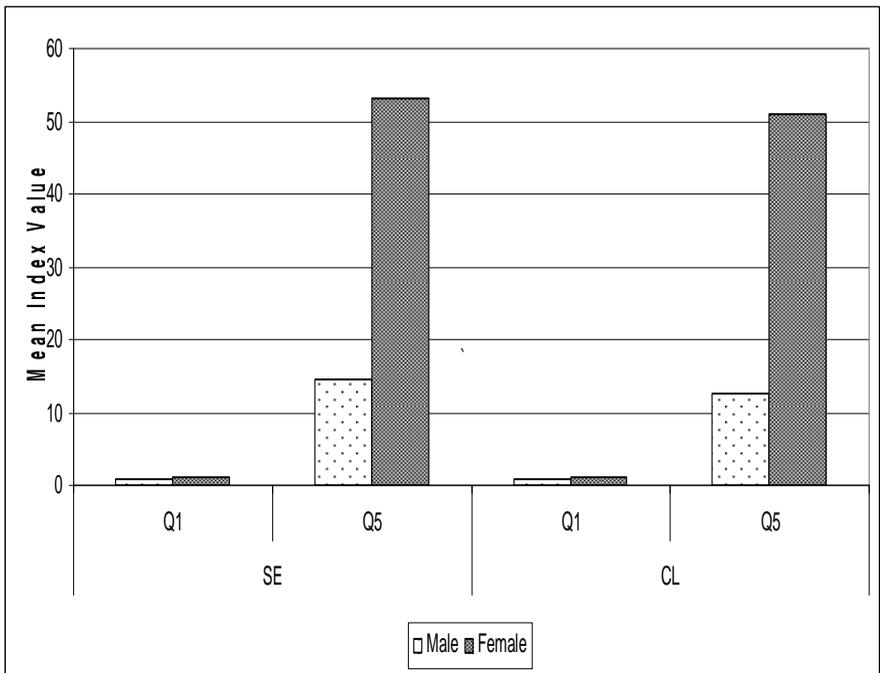
**d**

**Figure A.8: Multiple Correspondence Analysis (Round 1): Projection Plot**



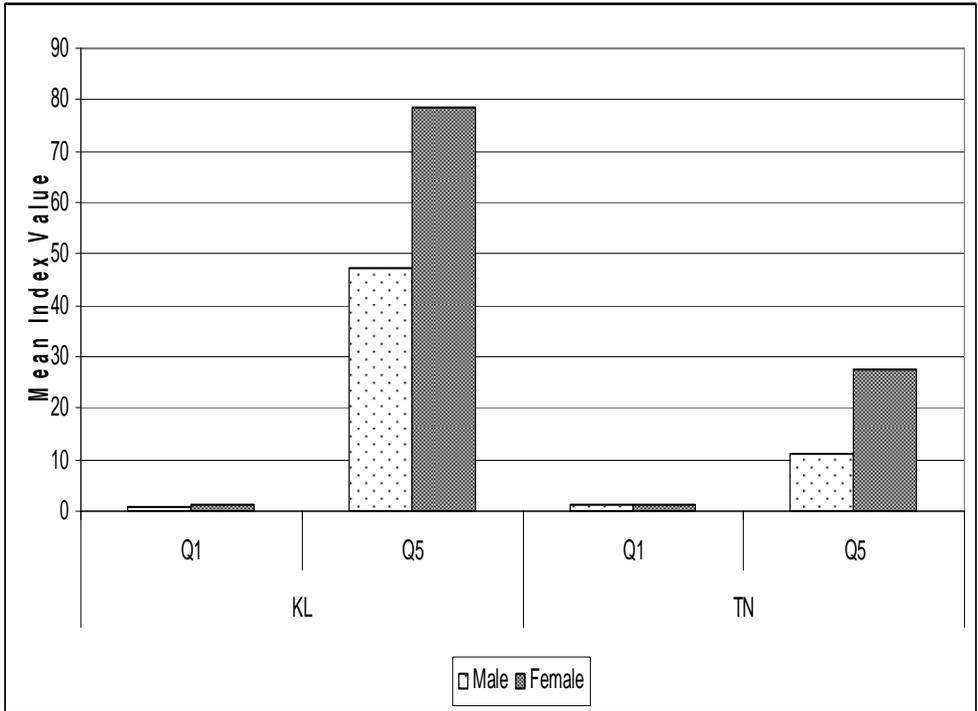
**Note:** See Table of Abbreviations and Codes for variable names.

**Figure A.9: Mean Labour Market Insecurity Values in Q1 and Q5 of Insecurity Index Values for Self Employed and Casual Labour: Males and Females**



