

NREGS and TPDS in Rajasthan and Madhya Pradesh: Complements or Substitutes? ¹

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Key words: Safety Nets, Targeted Public Distribution System, National Rural Employment Guarantee Scheme, Complements, Substitutes, India

JEL Codes: C31, D10, H31, H53

¹ We gratefully acknowledge financial support from Australian Research Council–AusAID Linkage grant LP0775444 and thank Raj Bhatia for expert statistical assistance. The usual caveat applies.

Abstract

The workfare scheme the National Rural Employment Guarantee Scheme (NREGS) and the direct food subsidy program the Targeted Public Distribution Scheme (TPDS) represent two alternative social safety nets instituted in India as anti-poverty measures. This paper examines whether from the point of view of individual households the two programs are substitutes or complements, as this will shed light on the appropriateness of the design of the two programs. Based on primary household data collected from the Indian states of Rajasthan and Madhya Pradesh (MP), we show that in Rajasthan, a large percentage of households consider TPDS and NREGS programs to be substitutes for each other, while in MP, the households often perceive the two programs as complements. This holds irrespective of household size, education level, size of land-holding, social group, transaction costs and poverty status. We further isolate the correlates of participation for households that consider the two programs to be either complements or substitutes. It is concluded that the two programs are better designed in MP since an incentive for participation in one program has desirable side-effects on participation in the other, because a large percentage of households perceive the two programs to be complements. However, in Rajasthan, an isolated policy measure aimed at enhancing participation in one program would tend to reduce the level of participation in the other program since households perceive NREGS and TPDS as substitutes. An important policy conclusion, therefore, is that anti-poverty intervention must be designed so as to maximize the proportion of households that consider the programs within such intervention to be complementary.

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1. Introduction

Although there has been an emerging consensus that renewed “broad-based” economic growth is a necessary condition for alleviating poverty within an acceptable time frame, in isolation it is not sufficient. In particular, it is now widely accepted that social safety nets are an important component of an effective poverty alleviation strategy.² India too has several such safety net programs. An important question to ask here is whether these programs reinforce each other’s effects on poverty reduction or whether they “crowd out” each other. In the Indian context there is only very sparse literature on this issue.

In this paper we fill this lacuna by examining the characteristics of participation in two such social safety schemes, namely: the National Rural Employment Guarantee Scheme (NREGS) and the Targeted Public Distribution Scheme (TPDS). The former is a workfare measure whereas the latter is a food subsidy scheme. Specifically, this paper analyses the determinants of participation in these welfare schemes for two states of India, viz. Rajasthan and Madhya Pradesh (MP). We use micro data to explore whether households perceive the two welfare schemes as substitutes or complements in respect of their participation in them. If households perceive NREGS and TPDS as substitutes, an isolated policy measure aiming at enhancing participation in one program would tend to reduce the level of participation in the other program. On the other hand, if the households perceive the two programs to be complements, an incentive for participation in one program can have desirable side-effects on the extent of participation in the other. Undoubtedly, this has important policy implications.

The present analysis draws upon primary household level data collected during 2007-08 (Rajasthan) and 2008-09 (MP). The sample selection of households was done as follows: First, a list of NREGS districts was compiled for each state. From these districts, three districts from Rajasthan and nine districts from MP were selected based on probability proportional to size³ (in this case, rural population as reported in the 2001 Census). From the selected districts, a total of 25 villages were randomly selected for each of the states. Thereafter, random selection of 500 households from these villages in each of the two states was made. Finally, the 1000 selected households were surveyed. The survey questionnaire

² In spite of the growing recognition of the importance of social safety nets, these transfer programs often have a number of shortcomings that undermine their effectiveness. For instance, such transfers often fail to reach the most vulnerable groups; are not very cost-effective; are often made up of myriad uncoordinated components that need to be better integrated in order to be more effective; and that they usually have a short-term focus on alleviating poverty; and thus generally fail to generate a sustained decrease in poverty independent of the transfers themselves. However, these aspects are outside the scope of the current paper.

³ The three districts selected in Rajasthan were Sirohi, Udaipur and Jhalwar. The nine districts chosen in Madhya Pradesh were Sheopur, Tikamgarh, Satna, Shahdol, Sidhi, Jhabua, West Nimar (Khargone), East Nimar (Khandwa) and Dindori.

included information on caste, occupation, landholdings, household size, type of ration card, and participation of households in NREGS⁴ and TPDS⁵ among others.

Briefly, the NREGS is an Indian job guarantee scheme that was enacted by legislation on 25 August 2005. The scheme provides a legal guarantee for one hundred days of employment in every financial year to at least one adult member of any rural household willing to do unskilled manual work. The work is performed at the statutory minimum wage of about USD 2.7 per day at 2009 prices/exchange rates. The Central Government's outlay for the scheme in fiscal year 2010-11 was Rs. 400 billion (USD 8.92 billion). The TPDS, on the other hand, is a national food security system that distributes subsidized food to India's poor. Major commodities distributed include wheat, rice, sugar and kerosene. TPDS has a network of about 478,000 Fair Price Shops (FPSs), perhaps the largest distribution network of its type in the world, operated by the Central and State Governments. The Central Government, through the Food Corporation of India has assumed the responsibility for procurement, storage, transportation and bulk allocation of food grains to the State Governments. The operational responsibility, including allocation within State, identification of families below the poverty line, issue of Ration Cards and supervision of the functioning of Fair Price Shop (FPS), rests with the State Governments.⁶ These programmes have been critically analyzed by several researchers (Jha et al., 2009, 2011, 2012; Khera, 2011; Kochar, 2005).

Depending upon the household's participation in NREGS and TPDS schemes, the households were classified in the following four mutually exclusive categories:

1. *Only TPDS* participating households: The households who participate only in TPDS and not in NREGS.
2. *Only NREGS* participating households: The households who participate only in NREGS and not in TPDS.
3. *Both TPDS and NREGS* participating households: The households who participate in both TPDS and NREGS schemes.
4. *Neither NREGS nor TPDS* participating households: The households who do not participate in either NREGS or TPDS.

A graphic representation of the household's participation in NREGS and TPDS schemes in the four categories (as described above) is given in Figure 1.

Figure 1 here

⁴ A household is said to be a NREGS participant if at least one member of that household worked for some time under NREGS in the past one year.

⁵ A household is said to be participating in TPDS if the household has consumed (bought) some quantities of rice, wheat or sugar from a fair price shop in the last 30 days.

⁶ Faced with budgetary difficulties, the government re-designed the PDS in 1997 and introduced the Targeted PDS (TPDS). Despite the noble intention of targeting subsidized food grains to '*poor in all areas*', unlike the erstwhile system which laid stress on '*all in poor areas*', the TPDS scheme, which consumes around one per cent of the country's gross domestic product (GDP) and covers up to 25 per cent of the poor households, is plagued with controversies (Jha and Srinivasan, 2001; Jha et al, 1999; Khera, 2008, 2010; Planning Commission (2005) and Kumar, 2010 to mention just a few).

The rest of the paper is organized as follows. In section 2, the distribution of household participation in the two welfare schemes is discussed. Analysis is carried out on the basis of household characteristics such as social groups, education levels and poverty status. An important determinant of households' participation in TPDS and NREGS is the transaction cost involved. These relate primarily to the time spent in reaching FPSs or NREGS work-sites, as well as the time taken to purchase grains from the FPS. Such aspects are discussed in Section 3. Section 4 discusses the specification and estimation of the econometric model. Here, we examine the determinants of participation for households that consider the two programs to be as either complements or substitutes. The correlates of substitutability and complementarity have been examined in the context of individual, household and village level characteristics. Thereafter, section 5 offers concluding remarks from a broad policy perspective.

2. Distribution of Household Participation in Welfare Schemes

In this section we study the distribution of a household participation in the two welfare schemes. This has been analyzed for:

1. Distribution of households, based on participation in TPDS and NREGS
2. Distribution of household participation in NREGS and TPDS by Social Group
3. Distribution of household participation in NREGS and TPDS by Education Level of Household Head (HH)
4. Distribution of household participation in TPDS and NREGS by Household Size
5. Distribution of household participation in TPDS and NREGS by Size of Land-Holdings
6. Distribution of household participation in TPDS and NREGS by Poverty Status
7. Distribution of household participation in TPDS and NREGS by Per Capita Monthly Consumption Expenditure

Each of these is discussed next.

2.1. Distribution Based on Participation in TPDS and NREGS

Figure 2, represents the distribution of households based on their participation in TPDS and NREGS. Few observations are made below.

Rajasthan: Amongst the four classifications, Rajasthan has the largest proportion of households' that participate in *only NREGS* (more than 45%). Households that participate in *only TPDS* is low (less than 15%). Further, about 20 per cent of the households participate in *both TPDS and NREGS*. Almost a similar percentage of households do not participate in *either TPDS or NREGS*.

Madhya Pradesh: Amongst the four classifications, MP has the largest proportion of households that participate in *both NREGS and TPDS* (more than 40%). *Only TPDS* and *only NREGS* participating households are below 20 per cent each. Further, about 20 per cent of the households do not participate in *either TPDS or NREGS*.

Figure 2 here

Comparison: Rajasthan and Madhya Pradesh: While a majority of the households in Rajasthan participate *only* in *NREGS*, in MP a majority participate in *both NREGS and TPDS*. Further, the proportion of *only NREGS* participating households in Rajasthan (46%) is much higher than the corresponding proportion in MP (19%). Proportions of households who participate *only* in *TPDS* and those who participate in *neither* are not very different across the two states (about 15% and 20%, respectively).

Hence, in Rajasthan, a large percentage of households consider *TPDS* and *NREGS* programs to be substitutes for each other and have a strong preference for *only NREGS* over *only TPDS*. On the other hand, since a large percentage of MP households prefer to participate in both programs simultaneously and thus consider the two programs to be complementary. Also the MP households who consider the two programs to be substitutes, do not have a strong preference for one program over the other, as the distribution of household participation over the two programs (*only NREGS* or *only TPDS*) is very similar.

2.2. Distribution of Household Participation in NREGS and TPDS by Social Group⁷

Table 1 shows the distribution of household participation in *NREGS* and *TPDS* by social groups. We make a few observations below.

Rajasthan: In Rajasthan, 52 per cent of Scheduled Caste (SC) households participate *only* in *NREGS*, while less than 10 per cent SC households participate *only* in *TPDS*. Further, about 17 per cent of the SC households participate in *both programs*. Also, 20 per cent of SC households did not participate in either of the two programs. Similarly, Scheduled Tribe (ST) participation is also much higher for *only NREGS* than for *only TPDS*. However, while 17 per cent of SC participate in *both* programs, the corresponding figure for ST is as high as 35 per cent.

Madhya Pradesh: SC participation *only* in *NREGS* is at 10 per cent, while the participation in *only TPDS* is almost 3 times higher at 35 per cent. The reverse holds for ST participation. It is over two times higher for *only NREGS* than for *only TPDS*. Further, 50 per cent of the SCs and STs participate in both welfare schemes.

Thus, while in Rajasthan, higher proportions of SC and ST households participate *only* in *NREGS*, in MP the percentage of households participating in both schemes is higher. Further, while in MP a very small proportion of SC and ST households do not participate in *either* of the two programs (about 5-7%), the corresponding figures are relatively high in Rajasthan (15-20%). Amongst the social group 'Others', households that do not participate in *either* of the two schemes is more than twice higher in MP compared to Rajasthan (67% versus 29%).

