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Workfare and Vulnerability in Rural India[1]

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ABSTRACT

Using a unique panel data for rural India for the periods 1999 and 2006 this paper models vulnerability to poverty in the context of local governance and the introduction of the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). We quantify household vulnerability in rural India in 1999 and 2006, investigate the determinants of ex post poverty as well as ex ante vulnerability, assess the role of ex ante vulnerability on poverty shift during the sample periods (i.e. movement into/out of poverty) and finally, examine how the effects of the determinants of vulnerability vary at different points across the vulnerability distribution. We conclude that exposure to MGNREGS has reduced the incidence of poverty. Although chronic poverty is relatively small the high incidence of transient poverty underscores the importance of covariate and idiosyncratic shocks. Household vulnerability across the distribution of such vulnerability is also investigated. A number of factors affect such vulnerability across this distribution. In particular, this paper is the first to investigate the role of village governance in affecting household poverty and vulnerability.

JEL Classification Code: C23, C25, C31, I32

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I. Introduction

Recently a growing body of research has examined household and individual vulnerability as expected poverty. This has been inspired by the fact that a variety of risks often cause high fluctuations in a household's income or consumption. In developing countries such volatility is more prevalent in rural areas where households' main source of income is agricultural activity, and where households face a lack of or incomplete credit and insurance markets. Although households try to prevent those risks *ex ante* and/or to reduce the degree of (downside) fluctuation *ex post*, such livelihood strategies often provide only imperfect protection (Townsend, 1994; Udry, 1990; Dercon, 2005). Consequently, for households lacking instruments for managing risks, vulnerability caused by risks is likely to translate into poverty.

Vulnerability is risk specific and a forward looking concept that illustrates future outcomes whereas poverty describes past or current status. Hence, poverty and vulnerability are close but distinct concepts. As indicated above vulnerability is essentially an intertemporal concept so that its precise assessment requires the use of lengthy panel data, which is seldom available in developing countries. One definition of *ex ante* vulnerability is 'Vulnerability as Expected Poverty' (VEP- e.g. Chaudhuri, Jalan and Suryahadi, 2002; Pritchett, Suryahadi and Sumarto, 2000). Moreover, because of its lower data requirement and because it acts as an *ex ante* measure of poverty the VEP measure is widely used in developing countries. In this paper, therefore, we adopt the VEP measure drawing on two rounds of a unique household level panel data for rural India.

Further, exploration of the dynamic nature of poverty and VEP measure enables one to identify the linkage between chronic poverty and vulnerability, particularly because the two existing popular approaches to chronic poverty do not incorporate vulnerability (e.g. Barrientos, 2007; CPRC 2008; McCulloch and Calandrino, 2003).[2] The extant empirical literature on the linkages between chronic poverty and vulnerability is relatively scant. The

[2] Two broad methods of chronic poverty in literature are (i) the spells approach focusing on poverty transition (Gaiha and Deolalikar, 1993) and (ii) the component approach distinguishing permanent component of income from fluctuating component (Ravallion, 1988; Jalan and Ravallion, 2001)

present paper seeks to explore this potential linkage formally using a unique panel household dataset for India. In particular, we wish to explore whether vulnerability generates poverty traps.

Why are rural households vulnerable? We posit that vulnerability of households can be attributed to two facets of the rural economy viz., a) low levels of skill formation and b) seasonal nature of agriculture; each of which contribute to significant uncertainties over future income streams. Low levels of skill formation increases the uncertainties associated with being employed as well as limiting the ability of members of households to be employed in activities that provide a stable source of income. In addition, low skill levels attract lower wages and salaries. Off farm employment has been shown to have significant impacts on poverty reduction and economic growth (Foster and Rosenzweig, 2004). Higher levels of skills allow for greater diversity of employment opportunities and enable households and household members to seek employment in sectors provide a stable source of employment. This will help in reducing the magnitudes of adverse impacts caused by negative shocks such as drought, variations in rainfall, etc.

