Original Article

Determinants and Persistence of Benefits from the National Rural Employment Guarantee Scheme Panel Data Analysis for Rajasthan, India

Raghbendra Jha[a], Raghav Gaiha[a], Manoj K. Pandey[a] and Shylashri Shankar[b]

[a]Australian National University, Canberra, Australia.
[b]Centre for Policy Research, New Delhi, India.

Abstract India's National Rural Employment Guarantee Scheme (NREGS) has been hailed as one of the country's most creative social initiatives. Since the program was begun only recently (in 2004–2005) there is a need to assess household access to this program and persistence of benefits to households not just in one year but over time. Using a unique panel data set for 2007–2008 and 2009–2010 for the Indian state of Rajasthan, this paper analyzes the transitions into and out of NREGS. It models the impact of such transitions on earnings of workers as well the determinants of such transitions. To the best of our knowledge this is the first study of this kind. Several policy conclusions are advanced.

Le Programme Nationale pour la Garantie de l'Emploi Rurale, en Inde (NREGS) a été acclame comme une des initiatives sociales plus créatives du pays. Puisque le programme est assez récente (il a débuté en 2004–2005) il faut évaluer l'accès des ménages au programme, et la longévité des bénéfices qu'ils en reçoivent, pendant plusieurs années. Cet étude analyse les ménages qui entrent et sortent du NREGS, utilisant une base de données couvrant l'état Indien du Rajasthan pendant les années 2007–2008 et 2009–2010. Cette elude monte les transitions des ménages, aussi que l'impact des transitions sur les salaires des travailleurs. Anotre connaissance, c'est le premier étude de ce type. Plusieurs recommandations en matière de politique sont avancées.

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Introduction

There is high incidence of both open unemployment and poverty in rural India. According to the Current Daily Status definition of unemployment in the 66th Round household data from the National Sample Survey, 6.4 per cent of male workers, 8.0 per cent of female workers and 6.8 per cent of all workers were unemployed in rural India in 2009–2010. This fact, along with a high incidence of poverty in rural India (22.2 per cent according to the traditional poverty line and 33.8 per cent according to the Planning Commission's revised poverty line in 2009–2010), underscore the high relevance of using a well-designed workfare program to address the twin problems of high rural poverty and unemployment.

The National Rural Employment Guarantee Act came into effect in November 2005 and was hailed as one of India's most creative social initiatives. This Act guarantees 100 days of employment a year to at least one member of a rural household willing to perform unskilled labor for the minimum wage. By combining rural development with livelihood protection, the work is designed to develop infrastructure such as roads, irrigation and flood protection measures. Beginning with the poorest 200 districts, this became a nationwide program in April 2008.

Planned expenditure for the National Rural Employment Guarantee Scheme (NREGS) in 2012–2013 earmarked for NREGS was Rs. 400 billion (~US$8 billion) (see Jha and Gaiha, 2012).

Against this backdrop it is important to ask both what benefits have accrued from this program to eligible workers and whether these benefits have persisted over time.[1] The first issue can be addressed using household-level cross-section data, and some dimensions have been addressed in a series of papers (Jha *et al*, 2012, for employment and Jha *et al*, 2011, for nutritional impact). The second issue can only be addressed using household-level panel data to track the movement of workers in and out of employment in NREGS.

We use a unique data set for two years for the state of Rajasthan in India to address these questions. The paper is organized as follows. The next section discusses sources of data, the subsequent section contrasts the results for 2007–2008 with those for 2009–2010 and describes the movement of workers in and out of NREGS. The latter section models the determinants of such transitions and the penultimate section analyzes the dynamics of participation in and exit from NREGS. The final section concludes.

Data

Our analysis is based on primary household-level panel survey data from Rajasthan for 2007–2008 and 2009–2010. We collected the data as follows. A list of Rajasthan NREGS districts[2] was compiled from which three were selected on the basis of probability proportional to size (rural population as reported in the 2001 Census). In the next stage, a total of 25 villages were randomly chosen from districts selected in the previous stage. Finally, from each selected village, 20 households were again randomly selected, giving us a sample of 500 households. In addition, a total of 500 households were sampled for 2009–2010. However, only 476 households were in the panel (common in both the years).[3]

Our analysis is based on this panel of 476 households. Data include information on personal attributes of household's head, social group, occupation, landholdings, income and expenditure, household size, NREGS participation,[4] type of ration card, Public Distribution Scheme (PDS) participation, and other village- and individual-level information.[5]

Furthermore, detailed ethnographic interviews were conducted in 2008–2009 and provide the perceptions of the beneficiaries, policymakers and village-level elites on the dynamics of power and the impact of NREGS.

Results

The performance of NREGS, as revealed by government statistics, has been disappointing and, if anything, has deteriorated over time. For 2007–2008 and 2009–2010 Table 1 presents data on actual expenditure against planned expenditure for India and Rajasthan. At the all-India level, both increased slightly. In Rajasthan, however, share of expenditure fell while work completed rose.

Table 2 shows data on average person days of employment under NREGS per household, as well as the proportion of households that had competed the stipulated 100 days of work in the first nine months of 2009–2010.

For 2009–2010, data on average number of days worked under NREGS per household and percentage of households worked on NREGS projects for 100 days are available only for nine months (April to December) and are reported in Table 2.

Table 1: Actual expenditure (percentage) against planned expenditure and completed work (percentage) against planned work

	Actual expenditure (percentage) against planned expenditure		*Completed work (percentage) against planned work*	
	2007–2008	*2009–2010*	*2007–2008*	*2009–2010*
India	82.26	82.99	46.04	48.94
Rajasthan	102.54	78.73	28.61	45.39
Summary statistics across states	Mean=78.66; Median=81.59; Standard deviation=15.28.	Mean=80.38; Median=79.27; Standard deviation=14.73.	Mean=50.08; Median=47.04; Standard deviation=19.85.	Mean=56.28; Median=54.83; Standard deviation=18.59.

Source: Computed from Government of India (2012).

Table 2: Average person days of employment under NREGS per household and percentage of households completing 100 days of employment under NREGS

Average person days of employment under NREGS per household 2009–2010		*Percentage of households completing 100 days of employment under NREGS 2009–2010*	
India	46.83	India	7.08
Rajasthan	65	Rajasthan	15
Mean across states	39.06	Mean across states	3.0

Source: Computed from Government of India (2012).

Rajasthan outperforms the country as well as across state averages in respect of both categories, although the percentage of households getting 100 days of employment under NREGS (15 per cent) is low.[6]

Tables 1 and 2 provide information at the aggregate level but do not reveal household behavior with respect to NREGS, in particular transitions between 2007–2008 and 2009–2010 and welfare implications thereof. To do this we turn to the primary household-level data.

Table 3 shows changes in the distribution of households over 2007–2008 and 2009–2010.

There was no significant change in the gender composition of the household heads, with male-headed households remaining dominant (more than 95 per cent) in 2007–2008 and 2009–2010. There was also no significant change in the social status of households. Household size increased slightly (but insignificantly) for all households except those with 4–8 family members.

We next examine how economic conditions of panel households changed between 2007–2008 and 2009–2010. To measure economic status, we use different poverty categories based on per capita monthly expenditure (PCME) (defined in Table A1) and land ownership.

The results are given in Table 4.