Hence, in Rajasthan, large proportions of SC and ST households consider *TPDS* and *NREGS* programs to be substitutes for each other and have a stronger preference for *NREGS* over *TPDS*. On the other hand, in MP, the SC and ST households often consider the two programs to be complementing each other, as a large proportion of households prefer to participate in

⁷ In India Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Castes (OBC) and 'Others' are referred to as social groups.

both programs. Also, SC households in MP who consider the two programs as substitutes, have a stronger preference for *only TPDS*; unlike the ST households who have a stronger preference for *only NREGS*. Also interesting to note is that in Rajasthan for social group ‘Others’, the two schemes are more of substitutes than complements. This is evidenced by the fact that more than 60 per cent of the households are either *only TPDS* participants (31.36%) or *only NREGS* participants (31.33%). Only 7.5 per cent of ‘Other’ households participate in both programs. On the other hand, in MP, majority of households belonging to social group ‘Others’ (67.6) prefer not to participate in either of the two welfare schemes.

Table 1 about here

2.3. Household participation in NREGS and TPDS by level of education of HH⁸

Table 2 shows the distribution of household participation in NREGS and TPDS by level of education of household head. The following observations follow.

Rajasthan: In Rajasthan, a high proportion of households with HH having education up to secondary participate in *only NREGS*. The preference of households with illiterate HH to work in *only NREGS* is almost 8 times stronger than in *only TPDS*. Households with HH with secondary level education have strong preference for participating *only* in *NREGS* but not for participating in both programs. For instance, while more than 30 per cent of the households with illiterate HH participate in *both* welfare programs, this percentage declines sharply to about 5 for households with HH with secondary education. Interestingly, while the households’ preference remains strong for *only NREGS* for HH with education levels up to secondary, thereafter there is a sharp decline (from 46% to 13%). Households with HH with education levels of higher secondary and above have a greater preference to participate in *only TPDS* (28% as against 13% for *only NREGS* and 7% for *both NREGS and TPDS*). Further, as expected, large percentage of households with HH with education levels of higher secondary and above, participate in *neither* of the two programs.

Madhya Pradesh: In MP, a large proportion of households with HH with low or moderate levels of education (up to secondary) participate in *both NREGS and TPDS*. Interestingly, while the households’ preference remains strong for *only NREGS* for education levels of HH up to secondary, thereafter there is a sharp decline (from 42% to 17%). Also, as expected, a large percentage of households with education levels of HH of higher secondary and above participate in *neither* of the two programs.

Comparison: Rajasthan and Madhya Pradesh: While in Rajasthan, households with HH with low or moderate education levels have a strong preference for *only NREGS* over *only TPDS*, the same does not hold true in MP. Here, the households’ preference for participation in the two programs remains equally distributed amongst the two programs. Further, irrespective of the education level of HH, households’ participation jointly in *both* programs remains much higher in MP than in Rajasthan. For instance, while in MP 41 per cent of the households with

⁸ For our study, education level of household head is used as a proxy for education level of the household.

HH with secondary level educated households participate in both the programs, the corresponding figure for Rajasthan is barely 5 per cent.

Table 2 about here

Hence, in Rajasthan, TPDS and NREGS act more as substitute programs for the households with a strong preference for the latter. This holds for households with HH education levels up to secondary. However, household with HH education levels of higher secondary and above prefer to participate more in *only TPDS* than in *only NREGS* (28% as against 13%), exhibiting a strong preference for the former over the latter. Thus, household choice between the two programs depends on the educational qualifications of HH. On the other hand, in MP, the two programs seem to complement each other as a large percentage of households prefer to participate in *both* programs. This holds for households with education levels up to secondary. Also, for households in MP who consider the two programs as substitutes, do not have a strong preference for one program over the other. Also noteworthy is the fact that in both states, households with literate HH households (i.e., with education levels beyond secondary) prefer not to participate in *either* of the two programs.

2.4. Distribution of household participation in TPDS and NREGS by Household Size

Table 3 shows the distribution of household participation in NREGS and TPDS by household size. Some comments follow.

Rajasthan: In Rajasthan, irrespective of household size, the percentage of *only NREGS* participating households is the highest. In fact, the percentage of households who participate in *only NREGS* is almost 4 times greater than the corresponding figure for *only TPDS* participating households. Interestingly, no household with family size of 12⁹ or more participates in *TPDS* (either *only TPDS* or *TPDS* along with *NREGS*).

Madhya Pradesh: In MP, irrespective of size, the proportion of households that participate in *both TPDS and NREGS* is largest, except for households with family size of 12 or more. Interestingly, no household with family size of 12 or more participates in *TPDS* (either *only TPDS* or *TPDS* along with *NREGS*).

Comparison: Rajasthan and Madhya Pradesh: In both Rajasthan and MP, households of all size groups have a stronger preference for *only NREGS* than for *only TPDS*. Further, the preference for *only NREGS* is stronger in Rajasthan as compared to MP. Interestingly, households with family size greater than 12 do not participate in *TPDS* at all in both states. In MP, when household size exceeds 12, all households participate in *only NREGS*. Participation of such households in *only TPDS* falls to zero. One reason could be that ration in PDS are on per household rather than per person basis. Thus, per capita ration allotments with 12 or more members may be so low so as to provide no incentive for participation in *TPDS*. Data also reveal that for MP, increase in household size (up to 12) is associated with increase in participation in *both TPDS and NREGS*. However, the same does not hold for Rajasthan. Here, while increase in household size is associated with increase in participation

⁹ In any case, it represents households that are unusually large.

in *only NREGS*, the corresponding participation in *both TPDS and NREGS* declines with an increase in family size. Finally, the number of households that participate in *both NREGS and TPDS* is higher for MP than Rajasthan.

Hence, in Rajasthan, greater proportion of households-irrespective of family size- consider TPDS and NREGS as substitute programs, while in MP a large percentage of households with family size up to 12 consider the programs as complements. Also, in both MP and Rajasthan, households with family size of 12 or more consider the two programs to be perfect substitutes for each other, with households participating in *only NREGS*. Not a single household of size 12 or more participates in TPDS. Thus NREGS becomes a perfect substitute for TPDS at this point. In both states, participation in TPDS (*only TPDS* and TPDS along with NREGS) falls to zero for household size of 12 or more.¹⁰

Table 3 about here

2.5. Distribution of household participation in TPDS and NREGS by size of land-holdings

Table 4 shows the distribution of household participation in NREGS and TPDS by size of land- holdings. The following observations are in order.

Rajasthan: In Rajasthan, irrespective of the size of land-holding, a large proportion of households prefer to participate *only* in NREGS. Further, while 40 per cent of the landless households prefer to work *only* in NREGS, only 12 per cent of landless households prefer to participate in both social programs. A large proportion of households also prefer not to participate in *either* of the two programs (33%). As expected, a large proportion of households (30%) with land assets greater than 5 acres¹¹ prefer not to participate in *either* of the two programs. Surprisingly, a very high percentage of landless households (almost 33%) also prefer not to participate in *either* of the two programs.

Madhya Pradesh: In MP, preference to participate in *both* programs remains strong (above 40 per cent) for households with land ownership less than 5 acres. Thereafter, the percentage of households participating in both the programs falls sharply to a low of about 5. Further, while an increase in land ownership up to 2 acres is clearly associated with an increase in *only TPDS* participation, the same does not hold for land ownership exceeding 2 acres. Thus, while 17 per cent of the households with land up to 2 acres participate in *only TPDS*, the corresponding figure declines to about 3 per cent for households with land assets in excess of 5 acres. Surprisingly, no such decline is registered with respect to household participation in *only NREGS*. Also, as expected, a large majority of households (70 per cent) with land assets greater than 5 acres prefer not to participate in *either* of the two programs.

Comparison: Rajasthan and Madhya Pradesh: While in Rajasthan, households with less land prefer to participate in *only NREGS*, the same does not hold for MP. Here, irrespective of the amount of land owned, households prefer to participate in both programs. Further, while in MP, the preference to participate in *only TPDS* and in *only NREGS* remains equally

¹⁰ Possible reasons behind this need to be further explored.

¹¹ 1 acre = 0.404685642 hectares. Alternatively, 1 hectare = 2.47105381 acres.

distributed among households with land ownership up to 2 acres, the same does not hold for Rajasthan. In Rajasthan, households have a stronger preference for *only NREGS*. Also, while 70 per cent of the households with land holdings greater than 5 acres in MP prefer not to participate in *either* of the two welfare schemes, the corresponding percentage is only 30 for Rajasthan.

Table 4 about here

Hence, in Rajasthan, TPDS and NREGS act more as substitute programs for households with different distributions of landholdings. Between the two schemes there is a strong preference for the latter, irrespective of the landholding size. On the other hand, in MP, the two programs seem to be more of complements, as a large percentage of households with landholdings up to 5 acres prefer to participate in both programs. Also, households in MP who consider the two programs as substitutes have a stronger preference for NREGS over TPDS. However, for the landless in MP, the opposite holds.

2.6. Distribution of household participation in TPDS and NREGS by Poverty Status¹²

Table 5 shows the distribution of household's participation in NREGS and TPDS by poverty status. We make the following observations.

Rajasthan: In Rajasthan, while more than 50 per cent of the poor households prefer to participate in *only NREGS*, the corresponding figure is less than 5 per cent for poor households that participate in *only TPDS*. This reflects a clear preference for NREGS over TPDS. Further, about 25 per cent of the poor households participate in *both* social programs, while 15 per cent of the poor households do not participate in *either* of the two programs. Interestingly, a large percentage (40 per cent) of non-poor households, also participate in *only NREGS*. Further, over 85 per cent of the households that participate in *only TPDS* are non-poor, while the percentage of households that participate in *only NREGS* is equally distributed (close to 50 per cent) between the poor and non-poor.

Madhya Pradesh: In MP, preference to participate in *both* the programs remains strong (above 50 per cent) for the poor households. On the other hand, a large proportion of the non-poor prefer not to participate in *either* of the two welfare programs. Interestingly, the variability in distribution of both 'poor and non-poor' households participation between *only NREGS* and *only TPDS* remains similar, with about 19 per cent favoring *only NREGS* and 15 per cent *only TPDS*. Further, the percentage of households participating in *both* the programs falls sharply from over 50 for the poor to about 20 for the non-poor.

Comparison: Rajasthan and Madhya Pradesh: While in Rajasthan, a majority of the poor households prefer to participate in *only NREGS*, the same does not hold for MP. Here, the poor have a clear preference to participate in *both* the programs simultaneously. Further,

¹² A household is referred to as poor if the per capita monthly expenditure for that household is below the state level poverty cut-off point. The state level rural poverty cut-off point for Rajasthan is Rs. 450.6 per month per person. For Madhya Pradesh it is Rs. 429.

while in MP, the preference to participate in *only TPDS* and in *only NREGS* remains almost equally distributed between the poor and non-poor, the same does not obtain in Rajasthan. Households in Rajasthan have a clear preference for *only NREGS* irrespective of their poverty status. Also, in sharp contrast to Rajasthan, where over 70 per cent of the households who participate in *only TPDS* are non-poor, in MP over 70 per cent of such participants are poor.

