

WORKFORCE PARTICIPATION AMONG THE ELDERLY IN INDIA: STRUGGLING FOR ECONOMIC SECURITY

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In India, ageing is rapidly becoming a major socio-economic concern. The rapidly increasing dependency ratios impose an economic burden on the family. Simultaneously, the State has failed to create an adequate social security network for the vulnerable elderly. In this situation, the labour market remains the only possible means of ensuring security for the elderly. The extent to which the labour market in India has succeeded on this front has been analysed in this study. The main source of data for the article is the National Sample Survey Office (NSSO) unit level data for the 55th (1999-2000) and 66th (2009-10) Rounds. In addition, data from the 60th Round (2004) survey on "Morbidity and Health Care" has also been used.

The study reveals a decline in the workforce participation rate among the elderly over the study period, particularly among the urban and rural males. This is accompanied by a high level of informalisation of the aged workforce. The decline in the workforce participation rate appears more as a deliberate withdrawal from the labour force, caused by rural prosperity and the expansion of employment opportunities in the manufacturing sector between 2004 and 2009, rather than due to forced unemployment. An examination of the occupational profile shows that in rural areas, the elderly workers are concentrated in the primary sector, whereas in urban areas, on the other hand, they are mainly engaged in services. An analysis of the occupational structure and earnings, however, reveals that the aged who continue to work are generally employed in the low-wage sectors. Further, their own wages are lower than the (low) average earnings in these occupational categories. This remains an area of concern that needs to be addressed by policy-makers.

Keywords: Ageing, Employment, Informal sector, Occupational pattern, India

I. INTRODUCTION

Ageing of the population is a phenomenon that occurs when the proportion of the aged in the total population increases to over 7 per cent owing to a reduction in fertility and mortality (Prakash, 1999). The United Nations projection indicates that the population aged 60 years and above would grow from an estimated 737 million older persons in 2009 to 2 billion in 2050 (UN, 2009). In particular, the oldest-old group (those aged above 80 years) would grow faster than the other age groups, and would comprise about one-fifth of the total elderly

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population by 2050. Although ageing has emerged as an important issue in European and American countries (Anderson and Hussey, 2000), in recent years, it has also become an important socio-demographic issue in Asia (UN, 2002). India is no exception to this trend, with the total number of elderly persons expected to increase from 70.6 million in 2001 (6.9 per cent of the total population) to 173 million by 2026 (12.4 per cent of the total population) (Subaiya and Bansod, 2011). Estimates by the Planning Commission (2011) indicate that, by 2050, one out of every five persons in India would be aged above 60 years. The increasing 'greying' of the population imposes a greater burden on social security, health services, housing and urban planning, and necessitates fundamental changes in consumption and saving patterns. Increasing feminisation of ageing is another major cause of concern in India (Alam, 2009; Subaiya and Bansod 2011), as they often lack financial security and are dependent to a greater extent on other family members.

In India, the family has traditionally taken care of the elderly; the Maintenance and Welfare of Parents and Senior Citizens Act in 2007 also laid an emphasis on familial care of the aged. The old-dependency ratio (the number of aged as a ratio of the total working population), however, is expected to rise in India (Subaiya and Bansod, 2011). This is likely to increase the pressure on the working population, particularly as more than half of the elderly people are fully dependent on others (Purohit, 2008). Moreover, other factors including the housing shortage, an increasing trend towards nuclear families, the shift from altruistic family-centric values to consumerism and individualism, greater mobility of workers, increasing work pressure and greater participation of women in economic activities has been threatening inter-generational family bonds and reducing the support provided to aged relatives (Prakash, 2005; Husain and Ghosh, 2010; Raju, 2011). While the Government has taken some measures to improve the socio-economic conditions of the economically vulnerable elderly in India—in the form of policies like Annapoorna and the National Old Age Pension Scheme—these policies fall far short of what is required (Purohit, 2008). Given the need to control fiscal deficit, one cannot be sure of the extent to which the Government can scale up expenditure on social security in order to meet the needs of a population with an increasing share of ageing persons. Inadequate social security leads to financial distress, which increases the economic dependence of the elderly and leads to a deterioration in their health status (Alam and Karan, 2011). The incidence of financial insecurity has been found to be greater among the rural elderly, female elderly (particularly widows), the aged residing in nuclear families or alone, and the aged afflicted with health problems (Rajan, et al., 2003).

Given the inability of both the society and the State to ensure the phenomenon of healthy ageing in India, the feasibility of market-based solutions has to be explored. In the long run, for instance, the incentive to increase savings during the working period is a possible instrument for safeguarding the health of the aged. In the short run, however, the participation of the elderly in the workforce may enable them to be economically independent (Vodopivec and Arunatilake, 2011), besides generating non-economic externalities. For instance, participation in economic activities has been observed to improve the self-reported health status of the elderly (Husain and Ghosh, 2010), and to improve satisfaction among the elderly (Chang

and Yen, 2011). Simultaneously, complete retirement leads to an increase in the number of episodes of illness and a decline in mental health of the elderly (Dave, et al., 2008), thereby adversely affecting their well-being (Stutzer, 2004). Given the inadequacy of social security, therefore, the participation of the elderly in the labour force should receive more importance in order for us to understand their economic dependence (Rajan, et al., 2003). The issue of increasing the participation of the aged in the labour market, however, has not received its due attention as governments use retirement as an instrument to provide more employment opportunities to the young (Salem, et al., 2008), even at the cost of increasing the proportion of the elderly who are financially dependent on the State (Walker, 1981).

Most of the research on the elderly in India has tended to focus largely on issues related to health, residential arrangement, social security and ill-treatment (Husain and Ghosh, 2011; Alam and Karan, 2011; Rajan and Mishra, 2011). The few studies that concentrate on the workforce participation of the elderly in India have been essentially descriptive, as they describe trends in employment and wages (Rajan, et al., 2003; Selvaraj, et al., 2011). Analytical works are rare; so far I have been able to trace only works by Alam and Mitra (2012), Pandey (2009), and Singh and Das (2012).

This paper examines the changes in the workforce participation rates (WPRs) and the nature of employment (reflected in the extent of participation in the informal sector and occupational pattern) between the years 1999-2000 and 2009-2010. Data for these two years are available in the 55th and 66th Rounds of the National Sample Survey Office (NSSO) survey on Employment and Unemployment. The choice of these two rounds enables us to examine the impact of changes that have occurred since the sweeping liberalisation of the Indian economy between 1985 and 2000, culminating in the integration of the Indian economy with world markets. This is also the period when India was 'shining' economically and was resilient enough to weather even the petro shocks and the sub-prime crisis. Using bivariate and econometric analysis, we have tried to examine whether growth was inclusive and resulted in a decline of economic vulnerability of aged workers over the decade studied.

II. WORKFORCE PARTICIPATION AMONG THE ELDERLY IN INDIA

On the basis of the Census data, Rajan, et al. (2003) have shown that the workforce participation (WFP) of the elderly in India decreased from 1961 to 1991, with the rural WFP rate being higher than the WFP in urban areas. Disaggregating by gender, they have found that the elderly male participated more in economic activities than the elderly female. Further, elderly workers were increasingly involved in the agricultural sector, with almost 80 per cent of the aged workers being engaged in this sector in 1991.

Selvaraj, et al. (2011) have also analysed the WFP trend in India on the basis of the usual activity status (usual principal status¹ and usual subsidiary status²) using NSSO data from 1983 to 2004-05. The total number of elderly workers in India was approximately 7 per cent of the total workforce (Selvaraj, et al., 2011). They have also shown that the WFP rate for the elderly decreased marginally from 42 per cent in 1983 to 39 per cent in 2004-05, mainly due to the growing number of elderly in the higher age group who are less

likely to participate in the workforce. The WFP of the elderly is higher in rural areas as compared to urban areas.