The top panel of Table 4 documents how the distribution of households changed by their poverty status according to PCME. About 40 per cent of households were below the poverty line in 2007–2008 and this increased by about 18 percentage points in 2009–2010.[7] More significantly, much of the increase in the proportion of poor households was because of an increase in acutely poor households. In such households, percentage of poor increased from

Table 3: Changes in the percentage distribution of household's composition in rural Rajasthan: 2007–2008 to 2009–2010

Household composition	*2007–2008*	*2009–2010*	*Changes*	*Pearson chi-square*
Gender of household heads				
Female	4.14	4.37	+0.23	Pearson $chi^2(1)=0.0356$
Male	95.86	95.63	−0.23	
Social group				
SC	25.58	25.58	0.00	Pearson $chi^2(3)=0.0000$
ST	30.59	30.59	0.00	
OBC	32.92	32.92	0.00	
Others	10.91	10.91	0.00	
Household size group				
4 and less	36.95	38.01	+1.06	Pearson $chi^2(3)=1.0416$
>4 – ⩽8	56.67	53.98	−2.69	
>8 – ⩽12	6.28	7.87	+1.59	
>12	0.11	0.15	+0.04	

29 per cent in 2007–2008 to about 43 per cent in 2009–2010. However, the proportion of affluent households decreased by more than 16 percentage points. Change in poverty status is validated by chi-square test at the 1 per cent level of significance.

We next investigate the distributional shift in the poverty status of those households. The second panel of Table 4 reports that about 70 per cent of the acutely poor households in 2007–2008 remained acutely poor in 2009–2010. Among households that were moderately poor in 2007–2008, only 18 per cent retained their status. About 64 per cent of them became acutely poor in 2009–2010 and the remaining 18 per cent became non-poor.

Among households that were moderately non-poor in 2007–2008, less than 27 per cent remained so in 2009–2010 and about 23 per cent became affluent. However, nearly half of them became poor (out of which 36 per cent became acutely poor and 15 per cent became moderately poor). Only 43 per cent of those households that were affluent in 2007–2008 remained so in 2009–2010; 19.51 per cent of such households moved to the moderately non-poor category, while nearly 20 per cent and 17 per cent of them, respectively, were acutely and moderately poor in 2009–2010. About 41 per cent of the non-poor households in 2007–2008 became poor in 2009–2010, and about 17 per cent of the poor households in 2007–2008 became non-poor in 2009–2010. Thus, there was a significant change in the poverty status of panel households between 2007–2008 and 2009–2010. This result is validated by Pearson's chi-square test at the 1 per cent level of significance.[8]

The third and fourth panels of Table 4 report changes in the percentage distribution of households and mobility of those households by land holding, respectively. The proportion of landless households fell from 31.35 to 29.69 per cent. The share of those with land holdings between 0–1 (2.471 acres are equal to one hectare) acre and between 1–2 acres decreased in this period (greater reduction occurred in the former category of households). Interestingly, the proportion of households with land holdings >2⩽5 acres increased dramatically from just 12 per cent in 2007–2008 to more than 31 per cent in 2009–2010. A similar pattern also emerged for households in the largest land owning group (>5 acres). Their proportion rose by 8 percentage points in 2009–2010. Pearson chi-square statistics with four degrees of freedom suggest that land

Table 4: Change in the percentage distribution of households: 2007–2008 to 2009–2010

Poverty status	*2007–2008*	*2009–2010*	*Changes*	*Pearson chi-square*
Acutely poor	29.11	42.79	+13.68	Pearson $chi^2(3)=63.6828$***
Moderately poor	11.31	15.60	+4.29	
Moderately non-poor	19.30	17.70	−1.60	
Affluent	40.27	23.91	−16.36	
Non-poor	59.58	41.61	−17.97	Pearson $chi^2(1)=47.6951$***
Poor	40.42	58.39	+17.97	

Mobility of households by poverty status: 2007–2008 to 2009–2010

Poverty status in 2007–2008	*Poverty status in 2009–2010*						*Pearson chi-square*
	acutely poor	*moderately poor*	*moderately non-poor*	*Affluent*	*Non-poor*	*Poor*	
Acutely poor	70.24	13.5	9.85	6.41	—	—	Pearson $chi^2(9)=78.72$***
Moderately poor	64.08	18.30	16.30	1.31	—	—	
Moderately non-poor	35.74	14.88	26.59	22.79	—	—	
Affluent	20.34	16.70	19.51	43.45	—	—	
Non-poor	—	—	—	—	58.56	41.44	Pearson $chi^2(1)=38.27$***
Poor	—	—	—	—	16.64	83.36	

Land ownership: 2007–2008 to 2009–2010

Land owned group (in acres)	*2007–2008*	*2009–2010*	*Changes*	*Pearson chi-square*
Landless	31.35	29.69	−1.66	Pearson $chi^2(4)=146.8763$***
>0–⩽1	27.19	6.07	−21.12	
>1–⩽2	25.28	20.66	−4.62	
>2–⩽5	11.90	31.20	+19.30	
>5	4.28	12.38	+8.10	

Mobility of households by land ownership: 2007–2008 to 2009–2010

Land ownership in 2007–2008 (in acres)	*Land ownership in 2009–2010 (in acres)*					*Pearson chi-square*
	Landless	*0–⩽1*	*1–⩽2*	*2–⩽5*	*5*	
Landless	73.58	6.39	8.83	10.06	1.14	Pearson $chi^2(16)=298.50$***
>0–⩽1	16.16	9.69	40.56	27.62	5.97	
>1–⩽2	5.19	5.65	14.82	57.03	17.31	
>2–⩽5	6.58	0.00	22.41	37.01	34.00	
>5	3.17	0.00	10.49	40.03	46.30	

NB ***indicates significance at 1 per cent.

holding is time variant.[9] Among households that were landless in 2007–2008, more than 26 per cent moved out of the landless category (11 per cent held >2 acres in 2009–2010). Among households with land holdings of between 0 and 1 acre in 2007–2008, 9.69 per cent remained in the same category, whereas 16.16 per cent were landless in 2009–2010. Land holdings increased

among the remaining households. Similarly, among households with land holdings of between 1 and 2 acres in 2007–2008, 11 per cent experienced a reduction in their land ownership (5 per cent became landless and 6 per cent had 0–1 acre) in 2009–2010. Among those households with 2–5 acres of land in 2007–2008, 7 per cent became landless, 22 per cent were in the group owning 1–2 acres, 37 per cent remained unchanged and the remaining 34 per cent shifted into the highest land ownership category (that is, >5 acres) in 2009–2010. Finally, among those households with more than 5 acres of land in 2007–2008, only 46 per cent remained in the same land ownership category in 2009–2010. Thus, overall, there were significant changes in land holding movements of panel households during 2007–2008 and 2009–2010, validated by Pearson's chi-square test at the 1 per cent level of significance.