To conclude: In Rajasthan, TPDS and NREGS act more as substitute programs for households with different poverty status. Between the two schemes, there is a stronger preference for the latter. On the other hand, in MP the two programs seem to be more of complements for the poor. For the non-poor in MP, no clear conclusion emerges.

Table 5 about here

2.7. Distribution of household participation in TPDS and NREGS by per capita monthly consumption expenditure

In addition to the distribution of different types of households by poverty status (based on a poverty cut-off point), we also investigate the differences in the distribution by per capita monthly expenditure (PCME). We do this by using descriptive statistics and One-way Analysis of Variance (ANOVA)¹³. Moreover, Bonferroni multiple-comparison test is performed to test the significance of differences in PCME for combination of any two types of household groups. Table 6 shows the distribution of households' participation in NREGS and TPDS by PCME. Some observations are made below.

Rajasthan: One way ANOVA results suggest that there are significant differences in the mean PCME across all the four types of households. Further, Bonferroni multiple-comparison test results show that in Rajasthan, mean PCME is highest for households who participate in *only TPDS*; followed by households that participate in *neither TPDS nor NREGS*. Thereafter, *only NREGS* participating households follow. Households that participate in *both* programs have the lowest PCME.

Madhya Pradesh: One way ANOVA results suggest that there are significant differences in the mean PCME across all four types of households. Further, Bonferroni multiple-comparison test results show that in MP, mean PCME is highest for households who participate in *neither TPDS nor NREGS*; followed by households that participate in *only NREGS*. PCME of *only TPDS* participating households follows thereafter. Finally, households that participate in *both* programs have the lowest PCME.

¹³ One of the essential assumptions of ANOVA is the equality of variances of the dependent variable (PCME) across different types of household. When this assumption is violated, the reported p-value from the significance test may be too liberal (yielding a higher than expected 'households who do not participate in either TPDS or NREGS' error rate) or too conservative (yielding a lower than expected 'households who do not participate in either TPDS or NREGS' error rate). In our analysis, Bartlett's test for equal variances suggests that variances are significantly unequal. As a remedial measure, W-test and F* robust one way ANOVA is performed. Both W-test and F* are more robust to violations of homogeneity of variances than the traditional F-test.

Comparison: Rajasthan and Madhya Pradesh: One way ANOVA results suggest that there are significant differences in the mean PCME across all four types of households in both states. Briefly:

1. *Households participating in both TPDS and NREGS:* In both Rajasthan and MP, households that participate in *both* the programs are the poorest. In Rajasthan, they have a PCME of Rs. 500 and in MP the corresponding expenditure is Rs.305.
2. *Only TPDS participating households:* Contrary to expectation, in Rajasthan the households that participate in *only TPDS* are the richest with PCME of Rs. 906. In sharp contrast, in MP only poorer households (PCME of Rs. 363) participate in *only TPDS*.
3. *Only NREGS participating households:* In Rajasthan, there is not much difference in the PCME of households that participate in *only NREGS* and those that participate in *both* programs. However, in MP the PCME of households participating in *only NREGS* is much higher than the PCME for households participating in *both*.
4. *Households participating in neither TPDS nor NREGS:* As expected, in MP households with highest PCME do not participate in *either* of the two programs. In Rajasthan too, the better-off do not participate in *either* of the two welfare schemes, though this class is not the one with highest PCME. As noted above, the class with highest PCME participates in *only TPDS*.

Table 6 about here

3. Opportunity cost of time for TPDS and NREGS participation

An important determinant of household participation in welfare schemes is the transaction cost involved. Costs for participation in TPDS relate primarily to the time spent in reaching the FPS, as also the time spent in purchasing grains from the FPS. Uncertainties regarding whether the shop will be open on a particular day, reinforced by the risk of not getting the supplies on the same day (despite the shop remaining open), necessitates frequent visits to the FPS before the purchase fructifies. Not only does this involve time and effort but also consequent loss of wages if the household member works elsewhere. Thus, distance to the fair price shop is an important determinant of household participation in TPDS, as also the amount they lift from the FPS. Here we analyze two aspects of transaction costs:

- Distance from residence to fair price shop, and
- The waiting time to buy from the TPDS.

Analysis is carried out for three categories of household's viz.: households that participate in *only TPDS*; households that participate in *both TPDS and NREGS*; and *all TPDS* participating households. Similarly, distance to the NREGS site can also be treated as a transaction cost that affects participation by households in this program. Therefore, we analyze this aspect also. Analysis is carried out for three categories of households viz.: households that participate in *only NREGS*; households that participate in *both TPDS and NREGS*; and *all NREGS* participating households.

3.1. Distance from Residence to Fair Price Shop

Rajasthan: For over 40 per cent of the households that participate in *only TPDS*, the FPS is very close to their residence, just over an average of 200 meters away. Also, for over 80 per cent of the households the average distance to FPS is less than 1 km. However, close to 10 per cent of the *only TPDS* households on average travel close to 4 km to make their purchases from the FPS. Overall, the mean distance of FPS from the residence of *only TPDS* participating households is 1.03 km. In contrast, for households that participate in *both TPDS and NREGS*, the average distance to FPS is greater (1.89 km). For *all TPDS* participating households, the average distance is a little over a kilometer and a half, though over 20 per cent of these households travel more than 4 km to make their TPDS purchases.

Madhya Pradesh: In MP, over 50 per cent of households that participate in *only TPDS* have a FPS that on average is 0.5 km. away. Nevertheless, a large percentage of households (close to 15) travel over 4 km to make their TPDS purchases. Further, the mean distance of FPS from the residence of *only TPDS* participating households is 1.33 km. By contrast, for households that participate in *both TPDS and NREGS*, the average distance is greater (1.81 km). For *all TPDS* participating households, the average distance is 1.69 km, though about 20 per cent of these households travel more than 4 km to make their TPDS purchases.

Comparison: Rajasthan and Madhya Pradesh: In both Rajasthan and MP, a large proportion of the *only TPDS* participating households have a FPS shop close to their homes. Nevertheless, 10 per cent or more of such households, travel far- an average of over 4 km to meet their ration demands. Further, as expected, the average distance to FPS is least for *only TPDS* households (1.03 km away for households in Rajasthan and 1.33 km away for corresponding households in MP). This is followed by *all TPDS* households (average distance to FPS is about 1.6 km). Finally, households that participate in *both TPDS and NREGS* have a FPS shop that is about 1.8 km away in both the states.

Table 7 about here

3.2. Waiting Time at the FPS

Rajasthan: Though on average, *only TPDS* participating households spend about 30 minutes to make their purchases, large variations exist. While about one-fourth of such households are able to make their purchase in just over 10 minutes, there are also about 4 per cent of the households that have an unpleasant task of waiting for over 3 hours to make their TPDS purchases. However, in general, over 90 per cent of households are able to make their purchases in about 20 minutes or so. Further, for *all TPDS* participating households, as well as *both TPDS and NREGS* participating households, there is not much variation exists in average waiting time at the FPS. Also, a significant proportion of both sets of households (28 per cent and 21 per cent respectively) have to wait for over 2 hours to get their ration supplies. Finally, broadly speaking, the *only TPDS* participating households spend almost 30 minutes waiting as compared to the corresponding alternate classifications (*both TPDS and NREGS* and *all TPDS*).

Madhya Pradesh: The average waiting time for all kinds of TPDS participating households remains high (close to an hour) in Madhya Pradesh. In fact, for 20 to 30 per cent of the households, the waiting time is over two hours, while for about 50 per cent the waiting period is over an hour.

Table 8 about here

Comparison: Rajasthan and Madhya Pradesh: Our results suggest that there are significant differences as well as similarities in the mean waiting time at the FPS in the two states. Some conclusions follow.

1. *Only TPDS participating households*: The average waiting period is much lower for households in Rajasthan than in MP. While in Rajasthan more than 80 per cent of households get their ration supplies in less than half an hour, the corresponding percentage is about 50 in MP. Further, while less than 5 per cent of households in Rajasthan wait for over an hour to get their supplies, in MP the corresponding percentage is over 20.
2. *Both TPDS and NREGS participating households*: In Rajasthan and MP, the average waiting time at the FPS for *both TPDS and NREGS* participating households is 65 and 62 minutes, respectively. Thus, for households that participate in *both TPDS and NREGS*, no major differences exist in terms of average waiting time at the ration shops between states. Further, the distribution of households across different waiting time periods is similar across the states.
3. *All TPDS participating households*: Here too, more similarities than differences exist in the average waiting time for purchasing grains from the FPS, with conditions being marginally better in Rajasthan (54 minutes in Rajasthan as against 60 minutes in MP). However, greater variations exist in terms of percentage of households that are able to purchase grains in less than half an hour. While 60 per cent of the households in Rajasthan have a waiting period of less than 30 minutes, the corresponding percentage is only 44 for households in MP. On the other hand, while large percentage of households have a waiting period of over 2 hours in both the states, the figures are marginally better in Rajasthan (21 per cent) as against MP (27 per cent).

3.3. Opportunity cost of time for NREGS participation

As a key element of NREGS transaction cost, we focus here on the distance from residence to NREGS work sites for NREGS participating households (*only NREGS, both NREGS and TPDS and all NREGS* participating households).

Rajasthan: On average, not much variation exists in the average distance for households to NREGS work-site. While it is 2.09 km for *only NREGS* participants, the corresponding figures are 2.12 and 2.10 km for *both TPDS and NREGS* and *all NREGS* households. Thus, the distance is a little over two km for all NREGS participating households. Despite an average distance of 2 km, over one-fourth of NREGS participating households have to travel over 3 km to work on NREGS projects. Analysis of data further reveals that for about 30 per

cent of the NREGS participating households, the work-site is about one km away. Results are shown in Table 9.

Madhya Pradesh: The average distance for households to NREGS work-sites remains very similar across all NREGS participating households (a little under 2 km). However, for a large proportion of the households (close to 40 per cent), the average distance is 2 km. Further, between 10 and 15 per cent of households have to travel over 3 km to reach the work-site.

Comparison: Rajasthan and Madhya Pradesh: Our results suggest that there are variations in the mean distance range of households to NREGS work-site. Some observations are in order.

1. *Only NREGS participating households:* On average, NREGS work-sites are closer to homes in MP than in Rajasthan (1.75 km as against 2.09 km respectively). Further, while only 10 per cent of households in MP travel over 3 km to work, the corresponding percentage in Rajasthan is over 25. Also, in MP, households who participate in *only NREGS* have highest concentration in the distance range of 1-2 km, while in Rajasthan for the same type of households the concentration is highest in the distance range of 2-3 km.
2. *Both TPDS and NREGS participating households:* Once again, the average distance to work-sites for households that participate in *both TPDS and NREGS* is lower in MP than in Rajasthan (1.80 km as against 2.12 km respectively). Further, while only 15 per cent of households in MP travel over 3 km to their duties; the corresponding percentage in Rajasthan is over 30.
3. *All NREGS participating households:* Here too, similar results hold. On average the distance to work-sites for *all NREGS* participating households is lower in MP than in Rajasthan (1.78 km as against 2.10 km, respectively). Further, while less than 15 per cent households in MP travel over 3 km to reach the work-site; the corresponding percentage in Rajasthan is close to 30.