Selvaraj, et al. (2011) also report that the educational attainments of elderly workers is low—more than 70 per cent of the elderly are illiterate, or have not acquired any primary education. This implies that it is economic vulnerabilities which ‘force’ the aged to work in India. Most of the elderly workers are self-employed, with the proportion of self-employed elderly workers further increasing with age. The incidence of casual employment is higher among the elderly females. In urban areas, significant proportions of the elderly female workers are engaged in regular employment. On the basis of current weekly status³ data of the NSSO, Selvaraj, et al. (2011) have also shown that the real wages of regular and casual workers increased by 60 per cent from 1983 to 2005. Although the elderly are receiving lower income than the non-aged workers, their (aged workers’) contribution to the total household income is substantial, amounting to about 4 to 5 per cent, on an average.

Singh and Das (2012) have analysed the determinants of old age wage labour participation and supply in India from 1993-94 to 2009-10 on the basis of the current weekly status data generated by the NSSO. The descriptive analysis shows that the wage labour participation of the elderly from 1993-94 to 2009-10 decreased in urban areas (from 7.45 per cent to 6.01 per cent) but increased in rural areas (from 9.66 per cent to 11.35 per cent). However, the average number of weekly days of work supplied by the working elders decreased in rural areas (from 6.22 per cent to 5.80 per cent) but remained the same in urban areas (6.42 per cent) (Singh and Das, 2012). Econometric analysis undertaken by using the probit regression model indicates that in urban areas, there is a negative relation between the probability of wage labour participation and the age of the elderly. In rural areas, they showed the same result only for the year 1993-94, but for the year 2009-10, they exhibited an insignificant relation. In rural areas, the Scheduled Castes (SCs) and Scheduled Tribes (STs), and in urban areas, the SCs were observed to be participating more than the others in 2009-10. In both the NSS Rounds, females are seen to be participating less than the males in both rural as well as urban areas. They have observed that in both rural and urban areas, the elderly from poorer households exhibit a higher probability of wage labour participation in both the Rounds. They report that education does not play any systematic role in wage labour participation, as the pattern of participation of those having acquired secondary level education and that of a higher educated person is significantly different from that of the illiterate. On the basis of descriptive analysis within econometric analysis, they have found that the elders from smaller families are more likely to participate in the workforce. Using the Heckman sample selection regression, they have found that in 2009-10, in both rural and urban areas, the number of weekly days of work supply by the working population of the elderly does not have any significant relation with their age.

Rajan, et al. (2003) have analysed the elderly WFP only during the pre-globalisation period. Although Selvaraj, et al. (2011) have studied the WFP trend from 1983 to 2004-05, their study is limited to the description of trends and does not involve any analytical work. Only the study of Singh and Das (2012) is analytical. However, it suffers from some

limitations, as delineated below.

1. For instance, they have used data on current weekly status which is not as reliable as (say) principal status, because the reference period is very small (the week preceding the data of survey). The use of the current weekly status increases the probability of unemployment.
2. Another limitation is that Singh and Das (2012) have considered only wage labour. However, unpaid family labour is also important for aged workers. For instance, in the context of rural China, Pang, et al. (2004) report that the elderly tend to participate in the informal sector after withdrawing from the formal labour market. They report that about 62 per cent of the elderly and near-elderly people in rural China are participating in the informal sector, by undertaking activities like household chores and taking care of the grandchildren.

The present study aims to address these deficiencies. Using data on principal status, this study focuses on the changing levels and patterns of the WFP of the elderly in India in recent years as compared to the period just after globalisation. The analysis has been undertaken after disaggregating by place of residence and gender. In addition, an attempt has also been made to examine the nature of employment of the elderly workforce, captured by the extent of informalisation and occupational pattern. The analysis facilitates an assessment of the extent to which the elderly have succeeded in their struggle to secure economic independence through participation in the labour market.

III. DATABASE AND METHODOLOGY

1. Database

The two most important sources of data on the Workforce Participation Rate (WFPR) in India are the Economic Tables of the decadal Census, and the Employment and Unemployment schedule of the NSSO quinquennial survey. The last Census undertaken was in 2011, but as data on employment is yet to be released, the latest Census data on employment is available only for 2001. Further, the Census does not provide data on informal sector. In contrast, NSSO provides unit level data, and the availability of socio-economic information in the NSSO data allows for richer bivariate and multivariate analysis over socio-economic and demographic correlates. Moreover, NSSO provides information on the informal sector. So, we use NSSO data even though it is based on a sample survey. This study uses data from the 55th Round (1990-2000) and the 66th Round (2009-10) surveys of NSSO on the "Employment and Unemployment situation in India". The selection of these two rounds enables us to analyse changes in the WFP of elderly people following the second round of liberalisation in the 1990s.

The sampling design adopted for the two surveys was essentially a stratified multi-stage one for both rural and urban areas. The surveys used the interview method of data collection from a sample of randomly selected households. The first stage units (FSUs) were villages (panchayat wards for Kerala) for rural areas and NSSO Urban Frame Survey (UFS) blocks for urban areas. The ultimate stage units (USUs) were households. In the 55th Round, data

was collected for 7,00,934 individuals. Within this sample, 48,223 persons were aged 60 years and above. In the 66th Round, data was collected for 4,59,784 individuals, among which there were 36,774 individuals aged 60 years or above. Table 1 shows the percentage distribution of the elderly population by sex and place of residence in the 55th and 66th Rounds. The table reveals that the proportion of rural and urban elderly people increased marginally by 0.9 and 1.5 percentage points, respectively, over the study period. If we disaggregate the rural and urban population by gender, a similar marginal increase is observed.

Table 1
Percentage of Elderly Persons in the Population by Place of Residence and Sex

Group	1999-2000	2009-10
Rural male	7.24	7.87
Rural female	6.95	8.13
Rural	7.10	8.00
Urban male	6.01	7.51
Urban female	7.10	8.52
Urban	6.50	8.00

Source: Calculated from the NSS 55th and 66th Rounds.

2. Some Methodological Issues

Two important macro measures of the decision to work are the Labour Force Participation Rate (LFPR) and the WFPR. The LFPR of elderly people shows the percentage of the elderly population that is in the labour force,⁴ while the WFPR of elderly people indicates the percentage of the elderly population that is in the workforce.⁵ Now, a person may be willing to work, but may not be able to find work (unemployed). In that case, the person is deemed to be part of the labour force, but not part of the workforce. This creates a gap between the two measures. In both the Rounds, we have found that the number of unemployed elderly workers are minimal—only 12 (comprising 0.06 per cent of the labour force) and only 35 (comprising 0.30 per cent of the labour force) in the 55th and 66th Rounds, respectively. The low rates of unemployment among the elderly is in keeping with studies reporting that if the aged do not secure work, they tend to withdraw from the workforce (Vodopivec and Arunatilake, 2011)—referred to as hidden unemployment (OECD 2006). The marginal difference between the LFPR and WFPR implies that it does not make much difference whether we look at the LFPR, or the WFPR. Given the trivial nature of the choice, we focus on the WFPR.

In the 55th and 66th Rounds, the persons surveyed were classified into various activity categories on the basis of the activities pursued by them during certain specified reference periods. There were three reference periods for this survey. These are: (i) one year, (ii) one week, and (iii) each day of the reference week. Based on these three periods, three different measures of activity status are arrived at—usual status, current weekly status and current daily status.⁶ Usual status is determined on the basis of the usual principal activity and usual subsidiary economic activity of a person taken together. Usual status data is a better indicator regarding the presence in the labour market as it looks at the status of the

person over a longer reference period. In the 55th round and 66th round on the basis of usual subsidiary status data we have found only 3.4 per cent and 5.6 per cent elderly people are employed. Such a small percentage is not helpful for meaningful analysis. So, we have taken only the usual principal status data for our analysis.