Table 5 shows changes in the participation of households in NREGS. Overall, the proportion of NREGS participating households decreased from 68 to 48 per cent. The participation of female households did not increase significantly, with their participation corresponding to their proportion in the population. While participation of Scheduled Castes (SCs) and Others in NREGS increased slightly, the proportion of Scheduled Tribes (STs) and Other Backward Castes (OBCs) dropped. However, this change is not statistically significant for any of the groups. The proportion of households with a family size of fewer than 5 and more than 8 persons rose and the proportion of households with a family size of 5–8 persons fell, but this variation was statistically insignificant. Participation in NREGS by acutely (moderately) poor increased by 22 (2) percentage points. The proportions of moderately non-poor and affluent (and hence, of non-poor households) decreased by 0.26 and 24 percentage points, respectively.[10] Participation in NREGS by landless households and those households with holdings of between 0–1 acre and 1–2 acres decreased by 5, 20 and 10 percentage points, respectively. The participation in NREGS of those with more than 2 acres of land increased sharply. The Pearson chi-square statistics suggest that participation in NREGS by households with varied economic status (based both on PCME and on land holdings) changed significantly.

To analyze switches into and out of NREGS, based on 476 panel households for 2007–2008 and 2009–2010, We classify households into four categories:

(I) Those that participated neither in 2007–2008 nor in 2009–2010;
(II) Those that participated in 2007–2008 but withdrew in 2009–2010;
(III) Those that did not participate in 2007–2008 but participated for the first time in 2009–2010; and
(IV) Those that participated in 2007–2008 and continued to participate in 2009–2010.

Based on this classification, we define four types of households: Type I, Type II, Type III and Type IV.[11]

Figure 1 suggests that 30 per cent of households never participated in NREGS during the period in question. Twenty-three per cent withdrew in 2009–2010 after participating in 2007–2008. Only slightly less than 3 per cent of households entered in the scheme for the first time in 2009–2010. Forty-five per cent of households continued to participate.

Table 6 shows distribution of four types of households by these characteristics in 2007–2008. Both row and column percentages are reported. However, we comment only on row percentages.

In both female- and male-headed households, the proportion of Type IV households is the highest. However, while the proportion of Type II households is the second highest among the former, Type I households come second in the latter. While Type IV households are in the majority among SC, ST and OBC households, among the 'others' social group the proportion of

Table 5: Changes in household NREGS participation distribution (per cent): 2007–2008 to 2009–2010

Household characteristics	*2007–2008*	*2009–2010*	*Changes*	*Pearson chi-square*
Gender of household heads				
Female	5.23	5.53	+0.30	Pearson $chi^2(1)=0.0845$
Male	94.77	94.47	−0.30	
Social group				
SC	27.12	27.76	+0.64	Pearson $chi^2(3)=0.0548$
ST	33.39	32.21	−1.18	
OBC	33.87	32.92	−0.95	
Others	5.62	7.11	+1.49	
Poverty status				
Acutely poor	34.09	56.26	+22.17	Pearson $chi^2(3)=61.6195$***
Moderately poor	15.56	17.49	+1.93	
Moderately non-poor	19.97	19.71	−0.26	
Affluent	30.37	6.54	−23.83	
Non-poor	50.34	26.25	−24.09	Pearson $chi^2(1)=42.5181$***
Poor	49.66	73.75	+24.09	
Land owned group (in acres)				
Landless	25.85	21.10	−4.75	Pearson $chi^2(4)=114.2382$***
>0–⩽1	30.13	10.03	−20.10	
>1–⩽2	30.46	20.35	−10.11	
>2–⩽5	10.67	37.25	+26.58	
>5	2.89	11.27	+8.38	
Household size group				
4 and less	38.39	40.11	+1.72	Pearson $chi^2(3)=2.6313$
>4–⩽8	54.45	49.57	−4.88	
>8–⩽12	7.08	10.02	+2.94	
>12	0.09	0.31	+0.22	
All	67.81	47.74	−20.07	

NB ***indicates significance at 1 per cent.

Type I is the highest. Going by poverty status of the households in 2007–2008 and 2009–2010, we observe that while among acutely poor, moderately poor (hence, among all poor) and moderately non-poor households, the proportion of Type IV households is the highest, among affluent and non-poor overall, proportion of Type I households is the highest.[12] The majority of landless households are Type I households. Among households with land holdings >0⩽5 acres, the proportion of Type IV households is the highest. However, the majority of those with land holdings >5 acres in 2007–2008 were Type I households.

We then investigated whether households that moved out of NREGS are better off. To determine this, we see how distribution of CPIAL-adjusted income net of NREGS and PCME changed (Table 7).

Table 7 documents mean, median, standard deviations of PCME and per capita monthly income net of NREGS earnings (PCMINNE) for all four types of households for both years. We also test whether changes between 2007–2008 and 2009–2010 are statistically significant. The significance of differences in paired means is tested using the *t*-test (a parametric test). Furthermore, non-parametric tests, Wilcoxon signed-rank test[13] and sign tests,[14] were used to test whether distribution of these variables is the same (that is, medians are equal) over time.

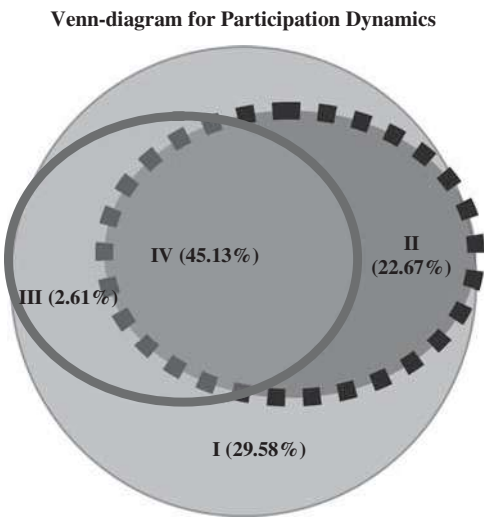

Figure 1: Figures in parentheses are the percentage proportions of Type I, II, III and IV households among the total population of panel households.

The results are also supplemented by the Stochastic Dominance test (Atkinson, 1987),[15] which plots cumulative distribution functions (CDFs) of PCME/PCMINNE separately for two years for all the four types of households. If the cumulative income distribution functions for 2007–2008 lie above that of 2009–2010 over the complete range of poverty thresholds, the first-order dominance (FOD) holds. This implies that the targeting of the former is better in terms of a class of poverty indices comprising the head-count ratio, the poverty gap and a distributionally sensitive measure over the complete range of poverty thresholds. If, however, the two curves intersect, a second-order dominance test is used that permits such comparisons for all such indices except the head-count index, and so on.[16]

Our key conclusions are as follows. Median PCME and mean and median PCMINNE fell significantly over the period from 2007–2008 to 2009–2010 for all four types of households. This is validated by means of statistical tests such as *t*-tests, signed rank tests and sign tests. FOD exists, implying dominance of 2007–2008 over those in 2009–2010 for all four types of households, implying that each type was poorer in 2007–2008 than in 2009–2010 in terms of MPCE. A similar result holds in the case of PCMINNE.

We find that there is no significant difference in the percentage changes in MPCE or PCMINNE for Type I and Type II households. However, as compared with Type I households, the percentage change (increase) in MPCE or PCMINNE is significantly lower for Type III and Type IV households, implying that households that joined the program in 2009 or continued to participate if already in the program had lower changes in both measures of income.