Productivity of wetland and dryland agriculture remains low and has stagnated over the past decades. For example, Foster and Rosenzweig (2004) find that agricultural productivity growth has slowed significantly between 1971-99, particularly so in the last two decades. Since much of rural employment continues to be in agriculture and allied activities (as of 1999, nearly 45% of households were involved in self-employment in agriculture or agricultural casual labor[3]), the impact of low productivity agriculture combined with poor skill formation makes households vulnerable to shocks. In addition, the level and rates of savings remain poor. Financial inclusion is incomplete in most villages. Indeed, recently released data suggest that nearly 38% of individuals report accumulation of some savings, only 14% had savings in a formal institution (Goedecke et al., 2018). Low levels of savings combined with poor skill formation, low productivity agriculture and increased uncertainties over future income streams makes household consumption (especially food consumption) depend entirely on current incomes. Food consumption expenditures as a result become volatile and are idiosyncratic. Uncertainties associated with expected incomes make households engage in risky coping mechanisms in response to adverse

[3]As of 2011-12, Saha and Verick (2016) suggest that the average non-farm employment rate in rural India is at 37.9%, with high growth rates in states such as Punjab where agriculture is the dominant primary activity of households traditionally.

events and leads to significant variations in consumption. Households that are vulnerable are more likely to either fall into poverty or remain poor.

MGNREGS was designed and implemented in such way that the uncertainties associated with incomes will reduce. Guaranteed employment upon applying for a job reduces the uncertainties that households may have over their future income streams. The design of MGNREGS was under the premise that variation in consumption is caused by uncertainties over employment. If employment prospects are uncertain then expected income streams are uncertain. Households could therefore resort to risky coping mechanisms (like starvation, or excessive borrowings) to compensate or overcome the uncertainties associated with expected incomes. In order to reduce variations in consumption, employment at a fixed wage rate was guaranteed under this scheme for up to 100 days.

MGNREGS provides for up to 100 days in employment to a household and its implementation is conditioned on timely allocation of budgets by the various central and state governments. The magnitudes of financial allocations to the scheme have varied significantly since inception, from inception till 2015-16, especially across states. For example, between 2008-09 and 2012-13, allocations to the scheme oscillated from Rs. 25,190 crore to Rs. 35,769 crore, with no clear understanding of the rationale behind such calibrations.[4]

In this paper we analyse VEP in rural India using nationally-representative data set, drawing on two rounds of panel data. Specifically, we attempt to (i) quantify household vulnerability in rural India in 1999 and 2006, (ii) investigate the determinants of *ex post* poverty as well as *ex ante* vulnerability, (iii) assess the role of ex ante vulnerability on poverty shifts during the sample periods (i.e. movement into/out of poverty) and finally, iv) examine how the effects of the determinants of vulnerability vary at different points across the vulnerability distribution. One of the most significant contributions of the paper is the articulation of a formal link between governance, MGNREGS, and vulnerability.[5]

[4] For an evaluation of the functioning of the MGNREGS during this period, see Jha and Gaiha (2015).
[5] For evidence on the impact of MGNREGS on nutritional intake, see Jha et al. (2011).

To address these research objectives the paper is structured as follows: we briefly describe the data sets used in section II, followed by discussion of the model specifications and the econometric methodology in section III. Section IV presents and discusses the results of our estimation. Section V offers policy implications and conclusion.

II. Data

The present paper draws upon the ARIS/REDS survey of the NCAER. Being designed to be a nationally representative multi-purpose rural household and village surveys, REDS was first collected in 1971 and subsequent rounds were conducted in 1982, 1999 and 2006. The survey is divided into three components (listing, household and village questionnaire) and collects detailed household and village information spread across various states in rural India.