3. Econometric Models

In this paper, in order to determine the influence of predictor variables on the WFPR of elderly by sex and place of residence, we have used the following model:

$$\begin{aligned} \text{WFORCE} = & \alpha + \beta_1 \text{AGE} + \beta_2 \text{LPCME} + \beta_3 \text{LPCME2} + \beta_4 \text{ILLITERATE} + \\ & \beta_5 \text{BPRIMARY} + \beta_6 \text{MIDDLE} + \beta_7 \text{SECONDARY} + \beta_8 \text{HIGHER} + \\ & \beta_9 \text{MUSLIM} + \beta_{10} \text{HSC} + \beta_{11} \text{HST} + \beta_{12} \text{OTHERS} + \beta_{13} \text{UNEMP} \end{aligned} \quad (1)$$

where

WFORCE = 1 if the respondent is a worker, = 0 otherwise

AGE = Age of the respondent

LPCME = Log of monthly per capita expenditure

ILLITERATE = 1 if the respondent is illiterate, = 0 otherwise

BPRIMARY = 1 if the respondent is below primary educated, = 0 otherwise

MIDDLE = 1 if the respondent is middle educated, = 0 otherwise

SECONDARY = 1 if the respondent is secondary educated, = 0 otherwise

HIGHER = 1 if the respondent is higher educated, = 0 otherwise

(PRIMARY, i.e. respondent has primary education, is taken as reference category)

MUSLIM = 1 if the respondent is a Muslim, = 0 otherwise

HSC = 1 if the respondent is a Hindu schedule caste, = 0 otherwise

HST = 1 if the respondent is a Hindu schedule tribes, = 0 otherwise

OTHERS = 1 if the respondent belongs to all others socio-religious identity, = 0 otherwise
(H-OTHERS, i.e. Hindu OBCs and forward castes, is the reference category)

UNEMP = State level unemployment

Region-specific fixed effect are also included, taking CENTRAL as the reference category.

Here the dependent variable—whether the respondent is working or not—is binary. In case of a binary choice model, we use either the logit or probit model.⁷ Now, one possible problem with model (1) is reverse causality. We know that monthly per capita expenditure level influences the individual's decision to work. On the other hand, if a person participates in economic activities, his/her participation in the workforce increases household income, and hence expenditure. In order to check the endogeneity between the above-mentioned variables, we have used two tests of endogeneity, namely, the Hayashi test⁸ and the Wu-Hausman⁹ test (results are reported in the Appendix). Both the statistics are significant at a 1 per cent level of significance (Table A1), so that we can reject the null hypothesis of exogeneity. Given that there is a two-way relation between monthly per capita expenditure level and work participation of the elderly, estimating logit or probit models may lead to biased estimates (endogeneity). To solve this endogeneity problem caused by reverse causality, Arellano (2008) suggests a control function approach using a two step probit model.

Let the initial model be as follows:

$$Y = 1 (\alpha + \beta X + U \geq 0)$$

$$X = \pi Z + \sigma v$$

Here $\begin{pmatrix} U \\ V \end{pmatrix} | Z \sim N \left[0, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right]$

In this model, X is an endogenous explanatory variable if $\rho \neq 0$ and exogenous if $\rho = 0$. U is an error term which is correlated with X but not with the instrument Z. Further, $E(U) = 0$ and $E(ZU) = 0$. The two step estimation of the model is given below:

Step 1: We have to obtain the Ordinary Least Square (OLS) estimates $(\hat{\pi}, \hat{\sigma}_v)$ of the first stage equation and then form standardized residual $\hat{v}_i = (x_i - \hat{\pi} z_i) / \hat{\sigma}_v$, $i = 1, 2, \dots, N$.

Step 2: Run an ordinary probit of y on constant, x, and i to obtain consistent estimates of the parameter.¹⁰

In our study, the functional forms of LPCME and WFPR are hypothesised as follows:

LPCME = f (WFPR, other explanatory variables)

WFPR = g (LPCME, LPCME2, other explanatory variables)

Following the Arellano's control function approach we have to identify an instrumental variable (IV) that affects the LPCME but not the WFPR of elderly. In our model, the instrumental variables are the number of non-aged working members of the family and percentage of elderly members co-residing with their children in the state. We first regress LPCME on the instrument and other variables. Based on this model, we estimate predicted residual and form standardized residual (SRES). As WFPR is the function of LPCME and LPCME2, we have calculated SRES and square of SRES (SRES2). We then estimate WFPR on SRES, SRES2 (in place of LPCME and LPCME2) and other variables to obtain unbiased consistent estimates. This model is estimated for only the aged sample.

One problem with the above model is that it does not incorporate information on the physical ability of the aged respondent and residential arrangements—even though such factors affect the ability of the aged to participate in the labour market and the economic pressure to work, respectively. As such information is available only in the NSSO Morbidity and Health Care round (60th Round data), undertaken in 2004, we have also estimated a revised model of WFP using this data.

In order to determine the influence of predictor variables on the informal sector participation of the people, we have used the model:

$$\begin{aligned} \text{IFS} = & \alpha + \beta_1 \text{LPCME} + \beta_2 \text{LPCME2} + \beta_3 \text{UNEMP} + \beta_4 \text{ILLITERATE} + \\ & \beta_5 \text{BPRIMARY} + \beta_6 \text{MIDDLE} + \beta_7 \text{SECONDARY} + \beta_8 \text{HIGHER} + \\ & \beta_9 \text{MUSLIM} + \beta_{10} \text{HSC} + \beta_{11} \text{HST} + \beta_{12} \text{OTHERS} \end{aligned} \quad (2)$$

where,

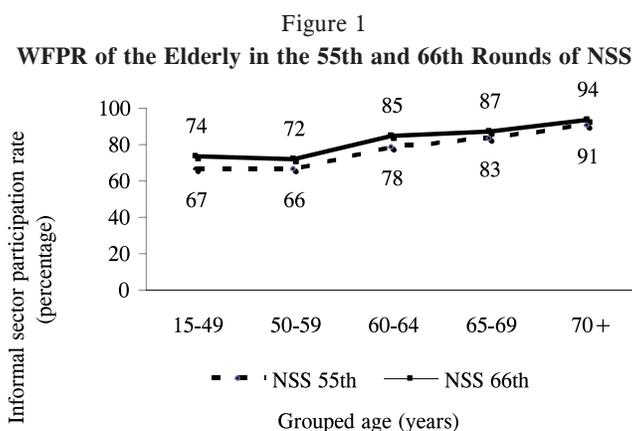
IFS = 1 if the respondent participating in the informal sector, = 0 otherwise

Other variables are same as (1).

IV. RECENT CHANGES IN THE WFPR IN INDIA

In India, the WFPR of elderly people decreased from 39 per cent (1999-2000) to 32 per cent (2009-10)—a decline of seven percentage points over the study period. Selvaraj, et al. (2011) had argued that the declining trend in the WFPR of the elderly in India is due to a decrease in the WFPR among the urban elderly, who are less likely to participate in the workforce. However, Figure 1 shows that the WFPR decreased for all the groups (rural male, rural female, urban male, urban female) over the study period. The greatest fall in the WFPR is observed among the urban elderly males (a decline of nine percentage points), followed by that among the rural male elderly (a decline of eight percentage points). The least decline is observed among the urban females (a decline of two percentage points). The pooled regression results (taking the NSS 55th and 66th Rounds together, and incorporating a TIME dummy to capture between-round changes in the work participation) also confirms that the WFPR decreased in the 66th Round, compared to the 55th Round, for all groups (Appendix Table A2).¹¹

The moot question is whether this decline is the result of a deliberate withdrawal from the labour force, or whether it can be attributed to factors like declining job opportunities, poor health, lack of skills commensurate with modern production techniques, and inconvenient public transport, among other things (Pandey, 2009). In times of distress, both the work participation rates of females, children and elderly people, and unemployment increase as the demand for jobs increases at a higher rate than the creation of job opportunities (Himangshu, 2011). Given that the unemployment rate of the elderly population was marginal in both the Rounds, the declining WFPR is likely to be a result of a withdrawal of the aged from the workforce.