Table 9 about here

The main conclusions that emerge from this comparative analysis of TPDS and NREGS participation in the two states are as follows:

1. The average distance to FPS is least for *only TPDS* households. Further, this distance is lower in Rajasthan than in MP (1.03 km in Rajasthan as against 1.33 km for corresponding households in MP).
2. For *only TPDS* participating households, the average waiting time is much lower in Rajasthan than in MP (30 minutes in Rajasthan as against 54 minutes in MP). However, for the other two TPDS household categories, no major differences exist between the states.
3. In general, NREGS work-sites are closer to homes in MP than in Rajasthan.

4. Econometric Analysis: Correlates of Substitutes and Complements

We now analyze the determinants of participation in the NREGS and TPDS. Depending upon household participation in NREGS and TPDS schemes, they are classified in the following four mutually exclusive categories:

1. *Only TPDS* participating households
2. *Only NREGS* participating households
3. *Both TPDS and NREGS* participating households
4. *Neither NREGS nor TPDS* participating households

Economic theory states that two commodities (programs) are substitutes if both can satisfy the same need of the consumer. Therefore, the consumer consumes only one of the two substitute commodities (programs) at any given time. On the other hand, commodities (programs) are complements if they are consumed jointly in order to satisfy some particular need. We thus state that households that participate jointly in *both the programs* consider the two welfare schemes to be complementary, while households that participate in either *only TPDS* or *only NREGS* consider the two programs as substitutes. Here we examine of individual, household and village level characteristics as correlates of substitutability and complementarity.

4.1. Methodology and Model Specification

The equation for household type that consider the programs as complements or substitutes (based on participation or non-participation in TPDS and/or NREGS), has been estimated as a multiple response dependent variable that takes the value ‘1’ if a household participates in *only TPDS*, ‘2’ if a household participates in *only NREGS*, ‘3’ if a household participates in *both TPDS and NREGS*, and ‘4’ if a household participates in *neither TPDS nor NREGS*. The data allow us to probe individual, household and village level characteristics that determine the likelihood of households considering the programs to be either substitutes or complementary. Some of the household specific correlates that have been examined are: size of household, caste, and ratio of per capita monthly expenditure to state level poverty cut-off.¹⁴ Village level characteristics include inequality in the distribution of land, ratio of NREGS to agriculture wage rate, average distance to FPS and NREGS work-sites from village, and ratio of market to TPDS price (for wheat, rice and sugar). Annexure 1 gives a description of the explanatory variables.

The multinomial logit model (Greene, 2003) is specified as:

$$P[Y_i = j] = \frac{e^{\beta'_j x_i}}{\sum_{k=1}^4 e^{\beta'_k x_i}}, j = 1,2,3,4,\dots \quad (1)$$

¹⁴ This is used as proxy for household income to avoid the problem of endogeneity of a household’s per capita monthly expenditure.

where $j = 1, 2, 3, 4$ refers to the type of a household based on its participation in welfare schemes. The estimated equations provide a set of probabilities for $j+1$ choices for a decision maker with characteristics x_i . Following Greene (2003), out of the four choices, only three parameters vectors are needed to determine all the four probabilities. The probabilities are given by:

$$P[Y_i = j/x_i] = \frac{e^{\beta_j x_i}}{1 + \sum_{k=1}^J e^{\beta_k x_i}}, \text{ for } j = 1, \dots, J, \beta_0 = 0, \dots \quad (2)$$

For our purpose, we use $j = 4$ as the reference group (or omitted). Since β coefficients in this model are difficult to interpret (Greene, 2003), we compute the marginal effects corresponding to $j = 1, 2, 3$ as:

$$\delta_j = \frac{\partial P[Y_i = j]}{\partial x_i} = P[Y_i = j][\beta_j - \bar{\beta}], j = 1, 2, 3, 4, \dots \quad (3)$$

Thus every sub-vector of β enters every marginal effect, both through the probabilities and through the weighted average that appears in δ_j . These values can be computed from the parameter estimates. Standard errors are computed using the delta method. Although the usual focus is on the coefficient estimates, (3) suggests that these could be misleading.

The model estimated is thus:

$$Q_{ij} = \alpha + H_{ij} \beta + I_{ij} \gamma + S_{ij} \delta + \theta_{ij}$$

Where:

- Q_i is the probability of participation in a particular welfare scheme.
- β , γ , and δ represent a set of marginal estimates for the corresponding set of explanatory variables viz. H_i , I_i and S_i .
- H_i is a vector of household characteristics such as size of the household and caste to which the household belongs.
- I_i is a vector of village level characteristics such as inequality in the distribution of land, ratio of NREGS to agriculture wage rate, average distance to NREGS work-site and FPS from village, and ratio of market to TPDS price (for wheat, rice and sugar).
- S_i represents marginal effects of several interaction terms.
- θ_i is the random error term assumed to be independently and identically (i.i.d.) distributed with constant variance.

1.2. Results

The marginal effects are given in Table 10 (Rajasthan) and Table 11 (Madhya Pradesh) whereas table A1 and A2 contain coefficient estimates (given as Annexures), We concentrate on the marginal effects. Note that the base (omitted or reference category) case is households

who participate in *neither TPDS nor NREGS*, leaving the other household types for detailed analysis. We therefore carry out the analysis for:

- i. Households that consider the two programs to be complementary and thus participate in *both TPDS and NREGS* simultaneously, and
- ii. Households that consider the programs as substitutes and therefore participate in either *only TPDS* or *only NREGS*.

We now analyze the correlates of participation for households that consider the two programs to be either complements or substitutes. Let us first consider the results for Rajasthan (Table 10).

Table 10 about here

First, we analyze the correlates of participation for households that consider the two programs to be *complements* (column 3, Table 10):

- *Gender*: In Rajasthan, the probability of a household to consider the programs to be complementing each other is significantly higher in male headed households.
- *Distribution of land holding*: The greater the village level inequality in the distribution of land, the higher is the probability of a household to consider the programs as complementary. This is because with an increase in inequality, participation in *both NREGS and TPDS* goes up. However, the probability of participation rises at a declining rate.
- *Education*: Education affects the probability of participation amongst households who consider the programs as complements. Specifically, more education lowers the likelihood of a household's participation in *both NREGS and TPDS* jointly. In other words, least educated households consider the programs as complementary.
- *Size of household*: In general, as the size of a household increases, the likelihood of the household's participation in *both NREGS and TPDS* becomes significantly lower, indicating that fewer households consider the programs as complements.
- *NREGS wages to AGR wages*: As NREGS wages increase relative to AGR wages, the likelihood of a household to consider the programs as complements also increases. However, participation in *both* increases at a declining rate at high relative NREGS wages. Surprisingly, an increase in relative NREGS wages makes households participate more in not just NREGS but also in TPDS. This may be on account of enhanced purchasing power that the households now have.
- *Distance of NREGS work-site from village*: The distance to NREGS work-site significantly lowers the likelihood of household participation in *both NREGS and TPDS*.
- *Distance of FPS from village*: Distance to FPS significantly lowers the likelihood of a household to consider the welfare programs as complements. Further, the decline in probability occurs at a rising rate with distance.
- *Market to PDS price ratio*: We now discuss how the market to TPDS price ratios (for wheat, rice and sugar) affect the probability of participation of households that consider the two programs to be complements.

- a. *Wheat*: Increase in the market to PDS price ratio for *wheat* makes the probability of a household's participation in *both NREGS and TPDS* higher as compared to its participation in *neither* of the welfare schemes. Increase in market price of wheat probably induces households' to earn more through participation in NREGS. Thereafter, enhanced earnings are used for purchasing more supplies from the TPDS by these NREGS participating households. This makes the two programs complements.
- b. *Rice*: An increase in the market to PDS price for *rice* significantly lowers the probability of a household's participation in *both TPDS and NREGS*. In other words, it lowers the probability of a household to consider the programs to be complements. Interacting the price ratio with the ratio of PCME to state level poverty cut-off leaves the probability of participation unchanged.
- c. *Sugar*: Further, an increase in the market to TPDS price ratio for *sugar* makes the probability of a household's participation in *both TPDS and NREGS* significantly lower. Also interesting to note is that while an increase in the market to TPDS price ratio for *sugar* makes the probability of a household's participation in *both TPDS and NREGS* significantly lower (lower probability of complementarity), the same becomes significantly higher for households that have relatively higher PCME. This is evident from the positive and significant estimate of the interaction term.

Additionally, correlates such as 'composition of household members', 'social group' and 'ratio of PCME to poverty cut-off' do not impact the probability of participation by households who consider the programs to be complements. This is because the marginal effects of joint participation in the two programs are estimated to be non-significant for these determinants.

We now consider the correlates of participation for households that consider the two programs as substitutes. Since we know that these households consider the programs to be substitutes, we examine the following: (i) correlates of participation that make preference for *only TPDS* higher (column 1, table 10) and (ii) correlates of participation that make preference for *only NREGS* higher (column 2, table 10).

- *Gender*: In Rajasthan, the probability of a household's participation in *only TPDS* is significantly lower if the household is headed by a male (than if headed by a female).
- *Composition of household members*: The probability of a household's participation in *only TPDS* becomes significantly higher as the percentage of male adults in the household increases.
- *Education*: Education affects the probability of participation across *only TPDS* and *only NREGS* participating households. Specifically, the probability of participation of households to participate in *only NREGS* is significantly lower amongst households with qualifications of higher secondary and above. On the other hand, the probability of households that participate in *only TPDS* is significantly higher for households with education up to middle school.

- *NREGS wages to Agricultural (AGR) wages*: As the NREGS wages increase relative to AGR wages, the likelihood of a household's participation in *only NREGS* increases. It may be recalled that it also significantly increases the household's participation in *both NREGS and TPDS*. This implies that increase in relative NREGS wages can make some households perceive the two programs as complements, while for others it is an incentive to treat them as substitutes. Estimates indicate that the probability is both higher and stronger for households that perceive the programs as substitutes than as complements. Further, the likelihood of households to consider the programs as 'substitutes' increases at a declining rate with increases in relative NREGS wages.
- *Distribution of land-holding*: The greater the village level inequality in the distribution of land, the higher is the probability for households to consider the programs as substitutes. This is because the probability of household participation in *only NREGS* increases. However, the probability of participation rises at a declining rate.
- *Market to TPDS price ratio*: Here we discuss how the market to TPDS price ratio (for wheat, rice and sugar) correlates with the household preference between *only NREGS* and *only TPDS*.
 - a. *Wheat*: Increase in the market to TPDS price ratio for *wheat* makes the probability of a household's participation in *only NREGS* higher (making it a perfect substitute of *only TPDS*) as compared to its participation in *neither* of the welfare schemes.¹⁵ Further, an increase in the market to PDS price ratio for *wheat* leaves the probability of a household's participation in *only TPDS* unchanged. However, the probability of its participation becomes significantly higher when 'Market price to TPDS price' is interacted with PCME as evident from the positive and significant estimate of the marginal effect of the interaction term.
 - b. *Sugar*: An increase in the market to TPDS price ratio for *sugar* makes the probability of a household's participation in *only TPDS* significantly higher (making it a perfect substitute of *only NREGS*). Also interesting to note is that while increase in the market to TPDS price ratio for *sugar* makes the probability of a household's participation in *only TPDS* higher, this probability becomes significantly lower when interacted with 'PCME as a ratio of poverty cut-off' as evident from the negative and significant estimate of the interaction term.