The listing component provides information on a number of important household characteristic such as household income and demographics. The household survey collects information with respect to individual and household characteristics, education, labor market participation, and detailed incomes by sources, household consumption expenditure, agricultural activities, land and ownership of various assets. The village survey provides information on economic and political structure, infrastructure, provision of public goods such as schools, health services, financial institutions and other social services.

Given that MGNREGS implementation was executed in a phased manner, we are able to exploit temporal variation in the rollout to test for effects of its exposure on vulnerability. MGNREGS was initiated in 2005 in 200 districts in the first phase with effect from February, 2006 and then extended to an additional 130 districts in April, 2007, with remaining districts covered in 2008. Given that past studies (Liu and Deininger, 2010) have used a difference-in-difference approach exploiting the staggered rollout of the programme, we extend this approach to several states in India to obtain nationally-representative estimates of the impact of MGNREGS on vulnerability.

The numbers of sample households in 1999 and 2006 surveys are 7474 and 8659 respectively, of which 5883 households were interviewed in both rounds. To analyze household vulnerability, we use the 5886 households that form the panel. The final sample size of used in the present study are 4743 (year 1999 observations of panel component), 4503 (year 2006 observations of panel components) and 3618 (panel) households due to missing observations in some variables. The summary statistics are given in tables 1 and 2.

Tables 1 and 2 here.

The data from REDS show that there are only minor differences in household characteristics between households residing in MGNREGS exposed villages and non-treated villages. For example, there are only minor differences between the head of the household's age (around 51 years for both groups) and the average household size (6.3 in both treated and control villages). However, there are differences in consumption patterns between households residing in villages exposed to MGNREGS and those not exposed. For instance, the per capita consumption of fruits and vegetables is around 25% higher among households in exposed villages, whereas expenditures on cereals is nearly double that of unexposed villages. These significant differences suggest (as we have seen earlier) that MGNREGS exposure could be a driving force behind variation in consumption patterns and behaviour.

III. Methodology

(a) Measuring Vulnerability[6]

Ex ante vulnerability in a poverty context is simply defined as the probability that a currently non-poor household will fall below the poverty-line, or a currently poor household will remain in poverty in the near future. Formally, for per capita consumption expenditure as an indicator of households' living standard, the vulnerability of a household *i* at time *t* is defined as the probability that the household will fall below the poverty line, *z*,

$$V_{it} = \Pr\left(c_{i,t+1} \leq z\right) \qquad (1)$$

[6] This section largely draws upon Chaudhuri et al. (2002)

where V_{it} is vulnerability of household *i* at time *t* and c_{it+1} denotes *i*'s per capita consumption expenditure at *t+1* respectively and *z* represents poverty threshold. Considering that a household's consumption, in general, depends on a variety of household characteristics, idiosyncratic and aggregate shocks, household *i*'s consumption can be expressed as follows:

$$c_{it} = c\left(X_i, \beta_t, \alpha_i, \varepsilon_{it}\right) \tag{2}$$

where X_i represents the bundle of observable household characteristics, β_t is a vector of parameters describing the returns to household characteristics, which reflects the state of the economy at time *t*. The terms α_i and ε_{it} capture, respectively, an unobserved time-invariant household level effect, and an error term that measures any idiosyncratic factors that contribute to differential welfare outcomes for households who are otherwise equivalent. Although *i*'s future consumption c_{it+1} cannot be observed in time *t*, estimating the consumption equation based on (2) enables us to measure household *i*'s vulnerability as:

$$V_{it} = \Pr\left(c_{i,t+1} = c\left(X_i, \beta_{t+1}, \alpha_i, \varepsilon_{i,t+1}\right) \leq z \;\middle|\; X_i, \beta_i, \alpha_i, \varepsilon_{it}\right) \tag{3}$$

Thus, the household's vulnerability can be derived from the stochastic properties of the inter-temporal consumption stream.

As explained earlier, our data sets are two rounds of cross-sectional with relatively large sample of households, rather than lengthy panel data. Therefore we use the following measure of VEP.