Source: NSS 55th and 66th Rounds.

The reduction in the supply of labour with regard to the elderly may be a response to a change in real earnings or it may be due to general prosperity, particularly in rural areas. Abraham (2009) found that the WFPR of the rural elderly population increased between 1999-2000 and 2004-05 due to a decline in the earning capacity of normal income-earners. Over a longer time period (1999-2000 and 2009-10), however, the daily average real earnings

of non-elderly people (in both rural and urban India) has increased.¹² This may be one of the reasons for the declining participation of the elderly in the workforce in rural and urban India. In particular, populist Government policies before the 2009 General Elections (like waiver schemes) and the success of various programmes including the Mid Day Meal Scheme (MDMS), the Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) and the Public Distribution System (PDS) buffered the Indian economy from the adverse effects of the global economic crisis on the Indian economy and the drought of 2009 (Himangshu, 2011; Khera, 2006; 2011).

1. Changes in the WFPR across Socio-economic Strata

Obviously the socio-economic implications of a decreasing WFPR would depend upon which socio-economic stratum has experienced the greatest decline in WFPR over the two rounds. In this section, we analyse changes in the WFPR across expenditure groups. In order to analyse the work participation of the elderly belonging to different expenditure groups, we have taken quintile divisions of the monthly per capita expenditure. The five groups are labelled as follows: Poorest, Poor, Middle, Rich and Richest. Table 2 shows that the WFPR of rural males increases over quintile groups, while that of the remaining gender-residence groups (rural female, urban male and urban female) decreases. The results also reveal marginal changes in the WFPR over the two rounds for most of the quintile groups. Only among rural males (top 20 per cent) and urban males (top 40 per cent) has the decline in the WFPR been greater than four percentage points.

Table 2
WFPR of the Elderly by Expenditure Group, Sex and Location of Residence in the 55th and 66th Rounds of the NSS (Percentage)

<i>Gender and Place of Residence</i>	<i>Round</i>	<i>Expenditure Group</i>				
		<i>Poorest</i>	<i>Poor</i>	<i>Middle</i>	<i>Rich</i>	<i>Richest</i>
Rural Male	NSS 55th	56.9	59.8	63.5	64.9	65.8
	NSS 66th	57.6	60.7	61.4	63.6	58.6
	Difference	0.8	1.0	-2.0	-1.4	-7.2
Rural Female	NSS 55th	17.1	16.1	15.8	15.3	13.4
	NSS 66th	15.0	15.3	15.4	17.8	14.4
	Difference	-2.1	-0.9	-0.4	2.5	1.1
Urban Male	NSS 55th	45.0	44.0	40.1	39.0	32.3
	NSS 66th	43.0	44.0	38.8	33.3	28.3
	Difference	-2.0	-0.1	-1.2	-5.7	-4.1
Urban Female	NSS 55th	13.1	10.0	8.0	5.0	3.2
	NSS 66th	10.2	10.7	8.4	5.1	3.1
	Difference	-2.9	0.7	0.4	0.1	-0.1

Source: Calculated from the NSS 55th and 66th Rounds.

2. Econometric Analysis

One limitation of the bivariate analysis is the failure to control for variables like socio-religious identity, geographical zone of residence, and other determinants of the WFP.

In order to remedy this deficiency, we have estimated the multivariate regression model, using the methodology described in Section III, to identify determinants of the WFP. Table 3 presents results of the regression model for determinants of the WFP of the rural male, rural female, urban male and urban female elderly. In all eight models, the LR χ^2 statistic is significant, indicating that the overall models are significant.¹³ The pseudo R² values show that all the independent variables explain 13 to 16 per cent of the variations in the dependent variables. These are acceptable given that we are using cross-sectional data.

The results reveal, predictably, that the WFP declines with age. In rural areas, the WFP increases with the household expenditure levels, but at a decreasing rate. In contrast, in urban areas, elderly persons from affluent families are less willing to re-enter the labour market, possibly because they enjoy economic security. Larger families have more potential working members, in general; this reduces pressure on the elderly persons to work. The impact of education varies, depending upon the gender of the respondent. Among aged male workers, the WFP initially rises, but subsequently declines with education—an inverse U-shaped curve is observed; in the case of female aged workers, we observe a negative relationship between the WFP and education. In urban areas, however, aged women with more than 12 years of education are more likely to be found to be working, in both the Rounds. In general, Hindu upper castes tend to have a higher WFP than aged members from other socio-religious groups. There are, however, several exceptions—urban female Muslims (55th Round), female SCs

Table 3
Determinants of WFP of the Elderly in the 55th and 66th Rounds—
All-India, by Place of Residence and Gender

Variable	Rural Male		Rural Female		Urban Male		Urban Female	
	NSS 55th	NSS 66th	NSS 55th	NSS 66th	NSS 55th	NSS 66th	NSS 55th	NSS 66th
AGE	-0.03*	-0.03*	-0.01*	-0.02*	-0.02*	-0.03*	-0.005*	-0.004*
LPCME	0.03*	0.03*	-0.02*	0.004*	-0.004*	-0.01*	-0.03*	-0.01*
LPCME2	-0.01*	-0.02*	-0.001*	-0.01*	-0.001*	0.01*	-0.001*	-0.001*
HHSIZE	-0.01*	-0.01*	-0.02*	-0.02*	-0.005*	0.001*	-0.01*	-0.01*
UNEMP	0.10*	-0.01*	-0.39*	-0.003*	1.04*	0.01*	0.02*	-0.0002*
Education Level (Ref. Cat. Primary)								
ILLITERATE	-0.07*	-0.12*	0.03*	0.02*	-0.02*	-0.01*	0.02*	0.01*
PRIMARY	-0.03*	-0.08*	0.03*	-0.01*	-0.01*	-0.04*	-0.004*	0.01*
MIDDLE	-0.05*	-0.05*	0.02*	-0.03*	-0.04*	-0.03*	-0.004*	-0.01*
SECONDARY	-0.22*	-0.18*	-0.04*	-0.08*	-0.16*	-0.16*	-0.02*	-0.03*
HIGHER	-0.16*	-0.31*	-0.07*	-0.10*	-0.22*	-0.24*	0.08*	0.01*
Socio-religious Identity (Ref. Cat. HINDU OTHERS)								
MUSLIM	-0.03*	-0.01*	-0.03*	-0.06*	-0.0003*	-0.02*	0.01*	-0.005*
HSC	-0.06*	-0.04*	0.02*	0.01*	0.03*	-0.34*	0.06*	0.03*
HST	0.04*	-0.02*	0.09*	0.06*	-0.003*	-0.12*	0.06*	0.05*
OTHERS	-0.01*	0.003*	-0.01*	-0.03*	-0.02*	-0.01*	0.0001*	0.001*
Region-specific Fixed Effect (Ref. Cat. CENTRAL): Included in All Models, but not reported								
PSEUDO R ²	0.14	0.16	0.15	0.15	0.10	0.13	0.16	0.16

Note: * denotes significance at 1%.

Source: Calculated from the NSS 55th and 66th Rounds.