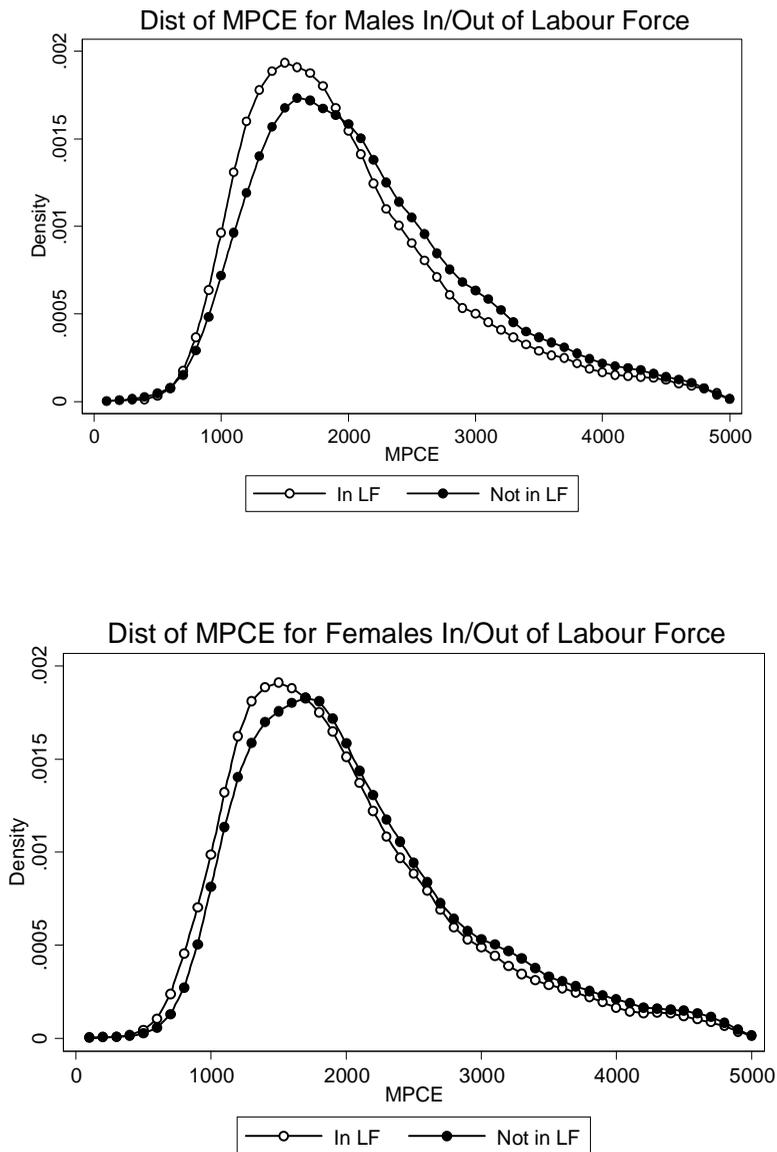
**Note:** 1. Q1 and Q5 are respectively First and Fifth Quintiles of Insecurity Index Values.  
2. SE: Self Employed; CL: Casual Labour

**Figure A.10: Labour Market Insecurity:  
Kerala (KL) versus Tamil Nadu (TN)**

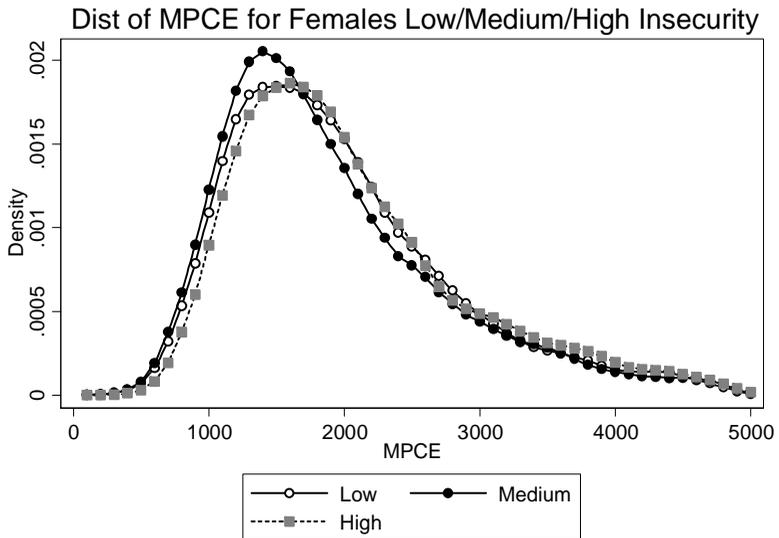
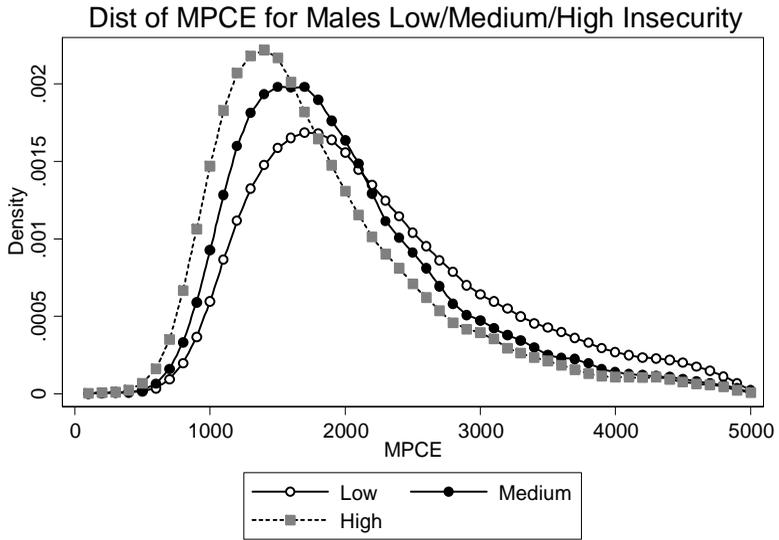


**Note:** Q1 and Q5 are respectively First and Fifth Quintiles of Insecurity Index Values.

**Figure A.11: Kernel Density Plots of MPCE  
By Labour Force (LF) Participation Status: Males and Females**



**Figure A.12: Kernel Density Plots of MPCE by Levels of Labour Market Insecurity: Males and Females**



## ***MSE Monographs***

- \* Monograph 1/2006  
A Tract on Reform of Federal Fiscal Relations in India  
*Raja J. Chelliah*
- \* Monograph 2/2006  
Employment and Growth  
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