With cross-sectional data, a household consumption function is assumed as follows:

$$\ln c_i = X_i \beta + \varepsilon_i \tag{4}$$

where $\varepsilon_i \sim \left(0, X_i \vartheta\right)$ (5)

Assuming that the structure of the economy is relatively stable over time, future consumption stems solely from the uncertainty about the idiosyncratic shocks and unobservable characteristics, captured by ε_i, which contribute to different per capita consumption levels.

It is also assumed that the variance of the disturbance is given as:

$$\sigma^2_{\varepsilon,i} = X_i \vartheta \quad (6)$$

Estimates for β and ϑ can be found using a three-step feasible generalized least squares (FGLS) procedure.[7] Using $\hat{\beta}$ and $\hat{\vartheta}$, we can estimate the expected log consumption and the variance of log consumption for each household as follows:

$$\hat{E}[\ln c_i | X_i] = X_i \hat{\beta} \quad (7)$$

$$\hat{V}[\ln c_i | X_i] = X_i \hat{\vartheta} \quad (8)$$

By assuming $\ln c_i$ is normally distributed and using the estimates above, the probability of falling into (for the currently non-poor), or remaining (for the currently poor), poverty in the future is given by the expression:

$$\hat{V}_i = \hat{\Pr}(\ln c_i < \ln z | X_i) = \Phi\left(\frac{\ln z - X_i \hat{\beta}}{\sqrt{X_i \hat{\vartheta}}}\right) \quad (9)$$

(9) reflects the presumption that high volatility of consumption reduces vulnerability for those with expected consumption below poverty line whereas it increases vulnerability for those whose expected consumption is above poverty line. Hence, if we reasonably assume that the poor are risk-averse, they might have little chance to escape from poverty.

(b) Determinants of poverty

First, a probit model is used to estimate whether a household's monthly per capita consumption expenditure was below the poverty line, conditioned on a vector of household and village characteristics (X_i). We hierarchically

[7] See Chaudhuri et al. (2002) and Chaudhuri (2003) for technical details.

run three models, adding to this base model: (a) MGNREGS exposure; (b) Political reservations for women; and (c) MGNREGS exposure interacted with political reservations for women.

$$\Pr(P_i = 1) = \Phi(X_i\psi', MGNREGS_{vt} * Post\phi', Res_{vt}\tau') \quad (4)$$

where $P_i = 1$ if $\ln c_i < \ln z$ and $P_i = 0$ otherwise. $MGNREGS_{vt} * Post$ is the exposure variable for MGNREGS impacts in the short run, Res_{vt} is a dummy variable that takes a value of 1 when the post of Pradhan in village *v* at time *t* was reserved for a woman, and zero otherwise. We also use the interaction effect of $MGNREGS_{vt} * Post * Res_{vt}$ to understand the impact of MGNREGS exposure in reserved villages relative to unreserved villages with no MGNREGS implementation. When 2006 data is used, we can address the association between households' vulnerability in 1999 and the probability of being poor in 2006 by adding VEP in 1999 as one of the covariates.[8]

(c) Role of vulnerability in poverty shift between 1999 and 2006

The estimation of the role of vulnerability on poverty is further extended by using a multinomial logit model to analyse poverty transition over the period 1999 - 2006. The key hypotheses tested are (i) whether the vulnerable poor in 1999 were more likely to stay in poverty in 2006 (i.e. whether vulnerability traps households into poverty) and (ii) whether vulnerability was likely to increase the likelihood that the non-poor in 1999 slip into poverty in 2006.

We consider the following 4 unordered categories of poverty transitions.