(in both rural and urban areas, and in both Rounds), rural male STs (55th Round), female STs (in both rural and urban areas, and in both Rounds), and other minorities (rural males in the 66th Round, and urban females in both Rounds).

In the next step we extend the above model by incorporating:

1. Physical health of the aged respondents, determining their ability to participate in the labour market. This is captured by the mobility of the respondents and freedom from chronic ailments; and,
2. Economic pressure on the aged to rejoin the workforce after retirement captured through economic independence and residential arrangements.

We have, therefore, run a revised model of the WFP by using the NSSO Morbidity and Health Care (60th Round, 2004), which has all this information. The only instrument taken is the number of non-elderly workers, while additional variables in the form of residential arrangements, mobility of the respondent, whether the respondent suffers from chronic ailments, and the economic independence of the respondent are incorporated in the second stage model. The results are reported in Table 4.

Table 4
Determinants of WFP of the elderly in the 60th Round—
All-India by Place of Residence and Gender

<i>Variable</i>	<i>Rural Male</i>	<i>Rural Female</i>	<i>Urban Male</i>	<i>Urban Female</i>
Mobility of respondent: Ref. Cat. Immobile				
Mobile	0.29*	0.06*	0.21*	0.02*
Freedom from chronic ailment: Ref. Cat. No ailment				
Chronic	-0.05*	-0.02*	-0.05*	-0.01*
Economic independence of the respondent: Ref. Cat. Economically dependent				
Economic independence	0.38*	0.16*	0.34*	0.12*
Living arrangement (Ref. Cat. Living with spouse or with spouse and others)				
Living with child but not spouse	-0.07*	-0.04*	-0.05*	-0.02*
Living with others including grandsons	-0.22*	-0.02*	0.05*	-0.01*
Living with others but not grandsons	-0.09*	-0.02*	0.04*	-0.01*
Other control variables	YES	YES	YES	YES
Pseudo R2	0.23	0.10	0.20	0.20

Note: * denotes significance at 1%.

Source: Calculated from the NSS 60th Round.

The results (Table 4) indicate that the physical health of the respondent—captured through mobility and chronic ailments—is an important determinant of the decision to work. In both cases, the expected signs (positive and negative, respectively) are obtained. It is also observed that economically independent aged persons generally withdraw themselves from the labour force. This may be attributed to the economic security enjoyed by such persons, which reduces the economic pressure on them to work. An analysis of the impact of the residential arrangements reveals that elderly persons residing with their spouses (with or without other relatives) are, in general, more likely to work.

The analysis in this section indicates that the elderly belonging to low-income households might not have been adversely affected by changes in the economic conditions or in the labour market. However, before arriving at a firm conclusion, we must also examine the quality of employment. In this study, the quality of employment is captured by the extent of informalisation and the occupational pattern.

V. THE INFORMAL SECTOR AND THE ELDERLY

The quality of employment may be captured through different indicators. One of these indicators is the extent of informalisation of the workforce. The concept of the informal sector was first propounded by the social anthropologist Keith Hart (1970), and popularised in the ILO report on employment in Kenya (ILO, 1972). The informal sector primarily comprises the urban self-employed labour force and those engaged in household production enterprises. It is not recognised by the Government, which is why its economic activities are not included within the national income statistics; nor is this sector subject to regulations or provided Government support (De Soto, 1989), despite its substantial coverage. This makes entry or exit easy and imparts flexibility in the operation of informal sector units. Consequently, the informal sector has been viewed as a refuge of reserve labour in urban areas. Further, early studies argued that, given its unregulated nature, employers in the informal sector were able to retain informal labour at low wages, without providing social security and good working conditions.

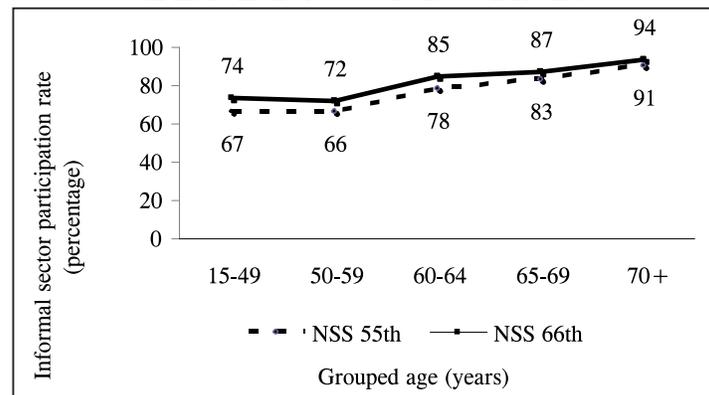
While initial researchers equated the informal sector with traditional and low-end technology, it has now been recognised that certain segments of the informal sector are capable of considerable adaptation. In particular, globalisation has resulted in economic integration of the formal and informal sectors, resulting in the emergence of a dynamic, rapidly growing and profitable segment within the informal sector (Arye, 1981). Thus, mere employment in the informal sector need not imply that the worker is in distress—as the experience of East Asian countries shows (Fields, 1990; Lubell, 1991; Charmes, 1998)—and educated workers may deliberately join the dynamic segment of the informal sector to earn decent wages. Therefore, the occupational distribution—which we will consider in Section VI—is also important.

1. Trends in Informalisation in India

In India, the informal sector is the largest employment-providing sector (Sakthivel and Joddar, 2006). Given that the population and workforce now contain a greater share of aged persons, we would expect the extent of informalisation to increase over time. As expected, we find that the proportion of workers aged 15 years and above who are engaged in the informal sector, grew from 67.59 per cent in 1999-2000 to 74.57 per cent in 2009-10. An analysis of the participation of the workforce¹⁴ in the informal sector reveals a positive relation between age and informal sector participation in both the Rounds (Figure 2). This is not surprising, given that full-time employment in the public sector is possible only up to 60, or at most, 65 years of age. More important is the fact that informalisation has increased over the study period for all age groups. The increasing informalisation of the

elderly workforce may simply be due to the increase in the number of workers aged above 65, or even 70, years. As the number of avenues for employment in the formal sector is limited for such workers, the increasing proportion of ‘middle-old’ (persons aged 70-80 years) in the population and workforce should result in an increase in the proportion of informal sector workers among the elderly. While the data does show an increase in the proportion of workers aged 65 years and above, it also reveals the increasing informalisation of workers in the 60-65 year age bracket by about 6 per cent. While this result may be attributed to jobless growth in the Indian economy, which has been squeezing out the elderly from the formal sector, such an explanation overlooks recent trends in employment in India. Studies report that while the growth rate of organised sector employment declined from 0.4 per cent per annum during the period 1994-2000 to -1.1 per cent in 2004-05, it subsequently increased to 0.7 per cent in 2005-08 (Papola, 2013). Goldar (2011) found the size of the organised manufacturing sector to have increased at the rate of 7.5 per cent per annum between 2003-04 and 2008-09; similar findings have also been reported by Himangshu (2011). What is more likely, therefore, is that the increasing integration of the formal and informal sectors has led to the creation of job opportunities and an increase in real earnings in the latter.¹⁵ Given the easy nature of entry into the informal sector labour force, this has led to aged workers from low-income households flowing to this sector for the purpose of augmenting household income.