Further, correlates such as 'social groups' and 'size of household' do not impact the preference structure of household that consider the programs as substitutes. This is because the marginal effects of participation in *only TPDS* and *only NREGS* are estimated to be non-significant. Additionally, transactions costs (as determined by distance to FPS and distance to NREGS work-sites) also do not impact households' preference between the two programs. PCME ratios too do not affect the preference structure of households that consider the programs as substitutes. Finally, an increase in the market to TPDS price for *rice* has a non-significant impact on the probability of a household's participation in *only TPDS* and *only*

¹⁵Increase in market price of wheat probably induces households' to earn more through participation in NREGS. Some of these enhanced earnings are used for purchasing more supplies from the TPDS by a few of these NREGS participating households.

NREGS. Interacting the price ratio with the ratio of PCME also leaves the probability of participation unchanged.

We now consider the correlates of household participation across the three types of households, for Madhya Pradesh (Table 11).

Table 11 about here

Correlates of Complementarity (column 3, Table 11): The probability of a household to consider the two programs as complements is significantly higher amongst non-privileged social groups (SC, ST, and OBC). Another factor that makes the probability of programs to be more of complements is a decrease in PCME ratio, i.e., relatively poor households participate more in *both the programs*. Thus, in general, the disadvantaged social groups and poor participate in both the programs implying that these households consider the programs to be complements. Increase in land inequality also increases the complementarity of the programs. The probability of a household to consider the two programs as complements also becomes higher with an increase in relative NREGS wages. Increase in relative price of rice also has similar effect. Further, distance to NREGS work-sites increases the probability of households to consider the programs as complements. While increase in NREGS wages makes the probability of a household's participation in *both NREGS and TPDS* higher, the sign changes when the same is interacted with average distance to NREGS site.

Correlates such as 'family size', as also the 'composition of family (males/females)', leaves the probability of households who consider the programs as complements unchanged.

Correlates of Substitutability (column 1 and 2, table 11): We now examine the factors that determine the preference structure of households between *only TPDS* and *only NREGS*.

- *Composition of household members*: The preference for a household for *only TPDS* becomes significantly higher as the percentage of male adults in the household increases, while this probability becomes significantly lower if the percentage of female adults in the household increases. The opposite holds for household participation in *only NREGS*. Here, while the likelihood of a household to prefer *only NREGS* is significantly lower for households with larger percentage of male adults, the probability to prefer *only NREGS* becomes significantly higher if the percentage of female adults in the household increases.
- *Distance of NREGS work-site from village*: While the distance to NREGS work-site does not impact the probability of a household's participation in *only NREGS*, it does significantly lower the likelihood of participation in *only TPDS* as compared to the reference category.
- *NREGS wages to AGR wages*: As the NREGS wages increase relative to AGR wages, the likelihood of a household's participation in *only NREGS* remains unchanged. However, with increase in NREGS wages (relative to AGR wages), the probability of participation in *only NREGS* becomes higher for households that stay farther away

from NREGS work-site. This implies that, while additional NREGS wages do not induce people living near NREGS worksites to work more, it does induce people living farther away to join NREGS. We now comment on how NREGS wages impact the probability of participation when interacted with PCME ratio. An interesting result is that, while increase in relative wages *per se* do not affect the probability of participation in *only NREGS*, it does induce the better-off households (with higher PCME) to join *only NREGS*.

- *Distribution of land holding*: The greater the village level inequality in the distribution of land, the higher is the probability that a household will prefer *only NREGS*. On the other hand, the probability of preference for *only TPDS* becomes significantly lower. Hence, households move away from *only TPDS* to *only NREGS*.
- *Ratio of PCME to state level poverty cut-off*: This ratio impacts the probability of a household's participation in *only TPDS*. Specifically, it makes the probability of a household's participation in *only TPDS* significantly higher.
- *Market to TPDS price ratio*: Here we discuss how the market to TPDS price ratio (for rice and sugar) correlates with a household's participation in welfare schemes.
 - a. *Rice*: An increase in the market to TPDS price ratio for *rice* increases the probability of a household's participation in *only TPDS*. Further, an increase in the market to TPDS price for *rice* significantly lowers the probability of a household's participation in *only NREGS*. This implies that increase in relative price of rice makes households move away from *only NREGS* to *only TPDS*. In other words, while the two programs remain substitutes, there is a greater preference for *only TPDS* over *only NREGS*.
 - b. *Sugar*: An increase in the market to TPDS price ratio for *sugar* makes the probability of a household's participation in *only TPDS* significantly higher as compared to its participation in *neither* program. Also, an increase in the market to TPDS price ratio for *sugar* leaves the probability of its participation in *only NREGS* unchanged.

Further, correlates such as 'social groups', 'size of household', as also the 'distance of FPS from village' do not impact the preference between *only NREGS* and *only TPDS*.

Rajasthan and Madhya Pradesh: Comparative Analysis

Correlates of Complementarity: To conclude, there exist both similarities and differences in the determinants of participation that affect the probability of household's participation in both NREGS and TPDS simultaneously in the two states. The following correlates increase the probability of household participation in both NREGS and TPDS in the two states: a) Increase in NREGS wages to AGR wages; b) Inequality in distribution of land, and c) Decrease in average distance to FPS

The differences relate primarily with respect to 'social groups' and 'PCME'. While these do not impact the probability of simultaneous participation in *both NREGS and TPDS* in

Rajasthan, it is not the case in MP. For instance, in MP, households belonging to the underprivileged social classes, as also the ones with relatively low PCME participate in *both programs*.

Correlates of Substitutability: With respect to households who consider the programs as substitutes, probability of higher preference for *only TPDS* in both the states has been estimated with respect to a) Percentage of males in the household, and b) . Relative increase in market price of sugar

In terms of differences, while the relatively affluent prefer to participate more in *only TPDS* (over *only NREGS*) in Madhya Pradesh, no such preference is observed in Rajasthan. Further, increases in relative NREGS wages, makes households prefer more of *only NREGS* in Rajasthan, but not in MP.

5. Conclusion and Policy Implication

The basic objective of this paper was to examine the characteristics of participation in two social safety schemes of India, namely: the NREGS and TPDS across two states: Rajasthan and MP using primary household level data. We explored whether households perceive the two welfare schemes to be substitutes or complements. The paper further analyzed the transaction costs of participation in the welfare schemes. Using econometric techniques, we also examined the determinants of participation for households that consider the two programs to be either complementary or substitutes.

Our analyses reveal that, in general, households perceive participation in the two programs as distinctly different. Our principal conclusions are: a) In Rajasthan, a large percentage of households considers TPDS and NREGS programs to be substitutes for each other, with a strong preference for *only NREGS* over *only TPDS*. b) On the other hand, in MP households often consider the two programs as complementing each other, as a large percentage of households prefer to participate in both the programs simultaneously. c) Also, households in MP who consider the two programs as substitutes do not have a strong preference for one program over the other, as the distribution of household participation in the two programs- *only NREGS* and *only TPDS*- is very similar. d) Though variations exist, in general, the preference for *only NREGS* remains strong in Rajasthan irrespective of household size, educational qualification, size of land-holding, social group, and poverty status. Similarly in MP, preference for participation in *both NREGS and TPDS* generally remains strong, irrespective of household characteristics. e) The percentage of households that participate in *neither TPDS nor NREGS* generally increases with education level, higher castes and larger land-holdings. Non-poor households generally participate less in welfare schemes in both states. f) In both Rajasthan and MP, households that participate in *both* programs are the poorest.

With regard to opportunity cost of time for TPDS and NREG participation the principal conclusions were: a) *Distance to FPS:* In both Rajasthan and MP, a large proportion of *only TPDS* participating households have a ration shop close to their homes. Nevertheless, a

significant proportion of the households, 10 per cent or more, also travel far- an average of over 4 km to meet their ration demands. b) *Waiting time at FPS*: With respect to the *only TPDS participating households*, the average waiting period at the FPS is much lower in Rajasthan than in MP. However, no significant differences exist in terms of waiting time for households that participate in *both TPDS and NREGS* and *All TPDS* participating households between the states. c) *Distance to NREGS work-site*: On average, NREGS work-sites are closer to homes in MP than in Rajasthan for *only NREGS*, *both TPDS and NREGS*, and *All NREGS* participating households.

Hence, there are two sharp differences in the preference structure for alternate welfare programs in the two states: a) Strong preference for participation in *both NREGS and TPDS* in Madhya Pradesh, and b) Strong preference for *only NREGS* in Rajasthan

The preference for one alternative amongst several alternatives may be on account of pull factors and/or push factors. Thus, strong preference for participation in *both NREGS and TPDS* in MP may be on account of both programs being well governed. This provides an incentive for households to participate in both. Alternatively, poverty may *push* households to participate in both. Similarly, strong preference for *only NREGS* in Rajasthan may imply that NREGS is better managed than TPDS. A good proxy for the *pull* factors is the transaction cost involved in participating in alternative programs. Low transaction costs are an incentive for participation. For instance, if FPS are closer to homes and the time taken to make purchases from FPS is low, then participation in TPDS is encouraged. Similarly, if NREGS work-sites are closer to homes or if relative NREGS wages are higher, then participation in NREGS is promoted. Poverty status of households, on the other hand, may determine the extent to which households are *pushed* into participating in the schemes.

To examine such push and pull factors as determinants that make households perceive the programs as substitutes or complements, we ran a multinomial logit model. In general, our estimates indicate that the correlates identifying programs as substitutes or complements are not the same across the two states. These results provide policy levers for ensuring greater participation in the two programs by the neediest in the two states.

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Table 1: Distribution of Household’s Participation in NREGS and TPDS by Social Groups

| Social group | Only TPDS participating households | Only NREGS participating households | Both TPDS and NREGS participating households | Neither TPDS nor NREGS participating households |
|-----------------------|------------------------------------|-------------------------------------|--|---|
| Rajasthan | | | | |
| SC | 9.49 (19.56) | 52.73 (29.29) | 17.43 (21.91) | 20.36 (23.59) |
| ST | 9.30 (22.34) | 39.53 (25.59) | 35.23 (51.64) | 15.94 (21.52) |
| OBC | 10.81(30.04) | 50.26 (37.64) | 13.20 (22.38) | 25.73 (40.18) |
| Others | 31.63 (28.05) | 31.33 (7.49) | 7.52 (4.07) | 29.52 (14.71) |
| All | 12.30 | 45.65 | 20.16 | 21.89 |
| Madhya Pradesh | | | | |
| SC | 34.22 (34.01) | 10.00 (7.73) | 49.90 (16.79) | 5.87 (3.80) |
| ST | 13.41 (32.19) | 28.35 (52.94) | 51.01 (41.47) | 7.23 (11.31) |
| OBC | 8.93 (25.23) | 16.48 (36.19) | 41.75 (39.91) | 32.83 (60.40) |
| Others | 15.42 (8.57) | 7.25 (3.13) | 9.72 (1.83) | 67.61 (24.48) |
| All | 14.76 | 18.98 | 43.60 | 22.66 |