P_1 = those who were poor in both 1999 and 2006;

P_2 = those who were poor in 1999, but non-poor in 2006;

P_3 = those who were non-poor in 1999, but poor in 2006;

P_0 =those who were non-poor in both 1999 and 2006. This is the reference case. The multinomial logit model is written as

[8]Also see Imai, Gaiha and Kang (2011).

$$\Pr(P_i = j) = \frac{e^{(X_i\lambda_j + \tau_k V\hat{E}P_i)}}{1 + \sum_{k=1}^{3} e^{(X_i\lambda_k + \tau_k V\hat{E}P_i)}}, \quad j = 1, 2, 3 \tag{11}$$

$$\Pr(P_i = 0) = \frac{1}{1 + \sum_{k=1}^{3} e^{(X_i\lambda_k + \tau_k V\hat{E}P_i)}}, \quad j = 0 \tag{12}$$

IV. Results

Table 3 shows the regression results for equations (7) and (8) where the log of per capita consumption for each year and variance of the disturbance term are estimated by household characteristics, political reservations for women, and exposure to MGNREGS. We discuss key results here.

First, we note that exposure to MGNREGS in the short-run reduces ex-ante consumption in 2006 on average by 2.8%, but also reduces variance in consumption by 20.4% on average. In contrast, having political reservations for women boosts ex-ante consumption in 1999 and 2006 and reduces variance in consumption significantly. In 1999, villages that were reserved had 10.3% more consumption, nearly 20% lower variation in consumption. When combined with political reservations for women, we find that MGNREGS has strong positive impacts on levels of consumption (per capita consumption goes up by 17.2% on average in reserved villages that were exposed to MGNREGS). It also significantly reduces the variability in consumption by 22.7% on average. In contrast, in unreserved villages, exposure reduces consumption on average by 4.5%.

Table 3 here.

Table 4 shows the results of estimating VEP without exposure to MGNREGS in the first survey period available to us in 1999. These results suggest that household characteristics such as years of education, land ownership and participation in governance (Gram Sabha meetings) all contribute to a lower likelihood of being poor in 1999. At the village level, having higher levels of infrastructure at the level of the Panchayat contributes significantly to a reduced likelihood of being poor. We use these controls for 2006 in the following analysis to ensure consistency.

Tables 4 and 5 here.

The results in table 5 show the impact of MGNREGS exposure, political reservations, and their interaction on likelihood of being poor in 2006. The likelihood of being poor in 2006 is significantly explained by the likelihood of being poor in 1999. These are hysteresis effects that show that regardless of the level of income growth or local economic development (evidenced by changes in the poverty line), if a household was poor in 1999, then it was on average, 11.6% more likely to remain poor in 2006. Similarly, if the state of economic development in the village was worse off in 2006 (at a 120% poverty line), then a household that was poor in 1999 nearly 20% more likely to remain poor in 2006 as well. Finally, if there was substantially better economic development (at 80% poverty line), then households were only 5% more likely to be poor in 2006.

In all scenarios (same, worse, or better economic development), households residing in Panchayats that had improved local agency due to political reservations for women were less likely to be poor in 2006. For example, under constant economic growth, those in reserved villages were 10% less likely to be poor in 2006. Under the 120% (80%) poverty line, we see that such households with a female Pradhan are 13.4% (5.6%) less likely to be poor in 2006, suggesting strong and positive effects of political empowerment of women on poverty transitions. However, exposure to MGNREGS alone appears to have no significant impact on household vulnerability in 2006 – except for poorer economic conditions (120% poverty line), MGNREGS exposure in the short run does not significantly influence the

likelihood of being poor. Where it does, it shows a slight increase in the likelihood of being poor in 2006, by around 3.5%, suggesting that MGNREGS exposure along cannot influence vulnerability.

The key results here show that short-term MGNREGS exposure to households residing in reserved villages have a significantly lower likelihood of being poor in 2006. As with previous estimates, this suggests that households residing in MGNREGS-exposed and reserved villages in 2006 are 3.2% less likely to be poor in 2006 (under 100% poverty line), and 5.6% less likely to be poor in 2006 even if conditions worsened (120% poverty line). Even if significant economic development was achieved (80% poverty line), such households are 2.2% less likely to be poor in 2006. This indicates that MGNREGS exposure in the short run can significantly affect falling into poverty especially when its implementation is coupled by a female elected representative.