Figure 2
Informal Sector Participation of Different Age Groups
in India in the NSS 55th and 66th Rounds

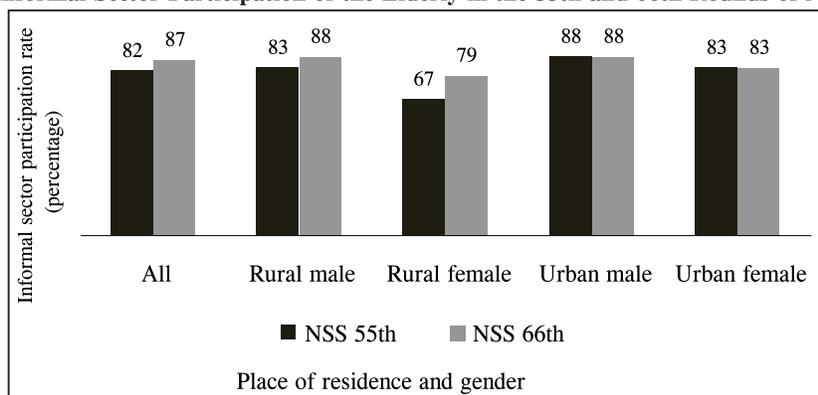


Source: NSS 55th and 66th Rounds.

Figure 3 presents the results of informalisation among the elderly workforce by disaggregating the place of residence and gender. Given the disadvantaged position of women in the labour market in most parts of the developing world—the result of long-standing societal norms which discourage the social and economic integration and advancement of women—a majority of the female workers are engaged in the informal sector (Sethuraman, 1998). This has also been observed in India (Figure 3). We also find that informalisation has increased among the rural male and rural female workers by 6 and 12 percentage points,

respectively. In contrast, the informal sector participation of elderly workers of both genders has remained about the same in urban areas in both the Rounds.

Figure 3
Informal Sector Participation of the Elderly in the 55th and 66th Rounds of NSS



Source: NSS 55th and 66th Rounds.

Econometric analysis¹⁶ indicates that the variable TIME is significant and negative for rural males and urban females at a 1 per cent level; it is statistically insignificant for rural female and urban male workers (Appendix Table A3). This is in contrast to the results of the bivariate analysis reported in Figure 3, wherein we had seen that informalisation had increased among the elderly in rural areas but had remained the same in urban areas. Econometric results are consistent with only the bivariate results for urban male workers. In the case of the remaining three groups, changes in the demographic and social structure may have masked the true change in informalisation. The coefficient is particularly high for urban females, indicating that they have been the biggest losers. This may have happened because the aged female workers are in a disadvantageous position, which prevents them from competing with other workers—both younger females and elderly males—who are more capable of adjusting themselves to the demands of the technology and organisational forms emerging in the informal sector (Jhabvala and Sinha, 2002).

An analysis of the changes in the level of informalisation among urban males by expenditure levels (Table 5) reveals a sharp increase in informalisation among the first three expenditure quintiles (bottom 60 per cent of the sample) in rural areas. The trend is less clear in urban areas. Among male workers, the phenomenon of informalisation has changed only marginally. The percentage of female workers engaged in the informal sector has increased by 10 per cent in the top quintile. This may indicate a shift to household-based part-time jobs by women from affluent households. On the other hand, there has been a decline in the share of women workers in the informal sector from the bottom quintile group. Given the vulnerability and poor health status of elderly women (Eapen, 2001), this may reflect their inability to continue working. Another possibility is that these women may shift to household activities like looking after their grandchildren, cooking, and similar chores, thereby facilitating the entry of younger and more productive women into the labour market.

Table 5
**Informal Sector Participation of the Elderly by Expenditure
 Quintiles in the 55th and 66th Rounds of NSS**

<i>Expenditure Group</i>	<i>NSS 55th</i>	<i>NSS 66th</i>	<i>%age change</i>	<i>NSS 55th</i>	<i>NSS 66th</i>	<i>%age change</i>
	<i>Rural Males</i>			<i>Urban Males</i>		
Poorest	70.13	78.61	12.1	82.77	85.00	2.7
Poor	75.17	84.81	12.8	90.08	85.82	-4.7
Middle	80.66	88.40	9.6	88.23	90.46	2.5
Rich	86.47	90.90	5.1	89.25	90.48	1.4
Richest	91.27	94.18	3.2	91.04	89.46	-1.7
	<i>Rural Females</i>			<i>Urban Females</i>		
Poorest	51.25	69.70	36.0	78.75	72.66	-7.7
Poor	61.60	75.82	23.1	82.83	88.28	6.6
Middle	65.82	77.13	17.2	84.27	81.36	-3.5
Rich	71.83	82.26	14.5	91.07	87.01	-4.5
Richest	83.47	86.01	3.0	82.28	90.57	10.1

Source: Calculated from the NSS 55th and 66th Rounds.

2. Determinants of Informalisation

Table 6 presents the results of the probit model of determinants of informal sector participation only for the aged workers.

Regression results reveal the existence of an inverse U-shaped relationship between education and informalisation among male workers. While Lubell (1991) had noted that informal sector workers in South Asia had very low levels of education, it appears that a new trend is emerging with the informal economy in India converging towards that of the South-east Asian economies.¹⁷ Aged male workers with middle and secondary level education may be able to secure jobs in the dynamic, productive and lucrative 'upper-tier informal sector' (Fields, 1990; Charnes, 1998), while respondents with even higher education levels are able to access jobs in the formal sector. On the other hand, urban females with 5–8 years of schooling seem to be more suited to find jobs in the urban informal sector.

Male workers from affluent households seem to find it easier to enter the informal sector. This is another indication of the dynamic nature of the informal sector. Expectedly of course, the supply of labour to the informal sector tapers off at high levels of household expenditure. This possibly reflects a withdrawal of labour from affluent households as the savings made during their working period may provide them with the necessary economic security; their children also may be in a position to provide for their economic needs.

One important finding is that the workers from the disadvantaged castes are participating less in the informal sector than their counterparts from among the Hindu upper class. This may be because of reservation. However, the probability of a Muslim male participating in the informal sector is significantly higher than that of a Hindu upper caste worker in urban areas. This is in keeping with studies of the Muslim community (GoI, 2006). Over time, the participation of Muslim female workers in the informal sector has gone down (coefficients fall from 0.06 to -0.16). This may be attributed to a fall in the demand for items produced by household-based women workers, with such items being produced in factories. It may also

Table 6
**Determinants of Informal Sector Participation of the
 Elderly People in the 55th and 66th Rounds of NSS**

Variable	Population Aged 60 Years and above							
	Rural Males		Rural Females		Urban Males		Urban Females	
	NSS 55th	NSS 66th	NSS 55th	NSS 66th	NSS 55th	NSS 66th	NSS 55th	NSS 66th
LPCME	0.59*	0.52*	-1.00*	1.33*	0.38*	0.45*	-0.24*	1.12*
LPCME2	-0.03*	-0.02*	0.11*	-0.07*	-0.02*	-0.03*	0.02*	-0.07*
HHSIZE	0.03*	0.03*	0.05*	0.06*	0.01*	0.02*	0.01*	0.01*
UNEMP	-1.07*	0.02*	0.50*	0.005*	0.06*	0.003*	0.47*	0.01*
Education Level (Ref. Cat. PRIMARY)								
ILLITERATE	-0.12*	-0.08*	-0.06*	-0.08*	-0.04*	-0.07*	-0.45*	-0.10*
BPRIMARY	-0.04*	-0.02*	0.13*	-0.12*	-0.003*	-0.02*	-0.93*	-0.08*
MIDDLE	-0.004*	0.02*	0.22*	0.05*	0.03*	-0.06*	-0.93*	0.18*
SECONDARY	0.08*	0.10*	-	-	0.03*	0.02*	-0.92*	-0.30*
HIGHER	-0.01*	-0.03*	-	0.17*	-0.001*	-0.05*	-0.95*	-0.20*
Socio-religious Identity (Ref. Cat. HINDU OTHERS)								
MUSLIM	-0.05*	-0.08*	-0.18*	-0.005*	0.04*	0.05*	0.06*	-0.16*
HSC	-0.22*	-0.15*	-0.25*	-0.26*	-0.08*	-0.08*	-0.06*	0.49*
HST	-0.04*	-0.09*	-0.07*	-0.04*	-0.03*	0.43*	-0.06*	-0.02*
OTHERS	-0.12*	-0.16*	-0.12*	-0.18*	0.01*	-0.03*	-0.08*	-0.07*
Region specific fixed effect Included (Ref. Cat. CENTRAL)								
PSEUDO R2	0.18	0.16	0.18	0.19	0.08	0.07	0.14	0.13

Note: The variable SECONDARY and HIGHER in the 55th Round and SECONDARY in the 66th Round for the rural female elderly population predicts success perfectly. These variables are dropped in the result. * denotes significance at the 1% level.