Note: Figures in parentheses are the column percentages

Table 2: Distribution of Household Participation in TPDS and NREGS by Education

| Education level | <i>Only TPDS</i> participating households | <i>Only NREGS</i> participating households | <i>Both TPDS and NREGS</i> participating households | <i>Neither TPDS nor NREGS</i> participating households |
|----------------------------|---|--|--|---|
| Rajasthan | | | | |
| Illiterate | 6.44(19.92) | 49.71(41.41) | 31.20(58.83) | 12.64(21.96) |
| Literate but up to primary | 8.94(19.92) | 52.98(31.80) | 19.06(25.90) | 19.01(23.79) |
| Middle | 14.06(15.74) | 48.83(14.72) | 12.34(8.42) | 24.76(15.56) |
| Secondary | 23.29(15.91) | 46.25(8.51) | 5.32(2.22) | 25.14(9.65) |
| Higher secondary and above | 28.21(28.50) | 13.11(3.57) | 7.51(4.63) | 51.17(29.04) |
| All | 12.30 | 45.65 | 20.16 | 21.89 |
| Madhya Pradesh | | | | |
| Illiterate | 16.99(57.82) | 18.23(48.25) | 50.62(58.33) | 14.16(31.4) |
| Literate but upto primary | 12.85(22.09) | 27.24(36.43) | 41.64(24.24) | 18.27(20.47) |
| Middle | 17.5(11.38) | 13.71(6.94) | 35.05(7.72) | 33.75(14.3) |
| Secondary | 12.26(5.64) | 7.60(2.72) | 41.82(6.52) | 38.32(11.49) |
| Higher secondary and above | 5.67(3.07) | 13.47(5.67) | 17.43(3.19) | 63.42(22.34) |
| All | 14.76 | 18.98 | 43.6 | 22.66 |

Note: Figures in parentheses are the column percentages

Table 3: Household Participation in TPDS and NREGS by Household Size

| Household size group | <i>Only TPDS</i> participating households | <i>Only NREGS</i> participating households | <i>Both TPDS and NREGS</i> participating households | <i>Neither TPDS nor NREGS</i> participating households |
|-----------------------|---|--|---|--|
| Rajasthan | | | | |
| 4 or less | 11.48 (35.90) | 43.32 (36.50) | 24.04(45.86) | 21.17 (37.19) |
| >4-≤8 | 12.75 (57.59) | 45.27 (55.08) | 18.33 (50.50) | 23.66 (60.02) |
| >8-≤12 | 13.59 (6.51) | 64.38 (8.30) | 12.47 (3.64) | 9.56 (2.57) |
| >12 | 0.00 (0.00) | 54.02 (0.12) | 0.00 (0.00) | 45.98 (0.21) |
| All | 12.30 | 45.65 | 20.16 | 21.89 |
| Madhya Pradesh | | | | |
| 4 or less | 14.12 (35.81) | 18.71(36.91) | 37.81(32.47) | 29.36 (48.51) |
| >4-≤8 | 16.13 (62.16) | 18.44(55.26) | 47.11(61.47) | 18.33 (46.01) |
| >8-≤12 | 5.41 (2.03) | 24.51(7.15) | 47.70 (6.06) | 22.39 (5.47) |
| >12 | 0.00 (0.00) | 100.00 (0.67) | 0.00 (0.00) | 0.00 (0.00) |
| All | 14.76 | 18.98 | 43.60 | 22.66 |

Note: Figures in parentheses are the column percentages

Table 4: Household Participation in TPDS and NREGS by Size of Land-Holdings

| Land owned group (in acres) | <i>Only TPDS</i> participating households | <i>Only NREGS</i> participating households | <i>Both TPDS and NREGS</i> participating households | <i>Neither TPDS nor NREGS</i> participating households |
|--------------------------------|---|--|---|---|
| Rajasthan | | | | |
| Landless | 15.48(42.31) | 39.09(28.78) | 11.98(19.97) | 33.46(51.36) |
| >0-≤1 | 8.11(17.65) | 45.34(26.59) | 29.56(39.25) | 16.99(20.78) |
| >1-≤2 | 8.04(16.04) | 56.37(30.27) | 25.00(30.40) | 10.58(11.84) |
| >2-≤5 | 18.18(16.49) | 44.61(10.90) | 16.74(9.26) | 20.48(10.44) |
| >5 | 23.37(7.52) | 39.98(3.46) | 5.75(1.13) | 30.90(5.58) |
| All | 12.30 | 45.65 | 20.16 | 21.89 |
| Madhya Pradesh | | | | |
| Landless | 19.50(50.80) | 15.27(30.94) | 44.54(39.28) | 20.70(35.13) |
| >0-≤1 | 12.66(13.64) | 18.83(15.78) | 58.36(21.29) | 10.14(7.12) |
| >1-≤2 | 17.47(18.65) | 22.82(18.94) | 46.75(16.90) | 12.96(9.02) |
| >2-≤5 | 9.96(15.21) | 21.51(25.55) | 42.53(21.99) | 25.99(25.86) |
| >5 | 3.42(1.70) | 22.73(8.78) | 3.20(0.54) | 70.65(22.87) |
| All | 14.76 | 18.98 | 43.60 | 22.66 |

Note: Figures in parentheses are the column percentages

Table 5: Distribution of household participation in TPDS and NREGS by poverty status

| Poverty Status | <i>Only TPDS</i> participating households | <i>Only NREGS</i> participating households | Both TPDS and NREGS participating households | <i>Neither TPDS nor NREGS</i> participating households |
|-----------------------|--|--|---|---|
| Rajasthan | | | | |
| Non-poor | 17.91(85.95) | 39.90(51.59) | 15.94(46.65) | 26.25(70.78) |
| Poor | 4.21(14.05) | 53.93(48.41) | 26.25(53.35) | 15.61(29.22) |
| All | 12.30 | 45.65 | 20.16 | 21.89 |
| Madhya Pradesh | | | | |
| Non-poor | 14.82(29.03) | 19.48(29.69) | 20.55(13.63) | 45.15(57.64) |
| Poor | 14.74(70.97) | 18.78(70.31) | 52.98(86.37) | 13.50(42.36) |
| All | 14.76 | 18.98 | 43.60 | 22.66 |

Note: Figures in parentheses are the column percentages.

Table 6: Per capita monthly consumption expenditure (rs./person/month) by household type

| Household type | Mean | Median | C.V. | Min | Max |
|---|---------------|---------------|-------------|---------------|----------------|
| Rajasthan | | | | | |
| <i>Only TPDS</i> participating HHs | 906.25 | 730.27 | 0.64 | 212.07 | 2618.50 |
| <i>Only NREGS</i> participating HHs | 501.44 | 475.71 | 0.47 | 128.14 | 1582.83 |
| <i>Both TPDS and NREGS</i> participating HHs | 499.59 | 441.33 | 0.46 | 119.78 | 2209.08 |
| <i>Neither TPDS nor NREGS</i> participating HHs | 686.22 | 589.50 | 0.55 | 179.38 | 3081.83 |
| All | 591.29 | 510.61 | 0.60 | 119.78 | 3081.83 |
| Madhya Pradesh | | | | | |
| <i>Only TPDS</i> participating HHs | 363.02 | 316.47 | 0.49 | 77.19 | 979.14 |
| <i>Only NREGS</i> participating HHs | 450.89 | 379.24 | 0.67 | 159.57 | 2037.00 |
| <i>Both TPDS and NREGS</i> participating HHs | 305.05 | 284.20 | 0.39 | 93.00 | 866.63 |
| <i>Neither TPDS nor NREGS</i> participating HHs | 623.99 | 458.60 | 0.64 | 168.14 | 2271.11 |
| All | 413.55 | 344.25 | 0.68 | 77.19 | 2271.11 |

Table 7: Distribution of Distance from TPDS Participating Households to the FPS

| Distance to Fair Price Shop (km) from home | <i>Only TPDS</i> participating HHs | | <i>Both TPDS and NREGS</i> participating HHs | | <i>All TPDS</i> participating HHs | |
|--|------------------------------------|-----------------|--|-----------------|-----------------------------------|-----------------|
| | Mean Distance | % of Households | Mean Distance | % of Households | Mean Distance | % of Households |
| Rajasthan | | | | | | |
| 0-1 km | 0.23 | 43.43 | 0.36 | 30.84 | 0.30 | 35.35 |
| 1-2 km | 1.00 | 38.72 | 1.05 | 26.15 | 1.03 | 30.65 |
| 2-3 km | 2.00 | 8.09 | 2.04 | 14.54 | 2.03 | 12.23 |
| 3 km+ | 3.89 | 9.76 | 4.25 | 28.46 | 4.20 | 21.77 |
| All | 1.03 | 100.00 | 1.89 | 100.00 | 1.58 | 100.00 |
| Madhya Pradesh | | | | | | |
| 0-1 km | 0.52 | 53.46 | 0.43 | 35.54 | 0.46 | 40.07 |
| 1-2 km | 1.08 | 18.34 | 1.27 | 26.08 | 1.23 | 24.13 |
| 2-3 km | 2.07 | 13.27 | 2.04 | 17.25 | 2.05 | 16.24 |
| 3 km+ | 4.18 | 14.93 | 4.69 | 21.13 | 4.60 | 19.56 |
| All | 1.33 | 100.00 | 1.81 | 100.00 | 1.69 | 100.00 |

Table 8: Distribution of Waiting Time (in minutes) at the Fair Price Shops

| Ranges of waiting times at the fair price shop | <i>Only TPDS</i> participating households | | <i>Both TPDS and NREGS</i> participating households | | <i>All TPDS</i> participating households | |
|--|---|-----------------|---|-----------------|--|-----------------|
| | Mean time | % of households | Mean time | % of households | Mean time | % of households |
| Rajasthan | | | | | | |
| ≥0- <15 | 10.50 | 25.65 | 10.96 | 17.50 | 10.78 | 19.99 |
| >15-≤30 | 23.52 | 62.15 | 26.79 | 28.52 | 25.19 | 38.82 |
| >30-≤45 | 35.00 | 0.56 | 42.37 | 5.08 | 42.03 | 3.70 |
| >45-≤60 | 60.00 | 7.60 | 60.00 | 20.46 | 60.00 | 16.52 |
| >60 | 188.22 | 4.03 | 144.35 | 28.44 | 146.93 | 20.97 |
| All | 29.65 | 100.00 | 65.04 | 100.00 | 54.21 | 100.00 |
| Madhya Pradesh | | | | | | |
| ≥0- <15 | 12.38 | 17.45 | 12.10 | 11.59 | 12.20 | 13.07 |
| >15-≤30 | 26.16 | 34.38 | 27.95 | 29.81 | 27.45 | 30.96 |
| >30-≤45 | 40.00 | 5.24 | 41.56 | 10.63 | 41.34 | 9.27 |
| >45-≤60 | 60.00 | 20.79 | 58.55 | 19.67 | 58.93 | 19.95 |
| >60 | 128.27 | 22.14 | 128.08 | 28.30 | 128.12 | 26.74 |
| All | 54.13 | 100.00 | 61.92 | 100.00 | 59.94 | 100.00 |