Let us turn to sources of change in PCMINNE. We summarize some of the descriptive statistics for share of per capita income from agricultural sources (agriculture, livestock and agricultural wages) in total per capita income for the base year 2007–2008 and percentage change in the period 2007–2008 to 2009–2010. We also summarize these descriptive statistics for share of per capita income from non-agricultural sources (non-agriculture wages, salary, self-employed business trade/artisans/professionals, and others such as pensions, remittances, rent, interest and dividends) in total per capita income for the base year and percentage change in this between

Table 6: Percentage distribution of four types of households by household characteristics in base year 2007–2008

Household characteristics	*Type I households*	*Type II households*	*Type III households*	*Type IV households*
Gender of Household heads				
Female	14.29	21.98	0.00	63.73
	(2.00)	(4.01)	(0.00)	(5.85)
Male	30.24	22.70	2.73	44.33
	(98.00)	(95.99)	(100.00)	(94.15)
Social group				
SC	25.60	22.58	2.52	49.3
	(22.14)	(25.47)	(24.67)	(27.94)
ST	21.78	27.94	4.20	46.07
	(22.52)	(37.69)	(49.19)	(31.23)
OBC	28.23	24.04	2.02	45.72
	(31.42)	(34.9)	(25.41)	(33.35)
Others	64.86	4.02	0.17	30.94
	(23.92)	(1.93)	(0.73)	(7.48)
Poverty status				
Acutely poor	18.08	25.32	2.52	54.08
	(17.79)	(32.51)	(28.04)	(34.89)
Moderately poor	6.70	40.17	0.00	53.13
	(2.56)	(20.04)	(0.00)	(13.32)
Moderately non-poor	25.47	22.82	4.38	47.33
	(16.62)	(19.43)	(32.39)	(20.24)
Affluent	46.30	15.78	2.57	35.36
	(63.03)	(28.03)	(39.57)	(31.55)
Non-poor	39.55	18.06	3.16	39.24
	(79.64)	(47.45)	(71.96)	(51.79)
Poor	14.90	29.47	1.81	53.82
	(20.36)	(52.55)	(28.04)	(48.21)
Land owned group (in acres)				
Landless	42.35	21.30	1.74	34.62
	(44.88)	(29.45)	(20.85)	(24.05)
>0–⩽1	24.50	25.25	0.37	49.88
	(22.52)	(30.28)	(3.81)	(30.05)
>1–⩽2	12.98	24.04	5.31	57.67
	(11.09)	(26.80)	(51.41)	(32.30)
>2–⩽5	34.79	18.04	4.41	42.76
	(14.00)	(9.47)	(20.07)	(11.28)
>5	51.91	21.22	2.35	24.51
	(7.51)	(4.00)	(3.85)	(2.32)
Household size group				
4 and less	26.41	24.28	3.15	46.16
	(32.99)	(39.56)	(44.50)	(37.79)
>4–⩽8	33.01	21.16	1.84	43.99
	(63.23)	(52.87)	(39.92)	(55.24)
>8–⩽12	17.81	27.33	5.68	49.17
	(3.78)	(7.57)	(13.66)	(6.84)
>12	0.00	0.00	45.98	54.02
	(0.00)	(0.00)	(1.93)	(0.13)
All	***29.58***	***22.67***	***2.61***	***45.13***

NB Figures in parentheses are the column percentages. Type I households: those that never participated; Type II households: those that participated in 2007–2008 but not in 2009–2010; Type III households: those that participated for the first time in 2009–2010; Type IV households: those that participated in both years.

Table 7: Descriptive statistics of household's CPIAL-adjusted per capita monthly consumption expenditure and per capita income net of NREGS earnings: 2007–2008 and 2009–2010

Type of household	*Mean (Standard deviation)*		*Paired t-test for difference of means: 2007–2008 and 2009–2010*	*Median (Standard deviation)*		*Tests for equality of median/distribution: 2007–2008 and 2009–2010*	
	2007–2008	*2009–2010*		*2007–2008*	*2009–2010*	*Signed Rank test*	*Sign test*
cpial-adjusted monthly per capita consumption expenditure							
Type I households	811.83 (507.02)	676.51 (304.52)	$t(74)=3.12$***	692.13 (507.02)	642.69 (304.52)	$Z=2.40$**	$P=0.1778$
Type II households	500.25 (229.58)	562.59 (743.47)	$t(103)=2.38$***	437.67 (229.58)	395.98 (743.47)	$Z=5.14$***	$P=0.0000$***
Type III households	543.75 (165.78)	380.62 (109.31)	$t(21)=2.82$***	565.43 (165.78)	379.65 (109.31)	$Z=2.52$**	$P=0.0669$*
Type IV households	503.26 (237.67)	391.05 (206.00)	$t(274)=4.31$***	470.42 (237.67)	360.43 (206.00)	$Z=7.25$***	$P=0.0000$***
ALL	594.91 (364.75)	514.12 (431.98)	$t(475)=6.06$***	514.25 (364.75)	406.80 (431.98)	$Z=9.21$***	$P=0.0000$***
CPIAL-adjusted per capita income net of NREGS earnings							
Type I households	1370.57 (1236.18)	868.70 (592.34)	$t(74)=3.34$***	1188.19 (1236.18)	815.74 (592.34)	$Z=3.59$**	$P=0.0026$***
Type II households	539.33 (348.89)	433.25(245.97)	$t(103)=4.35$***	443.75 (348.89)	382.05 (245.97)	$Z=4.34$***	$P=0.0011$***
Type III households	625.29(196.48)	352.57 (95.14)	$t(21)=3.47$***	596.88 (196.48)	341.13 (95.14)	$Z=2.78$**	$P=0.0669$*
Type IV households	524.28 (317.00)	342.15 (197.13)	$t(274)=9.99$***	453.57 (317.00)	285.43 (197.13)	$Z=9.43$***	$P=0.0000$***
ALL	780.67 (816.91)	518.84 (432.16)	$t(475)=8.63$***	546.88 (816.91)	366.82 (432.16)	$Z=11.07$***	$P=0.0000$***

Note: Type I households: those that never participated; Type II households: those that participated in 2007–2008 but not in 2009–2010; Type III households: those that participated for the first time in 2009–2010; Type IV households: those that participated in both the years. ***,** and * refer to significance at the 1, 5 and 10 per cent level, respectively. $t(m)$ denotes t-statistics with m degrees of freedom. Z refers to Z-statistics and P refers to the probability of number of positive outcomes (say X) larger than the observed positive outcomes (say x in a sample of n with probability of success P)=Binomial (n, $X >= x$, $P=0.5$). Positive values of t and z suggest that base year 2007–2008 values (mean or median) are significantly higher than those in 2009–2010.

2007–2008 and 2009–2010 with respect to the base year. A positive value of these changes indicates increases and negative changes reductions in the share over time. Table 8 reports descriptive statistics and pair-wise comparisons of means for these shares and percentage changes.

To examine the significance of pair-wise differences of means among the four types of households in these shares as well as percentage changes in them, we employ the Bonferroni multiple-mean comparison test along with one-way ANOVA (Table 9).

Our key conclusions are as follows. In 2007–2008 the mean share of per capita annual income from agricultural sources in total per capita income for all other households as compared with the households that never participated was significantly higher. As compared with households that participated in 2007–2008 but withdrew in 2009–2010, mean share of per capita annual income from agricultural sources in total per capita income for those that participated in 2007–2008 and continued to participate in 2009–2010 was significantly higher. However, mean share of per capita annual income from agricultural sources in total per capita income is higher for those that continued to participate in 2009–2010 as compared with first time participating households.