Source: Calculated from the NSS 55th and 66th Rounds.

reflect the incapability of the latter to adjust themselves to the demands of the technology and organisational forms emerging in the informal sector (Jhabvala and Sinha, 2002) due to lower levels of education and social restrictions on movement and interaction. The participation of female SC workers in the urban informal sector has also gone up sharply.

Among other findings are the facts that aged workers from larger households are more likely to join the informal sector, and that the prevalence of high levels of unemployment in the state are is more likely to push aged workers towards the informal sector.

VI. OCCUPATIONAL STRUCTURE

Our analysis indicates so far that the WFPR of the aged has decreased as a result of rural prosperity. The extent of informalisation, on the other hand, has either increased (in rural areas) or remained the same (urban areas). Given that real earnings have increased in the informal sector, this need not necessarily be an alarming development. However, before arriving at a conclusion on this issue, it is necessary to examine the occupational pattern of elderly workers. Two questions become important in this context: is there any substantial level of segregation in occupational choice between the elderly and near-elderly workers? The absence of segregation would indicate that workers probably choose to remain in the same occupation after crossing 60 years. As part of the second step, we will identify the

sectors wherein aged workers are concentrated and examine whether these are high-earnings or low-earnings sectors.

1. Occupational Segregation

Occupational segregation refers to the inequality in the concentration of two groups (here, the elderly and near-elderly) of workers in different occupational categories. An analysis of occupational segregation helps us to determine the objective and subjective status of aged workers and to trace the reasons for differences between the wages earned by the aged and near-aged workers. A commonly used measure of occupational segregation, suggested by Duncan and Duncan (1955), is:

$$D = \frac{1}{2} \sum_{i=1}^n \left| \frac{p_i}{P} - \frac{r_i}{R} \right|$$

When p_i is the number of workers from the first group in i th occupation, r_i is the number of workers from the second group in i th occupation, and P and R are the respective group sizes. D ranges from zero to one, while a higher value for the index shows a higher degree of segregation.

Given that D is not sensitive to occupational distributions, Hutchens (2004) computes an alternative measure of segregation, called the ‘square root’ segregation index. This measure facilitates the additive decomposition of segregation, allowing us to define segregation as the summation of ‘between group segregation’ and ‘within group segregation’. Let P_j be the number from social group A (elderly) in unit j and R_j be the number from social group B (near elderly) in unit j , and P and R be the total number of observations in groups A and B. The square root segregation index S is defined as:

$$S = 1 - \sum_j \sqrt{\left\{ \frac{P_j}{P} \right\} * \left\{ \frac{R_j}{R} \right\}} \quad j = 1, 2, \dots, J$$

Or equivalently:

$$S = \sum_j C_j \quad \text{Where } C_j = \frac{R_j}{R} - \sqrt{\left\{ \frac{P_j}{P} \right\} * \left\{ \frac{R_j}{R} \right\}}$$

‘ S ’ represents the summation of each unit’s shortfall from distributional equality. For each value of occupation, this shortfall is the difference between the geometric mean of the shares of individuals with different backgrounds characterised by group of age when there is no segregation, and the geometric mean of the actual shares.

Table 7 reports occupational segregation between the above two groups of workers, that is, the elderly and near-elderly, in each Round—disaggregating the sample by place of residence and gender. We present results for both the two-digit and three-digit classification systems. Changes are marginal—with an increase being observed in rural areas, and a decrease in urban areas. The low value of the segregation index suggests that aged workers continue to use their skills and experience by remaining in the same occupation after ‘retirement’—as the econometric results suggest, they only shift from the formal to the informal sector. Given that the latter is typically an unregulated sector, this would allow employers to exploit the skills and experience levels of elderly workers by offering them wages below the market rate.

Table 7
Occupational Segregation between the Elderly and Near-elderly

Classification Digit	Group	Duncan Index		Hutchens Index	
		NSS 55th	NSS 66th	NSS 55th	NSS 66th
2-digit Classification	Rural male	0.18	0.23	0.03	0.05
	Rural female	0.04	0.07	0.01	0.02
	Urban male	0.27	0.27	0.06	0.06
	Urban female	0.25	0.23	0.08	0.07
3-digit Classification	Rural male	0.21	0.24	0.06	0.06
	Rural female	0.08	0.09	0.03	0.03
	Urban male	0.39	0.31	0.15	0.10
	Urban female	0.34	0.30	0.16	0.11

Source: Calculated from the NSS 55th and 66th Rounds.

2. Occupational Structure and Earnings

As part of the last step of our analysis, we have examined the occupational pattern of the elderly sectors to identify the sectors wherein they are concentrated. We then estimate the average earnings of all workers in each occupational category to find out whether the occupations wherein the elderly workers are concentrated are high-earning or not. The tables are reported in Appendix (Table A4-A7). In the top panels of the tables, we have listed occupations (as per the two-digit NCO 2004 classification) where at least 2 per cent of the elderly workers are concentrated; this is followed by another panel, giving information for the remaining occupations. Corresponding to each occupation, we have given the proportion of aged workers and mean daily earnings of all workers.

Tables A4 and A5 present changes in the occupational structure of aged workers in rural areas. Both male and female rural workers are predictably concentrated in the primary sector (83 and 85 per cent workers, respectively, in 1999-2000). This is important as engagement in occupations in the primary sector, where food is directly produced, ensures a minimum level of security and protection against hunger. While the concentration in primary sector persisted in 2009-10, the proportion of aged workers in such occupations declined by 10 and 7 percentage points, respectively. This implies an increase in the vulnerability of elderly workers. In contrast, the aged elderly workers in urban areas are found to be concentrated in the service sector. In recent years, the percentage of workers in services has declined for both male and female workers.¹⁸ Another important point to be noted about the occupational structure is that most of the occupations wherein aged workers are concentrated are low-earning occupations. In the tables, the top ten earning occupations in each Round are shaded grey. It is easy to see that very few of the occupations with more than 2 per cent of the aged workers belong to the high-earning categories. This is an issue of concern. Interestingly, within the low-paying sector, the earnings of elderly workers (given in parantheses) are not necessarily below those of the average earnings in each occupational category. In several occupational categories, the elderly workers are earning more than the average payments in these occupational categories, while in some occupations, the gap between the average earnings and earnings of elderly workers is marginal. Variations in the earnings of aged

workers and the wage gap between the elderly and near-elderly workers across occupational categories requires greater in-depth analysis.

VII. CONCLUSION

As developments in the health sector prolong the life-cycle, the issue of meeting consumption and health needs of the aged becomes an increasingly important issue. In European and North America countries, the emergence of the concept of the welfare state has resulted in the creation of a social security system in many of these countries which ensures a minimum level of physical well-being for the elderly. Moreover, the realisation that longevity is increasing has also led to changes in the work and savings patterns which complements the efforts of the State. In developing countries, on the other hand, policies targeting the elderly from low-income households have failed to attain their objectives. This calls for other substitutes to protect the aged population from destitution and poverty. One such instrument is the labour market.