V. Policy implications and conclusion

Using a unique panel data for rural India for the periods 1999 and 2006 this paper has modelled vulnerability to poverty. We quantify household vulnerability in rural India in 1999 and 2006, investigate the determinants of ex post poverty as well as ex ante vulnerability, assess the role of ex ante vulnerability on poverty shift during the sample periods (i.e. movement into/out of poverty) and finally, examine the role of MGNREGS and political reservations in vulnerability as expected poverty.

This paper concludes that over time economic growth has reduced the incidence of poverty. Although chronic poverty is relatively small the high incidence of transient poverty underscores the importance of covariate and idiosyncratic shocks. Household vulnerability across the distribution of such vulnerability is also investigated. A number of factors affect such vulnerability across this distribution. The paper emphasizes the role of expected factors such as age and gender of household head, education and land owned in affecting vulnerability

and poverty. The most distinct contribution of the paper is in identifying the role of governance factors such as attendance of Gram Sabha meetings in influencing vulnerability and poverty. We also go one step further and understand the role of MGNREGS exposure on vulnerability, finding that it has no significant effect, and at the 120% poverty level marginally increases household vulnerability. However, when taken together, political reservations and MGNREGS have a retarding impact on vulnerability as well as the likelihood of falling into poverty. We are thus able to identify and explore key policy instruments that are useful in addressing poverty in India.

Table 1: Summary statistics

Variable	1999		2006	
	Mean	SD	Mean	SD
log (per capita household income)	8.561	0.463	8.642	0.547
1 if a household head if female, otherwise 0	0.055	0.229	0.100	0.300
Age of a household head	49.406	13.725	51.151	13.337
Share of members with secondary or higher education to total members	0.169	0.233	0.751	0.243
Share of female members to total members	0.474	0.153	0.495	0.164
Share of household members aged below 14 or above 65	0.442	0.174	0.458	0.194
Size of total owned land	3.903	6.883	1.627	4.416
the ratio of the irrigated land to total land size	0.401	0.465	0.353	0.457
1 if a household split, otherwise 0	0.453	0.498	0.345	0.476
1 if women inherit land, otherwise 0	0.049	0.217	0.330	0.470
Share of members participated in Gram Sabha meetings	0.065	0.147	0.084	0.160
1 if gender of a pradhan changed, otherwise 0	0.373	0.485	0.475	0.500
1 if a village has access to bus, otherwise 0	0.439	0.497	0.477	0.501
1 if a village has access to school, otherwise 0	0.598	0.491	0.941	0.236
1 if a village has access to public hospital, otherwise 0	0.191	0.394	0.315	0.466
1 if a village has access to public financial institution, otherwise 0	0.535	0.500	0.563	0.497
1 if a village has access to public tab, otherwise 0	0.506	0.501	0.559	0.498

Source: REDS 1999 and 2006

Table 2: Key household and individual characteristics (REDS)

	Total	1999/2000	2007/08	Control	Treated
			Panel A: Household characteristics		
Characteristics					
Household size	6.35	6.94	5.71	6.35	6.34
Head female	0.06	0.04	0.07	0.05	0.06
Head married	89.32	89.81	88.8	89.65	89.09
Head's age	51.41	50.68	52.19	50.98	51.71
Head's education	4.07	4.16	3.97	3.88	4.2
Max. education	6.98	7.61	6.31	6.98	6.99
Consumption					
Inc. p.c. (Rs./a)	12746	10141	15553	14292	11655
Cons. p.c (Rs/a)	5649	5087	6256	6271	5210
Food Cons p.c. (Rs/a)	17927	14580	21678	17347	19650
Non-Food Cons p.c. (Rs/a)	18715	17525	20049	19096	17583
Poverty ratio	0.37	0.43	0.31	0.31	0.41
No. of observations	6,468	3,356	3,112	2,677	3,791
			Panel B: Wages and individual characteristics		
Characteristics					
Female	48.96	48.15	49.76	48.37	49.44
Age	35.27	34.4	36.11	35.08	35.42
Educ. (years)	4.34	4.68	4.01	4.27	4.4
No. of observations	38,714	19,147	19,567	17,398	21,316

Source: Own computation from REDS 1999/00 and 2007/08.