The mean percentage change (increase) in the household's share of per capita income from agricultural sources compared with never participating households is significantly higher for those that ceased participating, but significantly lower for those that participated for the first time in 2009–2010 and those that continued to participate. As compared with those households that withdrew, there were significantly lower mean percentage changes (increase) in the household's share of per capita income from agricultural sources for those that entered for the first time and for those that continued to participate in NREGS. Between those that participated for the first time and those that continued to participate, mean percentage change (increase) in the household's share of per capita income from agricultural sources is significantly higher for the latter.

In 2007–2008, as compared with the households that never participated, mean share of per capita annual income from non-agricultural sources in total per capita income for all other households is significantly lower.[17] As compared with households that participated in 2007–2008 but withdrew in 2009–2010, mean share of per capita annual income from non-agricultural sources in total per capita income for those that participated for the first time in 2007–2008 and continued to participate in 2009–2010 is significantly lower. Mean share of per capita annual income from non-agricultural sources in total per capita income is lower for those that continued to participate in 2009–2010 as compared with first time participating households.

The mean percentage change (increase) in household's share of per capita income from non-agricultural sources compared with never participating households is significantly higher for those that withdrew and those that continued to participate but significantly lower for those that participated for the first time in 2009–2010. As compared with those households that withdrew, there was significantly lower mean percentage change (increase) in household's share of per capita income from non-agricultural sources for those that entered for the first time and for those that continued to participate in NREGS. Between those that participated for the first time and those that continued to participate, mean percentage change (increase) in the household's share of per capita income from non-agricultural sources is significantly higher for the latter.

Thus, there is a significant reduction in the share of per capita income from both agricultural and non-agricultural sources (net of NREGS wages) among both those households that participated for the first time in NREGS and those that continued to participate, as compared with those that never participated or withdrew after initial participation. In addition, mean shares of per capita income from both sources increased significantly.

Table 8: Descriptive statistics for household's share of per capita income from agricultural sources and non-agricultural (excluding NREGS) sources and percentage changes in these shares by type of household

Type of household	*Share of per capita annual income from agricultural sources in total per capita income in 2007–2008*		*% change (increase) in household's share of per capita income from agricultural sources over 2007–2008 and 2009–2010*		*Share of per capita annual income from non-agricultural (excluding NREGS) sources in total per capita income in 2007–2008*		*% Change (increase) in household's share of per capita income from non-agricultural (excluding NREGS) sources over 2007–2008 and 2009–2010*	
	Mean [SD]	*Median*	*Mean [SD]*	*Median*	*Mean [SD]*	*Median*	*Mean [SD]*	*Median*
Type I households	14.88 [26.97]	1.08	2.66 [23.97]	0.00	85.12 [26.97]	98.92	−2.66 [23.97]	0.00
Type II households	27.96 [27.77]	22.68	3.77 [27.63]	3.15	60.31 [30.43]	61.86	7.96 [29.49]	8.22
Type III households	44.12 [36.62]	30.31	−7.62 [26.55]	3.85	55.88 [36.62]	69.69	−5.56 [25.08]	−8.38
Type IV households	31.23 [27.11]	25.53	1.40 [27.66]	2.01	53.89 [28.77]	57.03	−1.09 [30.41]	−2.75

Note: Type I households: those that never participated; Type II households: those that participated in 2007–2008 but not in 2009–2010; Type III households: those that participated for the first time in 2009–2010; Type IV households: those that participated in both the years. SD=Standard Deviation.

Table 9: Repeated *t*-test for differences in the mean shares of base years and changes in the share of agricultural and non-agricultural sources by type of household

Bonferroni multiple-mean comparison test	*T-statistics for differences of means for*			
	Share of per capita annual income from agricultural sources in total per capita income in 2007–2008	*% change in household's share of per capita income from agricultural sources*	*Share of per capita annual income from non-agricultural (excluding NREGS) sources in total per capita income 2007–2008*	*% change in household's share of per capita income from non-agricultural (excluding NREGS) sources*
Type II households–Type I households	13.08***	1.11***	−24.81***	10.62***
Type III households–Type I households	29.24***	−10.28***	−29.24***	−2.90***
Type IV households–Type I households	16.34***	−1.26***	−31.22***	1.58***
Type III households–Type II households	16.16***	−11.38***	−4.43***	−13.52***
Type IV households–Type II households	3.26***	−2.36***	−6.42***	−9.04***
Type IV households–Type III households	−12.90***	9.02***	−1.99***	4.47***

Note: Type I households: those that never participated; Type II households: those that participated in 2007–2008 but not in 2009–2010; Type III households: those that participated for the first time in 2009–2010; Type IV households: those that participated in both the years. *** refers to significance at the 1 per cent level.

Determinants of Switches Into and Out of NREGS

The Model

Here the focus is on demand for participation in NREGS over the two years 2007/2008 and 2009/2010 in a multiple choice framework. Following the literature on applied demand analysis where a demand function is constructed from actual food or calorie intake with an appropriate specification (for example, Abdulai and Aubert, 2004; Ecker and Qaim, 2008, among others), we have specified and estimated a multinomial logit model that sheds new light on switches into and out of NREGS over the panel period. Alternatively, we could have modeled the actual choices as the result of interplay between the supply and demand factors. Lacking data on supply shocks and the paucity of demand-based explanations of transition from one choice to another, we have opted to focus on the latter.[18] Accordingly, we rely on the relative attractiveness of NREGS to other employment options determined by the ratio of NREGS wage to agricultural wage, distance to NREGS worksite and proxies for other employment options, given village and household characteristics.

Specifically, we constructed an estimation equation for the four types of households. We used a multiple response categorical dependent variable that takes the value 1 if the household is of Type I, 2 if the household is of Type II, 3 if the household is of Type III and 4 if the household is of Type IV. Explanatory variables used included (i) characteristics of households such as social group (SC, ST, OBC versus Others), proportion of adults, and land holdings; and (ii) village-level characteristics such as ratio of NREGS to agriculture wage rate, average distance of NREGS sites, and per capita annual earnings from non-agricultural sources net of NREGS earnings (as a

proxy for employment opportunities in the village other than NREGS). For time-variant household- and village-level variables, both initial (base) and change in the variables over time under study are used. Average distance of NREGS sites from the village is an exception, where only base variable is used due to very small changes during 2007–2008 and 2009–2010. Definitions of these variables are given in Table A2.

The multinomial unordered logit model for household type j is

$$P[Y_i = j] = \frac{e^{\beta_j' x_i}}{\sum_{k=1}^{4} e^{\beta_k' x_i}} \quad j = 1\ 2\ 3\ 4 \tag{1}$$

where j=1, 2, 3, 4 refers to type of household (Greene, 2003) since we believe the dependent variable is unordered. The estimated equations yield a set of probabilities for j+1 choices for a decision maker with characteristics x_i. Out of four choices, only three parameter vectors are needed to determine all the four probabilities. The probabilities are given by

$$P\left[Y_i = \frac{j}{x_i}\right] = \frac{e^{\beta_j' x_i}}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}} \text{ for } \quad j = 1 \quad \beta_0 = 0 \tag{2}$$

We use j=4 with Type 1 being the omitted or reference group. Furthermore, β coefficients in this model are difficult to interpret; therefore, we compute marginal effects as

$$\delta_j = \frac{\partial P[Y_i = j]}{\partial x_i} = P[Y_i = j]\left[\beta_j - \overline{\beta}\right] \quad j = 1\ 2\ 3\ 4 \tag{3}$$

Thus, every sub-vector of β enters every marginal effect, both through the probabilities and through the weighted average that appears in δ_j. Standard errors are computed using the delta method.