Table 9: Distribution of Distance from Households to NREGS work site (in km)

| Distance range from household to worksite (km) | <i>Only NREGS</i> participating households | | <i>Both TPDS and NREGS</i> participating households | | <i>All NREGS</i> participating households | |
|--|--|---------------|---|---------------|---|---------------|
| | Mean distance | % households | Mean distance | % households | Mean distance | % households |
| Rajasthan | | | | | | |
| 0-1 km | 0.46 | 3.09 | 0.43 | 2.56 | 0.45 | 2.93 |
| 1-2 km | 1.04 | 32.61 | 1.02 | 31.98 | 1.04 | 32.42 |
| 2-3 km | 2.01 | 38.29 | 2.02 | 34.35 | 2.02 | 37.08 |
| 3 km and above | 3.73 | 26.01 | 3.49 | 31.11 | 3.65 | 27.58 |
| All | 2.09 | 100.00 | 2.12 | 100.00 | 2.10 | 100.00 |
| Madhya Pradesh | | | | | | |
| 0-1 km | 0.39 | 1.25 | 0.56 | 2.11 | 0.53 | 1.85 |
| 1-2 km | 1.10 | 50.03 | 1.08 | 42.6 | 1.09 | 44.82 |
| 2-3 km | 2.05 | 37.58 | 2.01 | 40.28 | 2.02 | 39.47 |
| 3 km and above | 3.81 | 11.14 | 3.44 | 15.01 | 3.53 | 13.86 |
| All | 1.75 | 100.00 | 1.80 | 100.00 | 1.78 | 100.00 |

Table 10: Correlates of Households Participation in Welfare Schemes in Rajasthan
(Multinomial Logit Marginal Effect Estimates)

| Dependent variable outcomes | <i>Only TPDS</i> participating households | <i>Only NREGS</i> participating households | Both TPDS and NREGS participating households |
|--|---|--|--|
| | Column 1 | Column 2 | Column 3 |
| Explanatory variables | ME(z-value) | ME(z-value) | ME(z-value) |
| Gender | -0.69**(-2.12) | 0.39(1.49) | 0.22**(2.08) |
| Age | -0.01(-0.22) | 0.05(1.56) | -0.02(-0.51) |
| Square of age | 0.00(0.33) | -0.001*(-1.71) | 0.00(0.65) |
| Marital status: Married | 0.07(0.97) | 0.16(0.70) | 0.02(0.12) |
| Primary education | 0.11(0.95) | 0.04(0.27) | -0.12(-1.30) |
| Middle school | 0.50**(-2.12) | -0.17(-0.88) | -0.31***(-3.66) |
| Secondary education | 0.42(1.26) | -0.17(-0.64) | -0.25***(-2.65) |
| Higher secondary and above | 0.44(1.34) | -0.45***(-3.52) | -0.25***(-2.26) |
| SC | -0.05(-0.60) | 0.02(0.08) | 0.08(0.29) |
| ST | -0.04(-0.42) | -0.12(-0.47) | 0.23(0.85) |
| OBC | -0.01(-0.08) | 0.13(0.51) | -0.03(-0.11) |
| % male adult in the household | 0.71***(-2.49) | -0.51(-1.18) | -0.34(-0.93) |
| % female adult in the household | -0.16(-0.48) | 0.55(1.30) | -0.25(-0.65) |
| Household size | 0.03(1.14) | -0.01(-0.15) | -0.05*(-1.69) |
| Ratio of NREG to AGR wage rate | 6.90(1.56) | 37.82***(-3.14) | 14.89**(-1.97) |
| Square of Ratio of NREG to AGR wage rate | -2.96(-1.51) | -17.05***(-3.17) | -6.69**(-1.98) |
| Land Gini index | 1.20(0.69) | 8.55**(-2.18) | 6.28**(-2.08) |
| Square of Land Gini index | -1.04(-0.57) | -9.57**(-2.27) | -7.39**(-2.35) |
| AVGSITEVILLDIST | -0.09(-0.82) | -0.09(-0.44) | -0.30*(-1.66) |
| %hhs MEETATTEND | -0.01(-1.35) | -0.04***(-3.00) | -0.01(-1.62) |
| Average distance of FPS from the village | 0.04(0.25) | -0.39(-1.39) | -0.68***(-3.06) |
| Square of average distance of FPS from the village | -0.01(-0.38) | 0.05(1.50) | 0.07***(-2.93) |
| Village level Market to PDS price ratio: Wheat | -0.41(-0.82) | 3.60***(-3.1) | 1.98***(-2.81) |
| Village level Market to PDS price ratio: Rice | -0.78(-1.57) | -0.51(-0.76) | -0.81*(-1.85) |
| Village level Market to PDS price ratio: Sugar | 2.25**(-2.20) | -0.53(-0.28) | -3.65**(-2.44) |
| Ratio of PCME to state level poverty cut-off | 1.16(1.09) | 0.44(0.16) | -2.65(-1.21) |
| Interaction of village level Market to PDS price ratio of wheat and ratio of PCME to state level poverty cut-off | 0.69**(-2.20) | -0.34(-0.69) | -0.25(-0.84) |
| Interaction of village level Market to PDS price ratio of rice and ratio of PCME to state level poverty cut-off | 0.47(1.48) | -0.60(-1.39) | 0.16(0.51) |
| Interaction of village level Market to PDS price ratio of sugar and ratio of PCME to state level poverty cut-off | -2.69**(-2.40) | 1.07(0.72) | 2.06*(1.93) |
| <i>Predicted probability</i> | <i>0.10</i> | <i>0.54</i> | <i>0.27</i> |

Note: ***, **, * refer to significance at the 1 %, 5 % and 10 % level, respectively.

Figures in the parenthesis are the z-values. ME=Marginal Effect (dy/dx).

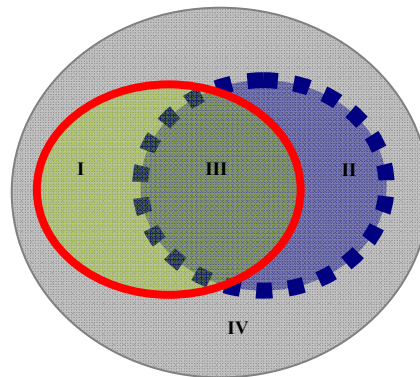
Definitions of the variables are given in Annexure 3.

Table 11: Correlates of Households Participation in Welfare Schemes in Madhya Pradesh
Multinomial Logit Marginal Effect Estimates

| Dependent variable outcomes | <i>Only TPDS</i> participating households | <i>Only NREGS</i> participating households | Both TPDS and NREGS participating households |
|--|---|--|--|
| | Column 1 | Column 2 | Column 3 |
| Explanatory variables | ME(z-value) | ME(z-value) | ME(z-value) |
| SC | 0.01(0.06) | -0.14(-1.25) | 0.30*(1.76) |
| ST | 0.03(0.44) | 0.04(0.25) | 0.51***(2.79) |
| OBC | -0.12w(-1.60) | -0.06(-0.36) | 0.36*(1.85) |
| % male adult in the household | 0.01*(1.88) | -0.01**(-2.24) | 0.00(0.25) |
| % female adult in the household | -0.01*(-1.73) | 0.01**(2.22) | 0.00(0.00) |
| Household size | -0.02(-1.05) | 0.01(0.97) | -0.01(-0.42) |
| Ratio of NREG to AGR wage rate | -0.84w(-1.55) | -0.76(-1.09) | 2.67*** (3.21) |
| AVGSITEVILLDIST | -0.83*(-1.82) | 0.07(0.26) | 1.37*** (3.06) |
| Interaction of village level Ratio of NREG to AGR wage rate and AVGSITEVILLDIST | 0.31** (2.05) | 0.24** (2.00) | -0.74*** (-4.37) |
| Average distance of FPS from the village | 0.03(1.09) | 0.01(0.22) | -0.07*(-1.69) |
| Village level Market to PDS price ratio: Rice | 0.05*** (3.37) | -0.04*(-1.66) | 0.05*(1.90) |
| Village level Market to PDS price ratio: Sugar | 0.03*** (2.83) | -0.01(-0.64) | -0.01(-0.53) |
| Ratio of PCME to state level poverty cut-off | 1.58** (2.22) | -0.27(-0.59) | -1.29*(-1.64) |
| Interaction of village level Ratio of NREG to AGR wage rate and ratio of PCME to state level poverty cut-off | -0.88** (-2.35) | 0.66** (2.24) | 0.24(0.59) |
| Land Gini index | -3.52*** (-2.87) | 2.05* (1.89) | 3.07** (2.02) |
| Interaction of village level Ratio of NREG to AGR wage rate and Land Gini index | 1.59** (2.00) | -0.86(-1.00) | -1.46(-1.38) |
| Interaction of AVGSITEVILLDIST and Land Gini index | 1.12*** (2.61) | -0.59*(-1.90) | -0.65(-1.40) |
| Interaction of AVGSITEVILLDIST and ratio of PCME to state level poverty cut-off | -0.33*(-1.88) | -0.14(-0.93) | 0.26(1.02) |
| <i>Predicted probability</i> | <i>0.13</i> | <i>0.20</i> | <i>0.56</i> |

Note: ***, **, * refer to significance at the 1 %, 5 % and 10 % level, respectively. Figures in the parenthesis are the z-values. ME=Marginal Effect (dy/dx). Definitions of the variables are given in Annexure 3.

Figure 1: Classification of Household's Participation



Where:

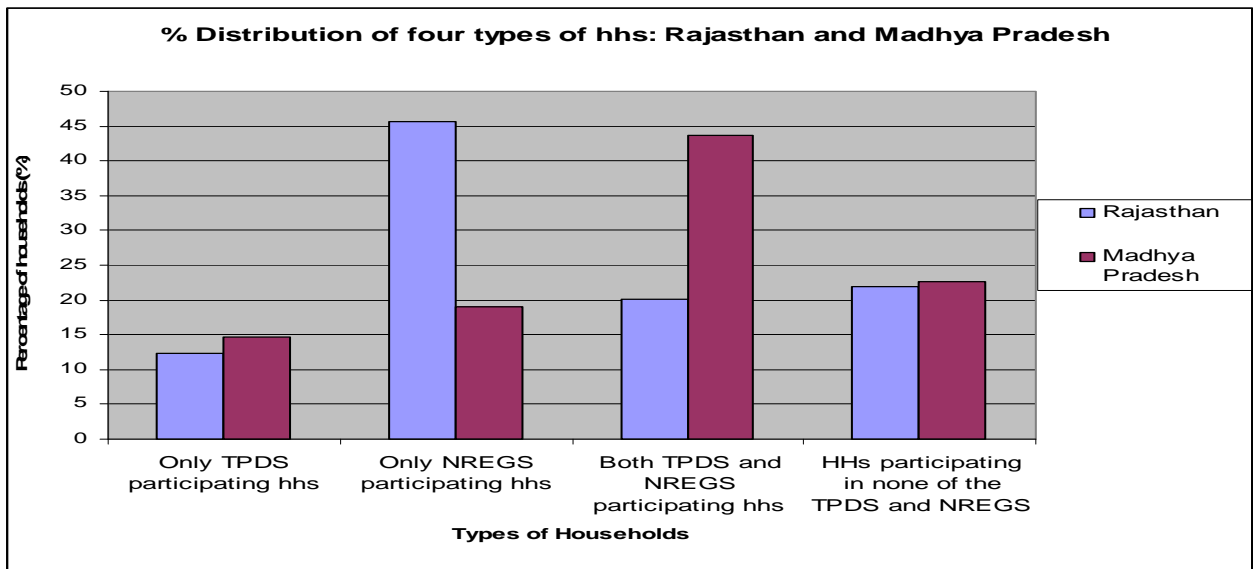
I represents: 'Only TPDS participating households',

II represents: 'Only NREGS participating households',

III represents: 'Both TPDS and NREGS participating households', and

IV represents: 'Households who participate neither in TPDS nor NREGS'

Figure 2: Distribution of Households Based on Participation in TPDS and NREGS (%)