Table 3: Consumption and Variance in Consumption

	1999		2006				2006	
VARIABLES	Ln (Cons)	Variance	Ln (Cons)	Ln (Cons)	Ln (Cons)	Variance	Variance	Variance
MGNREGS Exposure			-0.0280**			-0.204***		
			(0.0129)			(0.0751)		
Currently Reserved	0.103***	-0.199***		0.186***			-0.0955	
	(0.0100)	(0.0758)		(0.0146)			(0.0896)	
No Exposure * Reserved					0.150***			-0.312***
					(0.0187)			(0.111)
Exposure * Not Reserved					-0.0456***			-0.334***
					(0.0155)			(0.0912)
Exposure * Reserved					0.172***			-0.227*
					(0.0211)			(0.128)
Constant	8.106***	-3.145***	7.605***	7.299***	7.328***	-2.766***	-2.755***	-2.568***

	(0.0601)	(0.461)	(0.0855)	(0.0874)	(0.0878)	(0.480)	(0.499)	(0.501)
Observations	5,572	5,572	5,424	5,298	5,298	5,425	5,299	5,299
R-squared	0.531	0.024	0.409	0.430	0.431	0.022	0.021	0.024

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Household controls used but not reported include gender of head of the household, age and squared age of head of the household, proportion and squared proportion of females in household, per capita land owned, participation in governance; Village controls used but not reported include remoteness index (average of distance to nearest town, market, and bus stop), and income growth. State dummies are also included.

Table 4: Vulnerability as Expected Poverty in 1999

	Whether poor in 1999: Probit (dF/dx)		
VARIABLES	100% poverty line	120% poverty line	80% poverty line
Female Head of HH	-0.0153	-0.0328	0.0124
	(0.0289)	(0.0381)	(0.0198)
Age in years	0.00270	0.00809**	-0.00135
	(0.00310)	(0.00378)	(0.00157)
Squared age	-2.81e-05	-7.61e-05**	5.86e-06
	(3.08e-05)	(3.70e-05)	(1.56e-05)
Years of Education	-0.0112***	-0.0229***	-0.00365**
	(0.00251)	(0.00323)	(0.00143)
Share of HH members having secondary education	-0.482***	-0.632***	-0.205***
	(0.0428)	(0.0536)	(0.0261)
Share of female in HH	0.453**	0.672***	0.148
	(0.179)	(0.236)	(0.0975)
Squared share of females in HH	-0.337*	-0.525**	-0.114
	(0.174)	(0.233)	(0.0938)
Household splits	0.0181	-0.00177	0.00347

	(0.0242)	(0.0317)	(0.0127)
Land inherited (acre)	-0.0191***	-0.0237***	-0.00678***
	(0.00199)	(0.00244)	(0.00121)
Predicted Participation in GS Meetings	-4.682***	-7.033***	-1.910***
	(0.291)	(0.402)	(0.147)
Technology Index	-0.0578	-0.0676	-0.00252
	(0.0702)	(0.0878)	(0.0365)
Banking Index	0.212***	0.236***	0.0795***
	(0.0471)	(0.0603)	(0.0254)
Infrastructure Index	-0.151***	-0.158***	-0.0704***
	(0.0346)	(0.0453)	(0.0191)
Service Index	0.0514	0.108**	-0.0401**
	(0.0349)	(0.0466)	(0.0190)
Distance to nearest Pucca Road	-0.0341**	-0.0679***	-0.0250***
	(0.0153)	(0.0200)	(0.00870)
Distance to nearest Bus stop	-0.0891***	-0.101***	-0.0176**
	(0.0153)	(0.0199)	(0.00851)