Results

Estimation results for coefficients are given in Table 10 and for marginal effects in Table 11. We comment on the marginal effects results.

Type I households

As compared with others, the probability of never participating is significantly lower in SC, ST and OBC households. Higher land ownership in 2007–2008 increases the likelihood of never participating in NREGS. Increase in land holding over time does not have a significant effect. Ratio of village-level NREGS to agricultural wage rates in the initial year reduces the probability of never participation in NREGS. Increase in the ratio does not have a significant effect on it. Increase in the village-level per capita annual earnings from non-agricultural sources net of NREGS earnings in 2007–2008 increases the probability of never participating in NREGS.[19] However, percentage change in village-level per capita annual earnings from non-agricultural sources net of NREGS earnings in 2009–2010 relative to 2007–2008 does not have a significant effect on the likelihood of never participation. Effects of household composition in terms of share of adults (both initial percentages and change) and village distance from the NREGS worksites in 2007–2008 are statistically insignificant.

Type II households

The likelihood of a household withdrawing from NREGS is significantly higher if they are from SC, ST and OBC social groups as compared with others. Household composition in terms of proportion of adults and land ownership of households (both initial and change) does not have a

Table 10: Estimation of switches into and out of NREGS during 2007–2008 and 2009–2010 in Rajasthan: Multinomial logit coefficient estimates

Dependent variable outcomes	*Households that withdrew participation (Type II)*	*Households that participated for the first time ((Type III)*	*Household that continued to participate ((Type IV)*
Explanatory variables	*Coefficient (z-value)*	*Coefficient (z-value)*	*Coefficient (z-value)*
Social Group Dummy: SC	2.44***	3.73**	1.06[w]
	(3.10)	(2.56)	(1.58)
Social Group Dummy: ST	2.85***	4.70***	1.19*
	(3.61)	(3.55)	(1.76)
Social Group Dummy: OBC	2.51***	3.65***	1.09[w]
	(3.05)	(2.97)	(1.62)
% adults in the household: 2007–2008	−0.01	0.02	−0.01
	(−0.55)	(0.98)	(−0.87)
Δ % adult in the household: 2007–2008 to 2009–2010	0.01	0.06**	0.02
	(0.47)	(1.96)	(0.98)
Land owned by household: 2007–2008	−0.13	0.09	−0.22**
	(−1.08)	(0.72)	(−2.08)
Δ Land owned by household: 2007–2008 to 2009–2010	0.00	−0.04	−0.02
	(−0.05)	(−0.55)	(−0.52)
Ratio of NREG to AGR wage rate in Village: 2007–2008	4.53**	5.99*	2.66
	(2.14)	(1.86)	(1.26)
Δ Ratio of NREG to AGR wage rate in Village: 2007–2008 to 2009–2010	1.73	5.73**	1.26
	(1.08)	(2.45)	(0.79)
Average distance of NREG Sites from the village: 2007–2008	−0.23	0.04	−0.35
	(−0.51)	(0.06)	(−0.87)
Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in Village: 2007–2008	-1.6×10^{-4}**	0.00	-3.7×10^{-4}***
	(−2.30)	(−0.98)	(−5.11)
Δ Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in Village: 2007–2008 to 2009–2010	1.56	3.11*	1.20
	(1.21)	(1.83)	(1.00)
Constant	−4.07	−11.13**	1.79
	(−1.40)	(−2.22)	(0.68)
Number of observations		456	
Wald chi-square(36)		173.42***	
Pseudo R-square		0.1718	
Log pseudolikelihood		−433.8825	

Note: Type I households: those that never participated and are the reference category; Type II households: those that participated in 2007–2008 but not in 2009–2010; Type III households: those that participated for the first time in 2009–2010; Type IV households: those that participated in both the years. ***,**,* refer to significance at the 1, 5 and 10 per cent level, respectively; and *w* denotes weakly significant (>10 per cent level). Figures in the parenthesis are the *z*-values.

Table 11: Estimation of switches into and out of NREGS during 2007–2008 and 2009–2010 in Rajasthan: Multinomial logit marginal effect estimates

Outcomes	*Households that never participated (Type I)*	*Households that withdrew participation (Type II)*	*Households that participated for the first time ((Type III)*	*Household that continued to participate ((Type IV)*
Explanatory variables	*ME (z-value)*	*ME (z-value)*	*ME (z-value)*	*ME (z-value)*
Social Group Dummy: SC	−0.22***	0.31*	0.07	−0.16
	(−3.46)	(1.80)	(0.82)	(−0.99)
Social Group Dummy: ST	−0.26***	0.35**	0.10	−0.19
	(−3.67)	(2.11)	(1.15)	(−1.25)
Social Group Dummy: OBC	−0.24***	0.32*	0.06	−0.14
	(−3.25)	(1.87)	(1.02)	(−0.82)
% adults in the household: 2007–2008	0.00	0.00	0.00	0.00
	(0.78)	(−0.04)	(1.42)	(−0.83)
Δ % adult in the household: 2007–2008 to 2009–2010	0.00	0.00	0.00	0.00
	(−0.91)	(−0.27)	(1.44)	(0.84)
Land owned by household: 2007–2008	0.03*	0.00	0.003**	−0.04*
	(1.90)	(0.14)	(2.14)	(−1.76)
Δ Land owned by household: 2007–2008 to 2009–2010	0.00	0.00	0.00	−0.01
	(0.38)	(0.40)	(−0.40)	(−0.73)
Ratio of NREG to AGR wage rate in Village: 2007–2008	−0.57*	0.48**	0.05	0.04
	(−1.75)	(2.18)	(1.35)	(0.12)
Δ Ratio of NREG to AGR wage rate in Village: 2007–2008 to 2009–2010	−0.26	0.14	0.07**	0.05
	(−1.01)	(0.75)	(2.01)	(0.19)
Average distance of NREG Sites from the village: 2007–2008	0.05	0.00	0.00	−0.06
	(0.75)	(0.03)	(0.49)	(−0.92)
Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in Village: 2007–2008	5.0×10^{-5}***	2.0×10^{-5w}	0.00	-7.0×10^{-5}***
	(4.08)	(1.61)	(0.43)	(−4.63)
Δ Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in Village: 2007–2008 to 2009–2010	−0.23	0.13	0.03^{w}	0.07
	(−1.11)	(1.02)	(1.63)	(0.45)
Predicted probability	0.22	0.25	0.01	0.52

Note: Type I households: those that never participated and are the reference category; Type II households: those that participated in 2007–2008 but not in 2009–2010; Type III households: those that participated for the first time in 2009–2010; Type IV households: those that participated in both the years. ***,** and * refer to significance at the 1, 5 and 10 per cent level, respectively, and *w* denotes weakly significant (>10 per cent level). Figures in parenthesis are the *z*-values. ME=Marginal Effect (d*y*/d*x*). These marginal effects correspond to multinomial coefficient estimates in Table 10.

significant effect on the probability of moving out from NREGS participation after participating initially. Higher ratio of NREGS to agricultural wage rates in a village in 2007–2008 increases the likelihood of its households withdrawing from NREGS participation in 2009–2010 but this effect is insignificant. Increase in the village-level per capita annual earnings from non-agricultural sources net of NREGS earnings increases the likelihood of the households withdrawing from NREGS after participating. However, percentage change in village-level per capita annual earnings from non-agricultural sources net of NREGS earnings in 2009–2010 relative to 2007–2008 does not have a significant effect on the probability of existence of Type II households. Initial year's village distance from the NREGS worksites is not statistically significant.