Annexure 1

Table A1: Multinomial Logit Coefficient Estimates for Rajasthan

| Dependent variable outcomes | 'Only TPDS participating households' | 'Only NREGS participating households' | 'Both TPDS and NREGS participating households' |
|--|--------------------------------------|---------------------------------------|--|
| Explanatory variables | Coeff. (z-value) | Coeff. (z-value) | Coeff. (z-value) |
| Gender | -4.37*(-1.65) | -0.88(-0.44) | -0.57(-0.30) |
| Age | 0.33(1.32) | 0.47**(2.55) | 0.32(1.46) |
| Square of age | 0.00(-1.17) | -0.005**(-2.47) | 0.00(-1.34) |
| Marital status: Married | 2.43(1.23) | 1.83(1.23) | 1.56(1.00) |
| Primary education | 1.14(1.13) | 0.36(0.46) | -0.22(-0.27) |
| Middle school | 2.37*(1.83) | -0.18(-0.20) | -2.02*(-1.82) |
| Secondary education | 1.77(1.06) | -0.41(-0.34) | -1.80(-1.31) |
| Higher secondary and above | 0.31(0.21) | -3.20***(-3.55) | -3.51***(-2.99) |
| SC | 0.23(0.19) | 0.80(0.73) | 1.03(0.69) |
| ST | 0.44(0.31) | 0.69(0.64) | 1.67(1.16) |
| OBC | 1.20(1.05) | 1.53*(1.71) | 1.18(0.75) |
| % male adult in the household | 5.30**(2.21) | -2.56(-1.24) | -2.87(-1.34) |
| % female adult in the household | 0.07(0.02) | 2.62(1.12) | 0.68(0.25) |
| Household size | -0.05(-0.22) | -0.35*(-1.83) | -0.53***(-2.51) |
| Ratio of NREG to AGR wage rate | 766.91**(2.50) | 769.61**(2.50) | 754.31**(2.45) |
| Square of Ratio of NREG to AGR wage rate | -342.23***(-2.49) | -344.95***(-2.50) | -337.96***(-2.45) |
| Land Gini index | 199.99**(2.50) | 204.05***(-2.58) | 211.32***(-2.64) |
| Square of Land Gini index | -221.33***(-2.44) | -228.90***(-2.57) | -238.33***(-2.66) |
| AVGSITEVILLDIST | -6.45***(-2.07) | -5.72*(-1.85) | -6.64***(-2.08) |
| %hhs MEETATTEND | -0.79***(-2.38) | -0.79***(-2.36) | -0.77***(-2.32) |
| Average distance of FPS from the village | -11.77*(-1.93) | -12.86**(-2.34) | -14.65***(-2.63) |
| Square of average distance of FPS from the village | 1.22(1.64) | 1.42**(2.39) | 1.60***(-2.65) |
| Village level Market to PDS price ratio: Wheat | 56.67**(2.02) | 67.38**(2.40) | 67.99**(2.43) |
| Village level Market to PDS price ratio: Rice | -32.29***(-2.71) | -25.61**(-2.13) | -27.65***(-2.31) |
| Village level Market to PDS price ratio: Sugar | -0.65(-0.03) | -23.59(-1.16) | -36.00*(-1.84) |
| Ratio of PCME to state level poverty cut-off | -1.04(-0.07) | -11.56(-0.69) | -22.11(-1.43) |
| Interaction of village level Market to PDS price ratio of wheat and ratio of PCME to state level poverty cut-off | 8.00***(-3.37) | 0.62(0.27) | 0.33(0.21) |
| Interaction of village level Market to PDS price ratio of rice and ratio of PCME to state level poverty cut-off | 4.92**(2.06) | -0.80(-0.37) | 0.91(0.42) |
| Interaction of village level Market to PDS price ratio of sugar and ratio of PCME to state level poverty cut-off | -21.12*(-1.78) | 7.13(0.65) | 12.72(1.27) |
| Constant | -441.61***(-2.61) | -446.63***(-2.63) | -412.18***(-2.42) |
| Number of observations | 280 | | |
| Wald chi-square(87) | 246.26*** | | |
| Pseudo R-square | 0.3683 | | |
| Log pseudolikelihood | -234.44 | | |

Note: Households who do not participate in any of the TPDS and NREGS are the reference group. ***, **, * refer to significance at the 1 %, 5 % and 10 % level, respectively. Figures in the parenthesis are the z-values. Definitions of the variables are given in Annex.

Annexure 2

Table A1: Multinomial Logit Coefficient Estimates for Madhya Pradesh

| Dependent variable outcomes | 'Only TPDS participating households' | 'Only NREGS participating households' | 'Both TPDS and NREGS participating households' |
|--|--------------------------------------|---------------------------------------|--|
| Explanatory variables | Coeff. (z-value) | Coeff. (z-value) | Coeff. (z-value) |
| SC | 3.19***(3.27) | 2.11(1.37) | 3.61***(3.16) |
| ST | 5.30***(3.61) | 5.25***(2.90) | 6.12***(3.93) |
| OBC | 0.84(0.93) | 1.62(1.27) | 2.60***(2.66) |
| % male adult in the household | -0.01(-0.17) | -0.12***(-2.67) | -0.05*(-1.70) |
| % female adult in the household | 0.02(0.76) | 0.14***(3.01) | 0.07**(2.37) |
| Household size | -0.21(-1.11) | -0.01(-0.07) | -0.10(-0.74) |
| Ratio of NREG to AGR wage rate | 2.54(0.33) | 5.32(0.88) | 13.96***(2.64) |
| AVGSITEVILLDIST | -1.23(-0.25) | 5.64**(2.36) | 7.71***(3.20) |
| Interaction of village level Ratio of NREG to AGR wage rate and AVGSITEVILLDIST | 0.87(0.47) | -0.39(-0.35) | -2.92***(-2.80) |
| Average distance of FPS from the village | -0.11(-0.34) | -0.29(-1.01) | -0.46*(-1.66) |
| Village level Market to PDS price ratio: Rice | 0.89***(3.70) | 0.33*(1.90) | 0.61***(3.97) |
| Village level Market to PDS price ratio: Sugar | 0.33**(2.40) | 0.09(0.87) | 0.11(1.15) |
| Ratio of PCME to state level poverty cut-off | 12.69*(1.77) | -1.21(-0.33) | -2.11(-0.53) |
| Interaction of village level Ratio of NREG to AGR wage rate and ratio of PCME to state level poverty cut-off | -6.78(-1.48) | 3.51(1.57) | 0.59(0.25) |
| Land Gini index | -13.97(-0.76) | 24.27**(2.53) | 19.25**(2.14) |
| Interaction of village level Ratio of NREG to AGR wage rate and Land Gini index | 6.16(0.55) | -10.74(-1.50) | -8.95(-1.41) |
| Interaction of AVGSITEVILLDIST and Land Gini index | 7.85(1.54) | -4.03*(-1.70) | -2.19(-0.94) |
| Interaction of AVGSITEVILLDIST and ratio of PCME to state level poverty cut-off | -4.41***(-2.63) | -2.50**(-2.25) | -1.33(-1.05) |
| Constant | -20.67 | -23.82 | -33.56 |
| Number of observations | 300 | | |
| Wald chi-square(54) | 128.88 *** | | |
| Pseudo R-square | 0.2756 | | |
| Log pseudo-likelihood | -283.02 | | |

Note: ***, **, * refer to significance at the 1 %, 5 % and 10 % level, respectively; and w denotes weakly significant (>10 % level).

Figures in the parenthesis are the z-values.

Definitions of the variables are given in Annex.

Annexure 3:
Definitions of the variables used in the Multinomial Logit analysis

| Variables | Definition |
|--|---|
| Type of households: categorical | 1='Only TPDS participating households'; 2= 'Only NREGS participating households'; 3= 'Both TPDS and NREGS participating households' and 4='Households who do not participate in any of the TPDS and NREGS'; 4 is reference category |
| Gender | Gender of household head: =1 if male, 0 if female |
| Age | Age of household head |
| Square of age | Square of age of household head |
| Marital status: Married | =1 if household head is married; 0 otherwise |
| Illiterate (Reference) | Omitted education level |
| Primary education | =1 if household head is literate but upto primary education, 0 otherwise |
| Middle school | =1 if household head is literate but upto middle school, 0 otherwise |
| Secondary education | =1 if household head is literate but upto secondary education, 0 otherwise |
| Higher secondary and above | =1 if household head is literate but upto higher secondary and above, 0 otherwise |
| SC | =1 if social group is SC, 0 otherwise |
| ST | =1 if social group is ST, 0 otherwise |
| OBC | =1 if social group is OBC, 0 otherwise |
| Others (Reference) | Omitted social group |
| % male adult in the household | % of male adults in the total household size (=number of total adult male *100/household size) |
| % female adult in the household | % of female adults in the total household size |
| Household size | Size of the household |
| Ratio of NREG to AGR wage rate | Ratio of NREG wage to agricultural wage rate at the village level |
| Square of Ratio of NREG to AGR wage rate | Square of ratio of NREG wage to agricultural wage rate at the village level |
| Land Gini index | Land Gini index to measure inequality in the distribution of landholdings at the village level |
| Square of Land Gini index | Square of Land Gini index |
| AVGSITEVILLDIST | Average distance of NREGS site from the village |
| %hhs MEETATTEND | %households attending meetings at village level |
| Average distance of FPS from the village | Average distance of Fair Price Shop from the village (in km) |
| Square of average distance of FPS from the village | Square of average distance of Fair Price Shop from the village |
| Village level Market to PDS price ratio: Wheat | =(Market price/PDS price) for wheat at the village level |
| Village level Market to PDS price ratio: Rice | =(Market price/PDS price) for rice at the village level |
| Village level Market to PDS price ratio: Sugar | =(Market price/PDS price) for sugar at the village level |
| Ratio of PCME to state level poverty cut-off | =household's per capita monthly expenditure divided by state poverty cut-off |
| Interaction of village level Market to PDS price ratio of wheat and ratio of PCME to state level poverty cut-off | =Village level Market to PDS price ratios of wheat* ratio of PCME to state level poverty cut-off |
| Interaction of village level Market to PDS price ratio of rice and ratio of PCME to state level poverty cut-off | =Village level Market to PDS price ratio of rice* ratio of PCME to state level poverty cut-off |
| Interaction of village level Market to PDS price ratio of sugar and ratio of PCME to state level poverty cut-off | =Village level Market to PDS price ratio of sugar* ratio of PCME to state level poverty cut-off |
| Interaction of village level Ratio of NREG to AGR wage rate and AVGSITEVILLDIST | Interaction of village level Ratio of NREG to AGR wage rate and average distance from NREGS work sites |
| Interaction of village level Ratio of NREG to AGR wage rate and ratio of PCME to state level poverty cut-off | Interaction of village level Ratio of NREG to AGR wage rate and ratio of PCME to state level poverty cut-off |
| Interaction of village level Ratio of NREG to AGR wage rate and Land Gini index | Interaction of village level Ratio of NREG to AGR wage rate and Land Gini index |
| Interaction of AVGSITEVILLDIST and Land Gini index | Interaction of average distance of NREGS work-site from village and village level land Gini-index |
| Interaction of AVGSITEVILLDIST and ratio of PCME to state level poverty cut-off | Interaction of average distance of NREGS work-site from village and ratio of PCME to state level poverty cut-off |