Our analysis finds a decline in the WFPR among the elderly. This is accompanied by a high level of informalisation of the aged workforce. This may be interpreted as a matter of concern, particularly if we take the Lewisian view of the informal sector as a traditional, low-productive and stagnant sector. However, when we take into account the effects of rural growth and expansion of employment opportunities in the manufacturing sector, the decline in WFPR appears more as a deliberate withdrawal from the labour force, rather than forced unemployment. Moreover, recent studies have pointed out that the informal sector is not homogeneous, but may contain a highly vibrant and productive segment with close links to the formal sector. If by using their skill and experience, aged workers are able to secure work in these sectors, the growing informalisation need not necessarily be alarming.

A study of the occupational structure and earnings can shed some light in this regard. Such an analysis reveals that aged workers are employed in sectors that are typically low-earning. However, contrary to expectations, their wages are not always lower than the average earnings in these occupational categories. Although this is a positive feature of the informal sector in India, further analysis, particularly that based on micro-studies, is necessary to substantiate such findings and allow us to conclude that the condition of aged workers has improved.

We should also note that our study period is only up to 2009-10. The study focuses on a period during which populist measures like the loan waiver schemes and programmes to ensure inclusive growth like PDS, MNREGA and MDMS were in full swing. However, it was also at this time that the economy was approaching the doldrums. Inflation was entering into double digits, while industrial and overall economic growth would soon start their slump. This would be followed by troubles in the external sector—persistent Current Account deficit followed by a decline in Foreign Institutional Investment (FII) and devaluation of the rupee. All these had an adverse effect on the economy, which would be reflected in the labour market. Extending the study period to the next major NSS Round may, therefore, find the bell tolling for the elderly workers. In such circumstances, the market would become an

unreliable substitute of the Government-provided social security network unless compensatory policies were adopted.

One of the tenets of globalisation was the increasing non-involvement of the State in the market and economy. This trend must not be confused with distancing the State from the social sector. In the context of the growing proportion of elderly persons in India's population, public policy must be targeted to reduce structural rigidities obstructing the entry of elderly workers into the labour market. Simultaneously, employers should be encouraged to discard the notion that elderly workers have outdated skills and low capability for adaptation and appreciate that the experience, skill and loyalty of such workers can make them a valuable asset. This realisation would motivate employers to modify job specifications and operations, and redesign work to facilitate the employment of aged workers. In this context, it should be kept in mind that aged workers are easily stressed, particularly as their working conditions are poor (OECD, 2006). While regulations to improve working conditions should be introduced, a potential solution to reduce work-related stress is to offer elderly workers flexible working hours in the form of part-time employment. Although this may lead to co-ordination problems within the workforce, the lower wages paid to elderly workers can compensate for such co-ordination costs. Another challenge before the State is to increase the substitutability between elder and younger workers. Although Goldin and Katz (2007) have shown that older workers are rapidly becoming closer skill substitutes for their younger counterparts, a similar trend is yet to be observed in India. This makes training an important issue. Although older workers are reluctant to enter training programmes, the increasing duration of working careers may help them overcome such reluctance—especially if it increases their flexibility with respect to occupational choice. Finally, investment in the health of the elderly workers is an important challenge before policy-makers. Poor health is a major reason for the withdrawal of the elderly from the labour market (Currie and Madrian, 1999). On the other hand, the aged from low-income households may be forced to work for monetary reasons, which is likely to aggravate their poor health. An important challenge before the State is thus to ensure healthy ageing through a public health policy which caters to the needs of the elderly. This would increase the motivation of the aged to work, while also reducing their dependence on the State social support system.

Acknowledgement

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Notes

1. If an individual is identified as a worker for the major part of the year, he/she is categorised as a worker on the basis of usual principal status.
2. If an individual is identified as a worker only for a minor part of the year, he/she is categorised as a worker on the basis of subsidiary status.
3. It is the activity status obtaining for a person during a reference period of seven days preceding the date of the survey.
4. Labour force includes persons who are working and those who are willing to work but may be currently unemployed.
5. Workforce includes persons who are currently working.
6. This activity status for a person is determined on the basis of his/her activity status on each day of the reference week.
7. In recent years, Linear Probability Models (LPM) have re-emerged as the latest fashion. The fundamental weakness of LPM is its underlying assumption that the probability of the event occurring increases linearly with the level of regressor. This may result in values of probability being greater than unity or less than zero. In addition, the assumption of homoscedasticity is often violated in LPMs.
8. Hayashi (2000) suggests the use of a C statistics (also known as a 'GMM distance' or 'difference in Sargan' statistic). This is defined as the difference of the Sargan-Hansen statistic of the equation with the smaller set of instruments (valid under both the null and alternative hypothesis) and the equation with a full set of instruments (that is, including the instrument whose validity is suspect). Under the null hypothesis that both the smaller set of instruments and the additional, suspect instruments are valid, the C statistic is distributed as χ^2 in the number of instrument tested.
9. The Wu-Hausman test checks for endogeneity of a variable by comparing instrumental variable estimates (2SLS) to ordinary least square estimates (OLS). The null hypothesis is that both the estimators are consistent but 2SLS is efficient: the alternative is that OLS is consistent while 2SLS is not. If we reject the null hypothesis, this means that 2SLS is inconsistent.
10. The control function approach departs from the standard two-stage model by regressing Y on standardised residuals, instead of regressing Y on predicted values of the instrument. Adopting the latter implies that our model will be:

$$Y = 1 (\alpha + \beta(Z) + \varepsilon \geq 0)$$

$$\text{where } \varepsilon \sim N(0, \sigma_\varepsilon^2) \text{ with } \sigma_\varepsilon^2 = 1 + \beta^2 \sigma_Z^2 + 2\beta\sigma_{Z,\rho}$$

The problem is that though it is possible to get consistent estimates of $\alpha/\sigma_\varepsilon$ and β/σ_ε , we cannot obtain consistent estimates of α and β from the estimates and as ρ is unknown (Arrelano, 2008, p. 5).

11. $WFORCE = \alpha + \beta_1 AGE + \beta_2 LPCME + \beta_3 LPCME2 + \beta_4 ILLITERATE + \beta_5 BPRIMARY + \beta_6 MIDDLE + \beta_7 SECONDARY + \beta_8 HIGHER + \beta_9 MUSLIM + \beta_{10} HSC + \beta_{11} HST + \beta_{12} OTHERS + \beta_{13} UNEMP + \beta_{20} TIME$. Reported in Appendix Table, Table A2.
12. Daily average real earnings of non elderly people increases from Rs. 87.73 in 1999-2000 to Rs. 137.98 in 2009-10.
13. We do not report the sample size and LR χ^2 statistic as both of them are very large due to the use of NSSO survey weights as multipliers.
14. A worker is said to work in the informal sector if: (1) (S)he is an own account worker or employer or helper in household enterprises; or (2) (S)he works in enterprises which do not use electricity (or the electricity use is not known) and the number of workers in that enterprise is less than twenty; or (3) (S) he works in enterprises which use electricity but the size of the workforce is less than ten.
15. The real earnings of the aged in the informal sector have increased by 21 per cent.
16. Regression model: $IFS = \alpha + \beta_1 TIME + \beta_2 MUSLIM + \beta_3 HSC + \beta_4 HST + \beta_5 OTHERS + \beta_6$

- LPCME + β_7 LPCME2 + β_8 ILLITERATE + β_9 BPRIMARY + β_{10} MIDDLE + β_{11} SECONDARY + β_{12} HIGHER + β_{13} UNEMP. Reported in Appendix, Table A3
17. Lubell (1991) reported that the informal workforce in South-east Asia generally had secondary, or even tertiary, level of education.
 18. The percentage of male workers in services has declined from 51 per cent to 45 per cent over the study period. For female workers, the corresponding figures are 60 per cent and 55 per cent, respectively.

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