Type III households

There is no significant difference in the likelihood of Type III households among SCs, STs and OBCs as compared with 'others' social group. Household composition in terms of proportion of adults does not alter the probability of first time entrance in NREGS. Increase in the household's land ownership in 2007–2008 (but not increase over time) increases the likelihood of a household's participation.

Although ratio of village-level NREGS to agricultural wage in 2007–2008 does not significantly alter the likelihood of a household's first time participation in the scheme , increase in its value over time has a significant and positive effect. Similarly, the initial year's village-level per capita annual earnings from non-agricultural sources net of NREGS earnings do not significantly increase the likelihood of a household participating for the first time in the scheme. However, percentage change in village-level per capita annual earnings from non-agricultural sources net of NREGS earnings in the current year relative to the base year significantly increases the likelihood of Type III households. Initial year's village distance from the NREGS worksites is not statistically significant.

Type IV households

The probability of a household continuing in NREGS does not vary significantly for SCs, STs and OBCs. Increase in the proportion of adults in the household in 2007–2008 as well as increase over time do not have a significant effect on the likelihood of Type IV households participating . In contrast to those that participated for the first time in 2009–2010, the likelihood of a household continuing under the scheme decreases significantly with increases in its initial year's land ownership. However, change in the land holdings over time does not change the likelihood of Type IV households participating.

Neither initial year's ratio of village-level NREGS wage to agricultural wage ratio nor increase in its value over time has significant effects on the probability of a household's continued participation. The higher the village-level per capita annual earnings from non-agricultural sources net of NREGS earnings in the base year, the lower the probability of continued participation in NREGS. However, the percentage change in village-level per capita annual earnings from non-agricultural sources net of NREGS earnings in the current year relative to the base year does not have a significant effect on the likelihood of households continuing their participation in the scheme. Initial year's village distance from the NREGS worksites is not statistically significant. The Wald test validates the significance of the specification.

Thus, the role of incentives in participation in NREGS is confirmed. Workers exit from NREGS when they see better economic opportunities elsewhere in the village economy, while others enter the scheme because of the lure of remunerative wages.

Explaining the Dynamics of Participation and Exit From NREGS

The ethnographic survey conducted in the period between the first study and the panel study illuminates some of the perceived dynamics triggered by NREGS and explains why those belonging to Type II households exited NREGS in 2010.[20] Exits could have occurred due to several reasons:

(a) Workers found more lucrative work as agricultural laborers. The perception in the villages is that NREGS, whose wage rates are pegged to the statutory minimum agricultural wages, has been instrumental in increasing agricultural wages.
(b) They worked on their own expanded land holdings. Our data show that 30 per cent of Type II households owned >1<2 acres of land in 2007–2008, and about 56 per cent owned >2 acres, but in 2010, only 1 per cent owned >1<2 acres and over 70 per cent owned more than 2 acres. However, since the numbers of acutely and moderately poor among these households also increased (though not as dramatically as for Type III households), it is clear that ownership of land (especially if it is non-arable land) alone cannot lift a household out of poverty. Perhaps the explanation is as follows. In Rajasthan, the worksites functioned all year round, and not just in lean seasons. If the worksite was functional during the agricultural season, these Type II households (that had increased their landholdings) may have exited since they needed to work on their own lands and also needed to pay hired workers. In the qualitative survey, several farmers complained that they were unable to obtain labor during the harvest season because of ongoing NREGS work, and that the agricultural wages had increased.
(c) They worked in non-farm jobs: Type I and Type II households were more likely to live closer to markets (which we take as a proxy for a town) than the other two types of households. If we take the distance to the market as a proxy for distance to the nearest town, the figures show that for all three types of households, the distances to the nearest market have decreased.

With the boom in the construction industry in the state since 2008, the opportunities for skilled and unskilled laborers have increased and have been more lucrative than working on NREGS. Type III households, however, were more likely to live farther away from the market and had less connectivity, with lower access to such jobs.

Among Type IV households, the reasons for continuing to stay within the program can be traced to their use of NREGS as an additional source of income. The story seems to be that of a Type IV household that has seen a marginal improvement in its circumstances from NREGS (http://nrega.nic.in/netnrega/writereaddata/Circulars/Report_People_Eng_jan_2014.pdf, accessed 10 June 2014).

Another perception of the respondents in several villages was that migration had reduced since 2007–2008. In addition, our panel data in Table 4 reveal that almost 50 percent of Type III households were STs, and were first time entrants into NREGS. Hence, it appears that females were sent to NREGS worksites while males went to find better-paying jobs in the city. Without firm evidence at this time this is an open question.

What is clear from the ethnographic survey is that the general perception is that NREGS has increased wage rates in other jobs (farm and non-farm).

Conclusions

NREGS is one of the most ambitious workfare programs in the developing world. John Stuart Mill characterized the poverty alleviation problem as how to give the greatest amount of needful

help, with the smallest encouragement to become unduly reliant on it. India has a long history of direct and targeted interventions to fight poverty through workfare schemes, subsidized food, farm-input and credit subsidies. More recently, and following the logic of Mills' dictum, the Indian government wanted to ensure that rural households achieved a minimum income level cost-effectively, but without encouraging them to become dependent on public support. About 42 per cent of the rural population were poor, and most earned their livelihood from agriculture in 2004–2005. Indian government launched the NREGS in November, 2005, offering 100 days of employment to a rural household on demand. While there is a vast literature on the benefits of NREGS – including some of our own contributions – this is the first study based on a unique panel data set collected by us that throws light on entry into and exits from NREGS in Rajasthan over the years 2007/2008 and 2009/2010. This period is particularly interesting as there was a drought in 2009/2010 while over the period 2007/2008 and 2009/2010 a land market emerged and land values rose following a food price spiral.

Using household-level panel data for Rajasthan, this article has considered the important issue of how benefits in terms of employment and earnings from a workfare program vary over time. It has analyzed movements in and out of NREGS for various groups of households in the sample, as well as the impact such transitions have on earnings. We have modeled the determinants of such transitions and the dynamics of participation and exit from NREGS. Hence, this article provides the first systematic analysis of the dynamics of entry, participation in and exits from NREGS. A major policy implication of our analysis is that incentives to participation matter-lack of remunerative employment opportunities. A related issue therefore is that the strong case because of workfare – on the grounds that public support (in the form of guaranteed employment) induces dependence on it, and discourages job search and investment in human capital – is exaggerated, if not mistaken. This of course should not be taken to imply that all is well with NREGS. Targeting is often unsatisfactory, and leakage of funds and earnings is scandalous. Sharp hikes in NREGS wages have added to the attractiveness of this scheme to the (relatively) affluent while weakening its self-selection mechanism, and thus crowding out of the poor has become a major concern. Raising awareness of local communities about the potential benefits of this scheme and mobilizing them for greater accountability and transparency are crucial for ensuring that the benefits accrue to the needy as their economic circumstances deteriorate.

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Notes

1. For an analysis of NREGS benefits in an empowerment framework, see Shankar and Gaiha (2013).
2. NREGS was implemented only in seven districts of Rajasthan in 2007–2008 but this number increased subsequently.
3. As the magnitude of attrition was small and the pattern random, no further comment is necessary.
4. A household is said to be an NREGS participating household if at least one of its members worked for some time under NREGS in the last 365 days. Although we collected data on NREGS card holders, we did not use the data for validation because of glaring mismatch between the card holders and participants – especially the fact that only a fraction of the former participated in this scheme (Khera, 2011). Therefore, our estimates of NREGS participants are based on household member responses.

5. A household is said to be a PDS participating household if it has drawn foodgrain (rice or wheat) or sugar or kerosene from PDS.
6. State averages are unweighted means and thus differ from all-India averages.
7. We surmise that food price hikes during 2007–2008 were associated with rise in poverty, especially among net buyers of food.
8. Whether such changes in poverty status over a short period are plausible requires elaboration. Such changes did occur in the past over a period of just 3 years in the initial phase of the Green Revolution in India (Gaiha, 1987, 1988). The period 2007–2009 was marked by the emergence of a land market and rising land values due to the food price spiral. These changes to a large extent offset the effects of a drought in 2009, with landowners and net sellers of food benefiting and landless and net buyers of food losing. We are grateful to an anonymous reviewer for raising this issue.
9. As noted in the previous footnote, this reflects emergence of a land market and rising land values due to sharp food price spikes in 2007–2008.
10. It is unclear why there was a large reduction in the proportion of affluent households.
11. This classification is specific to the period covered by the panel data set. We owe this clarification to an anonymous reviewer.
12. To avoid cluttering the text with numbers, we summarize here the findings from stochastic dominance tests (graphs available on request). Consider Type IV households first. Both proportions of acutely poor and moderately poor were higher in 2009–2010 than in 2007–2008, especially the former. In sharp contrast, among Type I households, proportions of acutely and moderately poor were only slightly higher. More on these tests later.
13. This tests the equality of matched pairs of observations by using the Wilcoxon matched-pairs signed-ranks test (Wilcoxon, 1945). The null hypothesis under Wilcoxon signed-rank test is that distributions for both the years 2007–2008 and 2009–2010 are the same.
14. This tests the equality of matched pairs of observations. The null hypothesis is that the median of the differences is zero.
15. The test enables ordinal poverty comparisons for a range of poverty thresholds and the FGT class of poverty indices.
16. These details are not reported here but are available upon request.
17. Repetition of net of NREGS earnings is omitted to enhance readability.
18. We are grateful to two anonymous reviewers for raising this issue.
19. These results point to the importance of economic incentives in choosing NREGS, contrary to the view of Besley and Coate (1992) that public support in the form of workfare causes the poor to depend on it and neglect job search and other employment options. For an earlier critique, see Gaiha (1996).
20. For further details, see Shankar and Gaiha (2013).

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Appendix

Table A1: Definition of different levels of poverty

Household's poverty status	*CPIAL-adjusted per capita monthly consumption expenditure ranges*[a]
Acute poverty	<Rs. 383
Moderate poverty	⩾Rs. 383 but<Rs. 450
Moderate non-poverty	⩾Rs. 450 but<Rs. 585
Affluent	⩾Rs. 585
Non-poor	⩾Rs. 450
Poor	<Rs. 450

[a]Please note that to adjust per capita monthly consumption expenditure using CPIAL We multiply per capita monthly consumption expenditure (and all other income variables) for 2009–2010 by ratio of CPIAL in 2007–2008 to CPIAL in 2009–2010 (=0.797270955).

Table A2: Definitions of the variables used in the analysis

Variables	*Definition*
Dependent variable	
% change in Per Capita Monthly Expenditure	=(Per Capita Monthly Expenditure in 2009–2010 minus Per Capita Monthly Expenditure in 2007–2008)×100/Per Capita Monthly Expenditure in 2007–2008
% change in Per Capita Monthly Income Net of NREGS Earnings	=(Per Capita Monthly Income Net of NREGS Earnings in 2009–2010 minus Per Capita Monthly Income Net of NREGS Earnings in 2007–2008)×100/Per Capita Monthly Income Net of NREGS Earnings in 2007–2008
Type of household: mlogit	1=Type I households (those that never participated in NREGS); 2=Type II households (those that participated in 2007–2008 but withdrew in 2009–2010); 3=Type III households (those that did not participate in 2007–2008 but for the first time in 2009–2010, and 4=Type IV households (those that participated in 2007–2008 and continued in 2009–2010); 1 is the reference category

Table A2 *continued*

Variables	*Definition*
Explanatory variables	
Type I households: Dummy (Reference)	=1 if a household neither participated in 2007–2008 nor in 2009–2010; 0 otherwise
Type II households: Dummy	=1 if a household participated in 2007–2008 but not in 2009–2010; 0 otherwise
Type III households: Dummy	=1 if a household not participated in 2007–2008 but in 2009–2010; 0 otherwise
Type IV households: Dummy	=1 if a household participated in both 2007–2008 and in 2009–2010; 0 otherwise
Social Group Dummy: SC	=1 if social group is Scheduled Castes, 0 otherwise
Social Group Dummy: ST	=1 if social group is Scheduled Tribes, 0 otherwise
Social Group Dummy: OBC	=1 if social group is OBC, 0 otherwise
Social Group Dummy: Others (Reference)	Omitted social group
Household Size: 2007–2008	Household Size in base year 2007–2008
Change in Household Size: 2007–2008 and 2009–2010	Change in Household Size during 2007–2008 and 2009–2010 (Household Size in 2009–2010 minus Household Size in base year 2007–2008)
% adults in the household: 2007–2008	% of adults in the total household size in base year 2007–2008 (=number of total adults in the household×100/household size)
Δ % adult in the household: 2007–2008 to 2009–2010	change in the share of adults in the household during 2007–2008 and 2009–2010 (% in 2009–2010 minus 2007–2008)
Per Capita Monthly Expenditure: 2007–2008	Per Capita Monthly Expenditure in base year 2007–2008
Per Capita Monthly Income Net of NREGS Earnings: 2007–2008	Per Capita Monthly Income Net of NREGS Earnings in base 2007–2008
Land owned by household: 2007–2008	Land owned by household in 2007–2008 (in acres)
Δ Land owned by household: 2007–2008 to 2009–2010	Change in land owned by household during 2007–2008 and 2009–2010 (=land owned in 2009–2010 minus 2007–2008)
Ratio of NREG to AGR wage rate in Village: 2007–2008	Ratio of NREG wage to agricultural wage rate at the village level in 2007–2008
Δ Ratio of NREG to AGR wage rate in Village: 2007–2008 to 2009–2010	Change in Ratio of NREG wage to agricultural wage rate at the village level during 2007–2008 and 2009–2010 (ratio in 2009–2010 minus ratio in 2007–2008)
Average distance of NREG Sites from the village: 2007–2008	Average distance of NREG Sites from the village in 2007–2008
Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in Village: 2007–2008	Village Level Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in 2007–2008
Δ Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in Village: 2007–2008 to 2009–2010	Relative Change in Per Capita Annual Earnings from Non-agricultural sources net of NREGS earnings in Village during 2007–2008 to 2009–2010