Mean rainfall	0.000179**	6.61e-05	0.000108**
	(7.28e-05)	(9.45e-05)	(4.24e-05)
Observations	5,781	5,781	5,413

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Reservations, MGNREGS Exposure and VEP in 2006

	Whether poor in 2006: Probit (dF/dx)								
VARIABLES	100% Poverty Line			120% Poverty Line			80% Poverty Line		
VEP99_100	0.111***	0.116***	0.122***						
	(0.0242)	(0.0260)	(0.0260)						
VEP99_120				0.197***	0.208***	0.210***			
				(0.0313)	(0.0324)	(0.0325)			
VEP99_80							0.0536***	0.0491**	0.0562***
							(0.0173)	(0.0191)	(0.0191)
Reserved	-0.0990***			-0.134***			-0.0557***		
	(0.0126)			(0.0159)			(0.00828)		
MGNREGS Exposure		0.0160			0.0354**			0.0122	
		(0.0141)			(0.0180)			(0.00886)	
MGNREGS Exposure * Reserved			-0.0320**			-0.0560***			-0.0225***

			(0.0128)			(0.0169)			(0.00769)
Observations	5,471	5,471	5,471	5,471	5,471	5,471	5,471	5,471	5,471

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

References

Barrientos, A. (2007) 'Does Vulnerability Create Poverty Traps?', CRPC Working Paper 76, University of Manchester.

Chaudhuri, S. (2003) 'Assessing Vulnerability to Poverty: Concepts, Empirical Methods and Illustrative Examples', mimeo, Columbia University.

Chaudhuri, S., Jalan J. and Suryahadi, A. (2002) 'Assessing Household Vulnerability to Poverty: A Methodology and Estimates for Indonesia', Discussion Paper, No. 0102-52, Columbia University.

Deaton, A. (1997) *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, Baltimore and London: The Johns Hopkins University Press.

Liu, Y., & Deininger, K. (2010). *Poverty Impacts of India's National Rural Employment Guarantee Scheme: Evidence from Andhra Pradesh* (No. 62185). Agricultural and Applied Economics Association.

Dercon, S. (2005) (ed.) *Insurance Against Poverty*, New York: Oxford University Press.

Gaiha, R. and A. Deolalikar (1993) 'Persistent, Expected and Innate Poverty: Estimates for semi-arid Rural India', *Cambridge Journal of Economics*, 17(4), pp. 409–21.

Goedecke, J., Guérin, I., D'espallier, B., & Venkatasubramanian, G. (2018). Why do financial inclusion policies fail in mobilizing savings from the poor? Lessons from rural South India. *Development Policy Review*, *36*, O201-O219.

Hammarstedt, M. and Shukur, G. (2007) 'Immigrants' Relative Earnings in Sweden — A Quantile Regression Approach', *International Journal of Manpower*, 28(6), pp. 456–73.

Imai, K., Gaiha, R. and Kang, W. (2011) 'Vulnerability and Poverty Dynamics in Vietnam', *Applied Economics*, 43(25), pp. 3603–18.

Jalan, J. and M.Ravallion (2001) 'Behavioral Responses to Risk in Rural China', *Journal of Development Economics*, 66(1), pp. 23–49.

Jha, R. and R. Gaiha (2015) 'NREGS: Interpreting the Official Statistics' *Economic and Political Weekly,* 47(40). Pp.18-22,

Jha, R., Bhattacharyya, S. and R. Gaiha (2011) 'Social Safety Nets and Nutrient Deprivation: An Analysis of the National Rural Employment Guarantee Program and the Public Distribution System in India' *Journal of Asian Economics*, 22(2), pp. 189-201.

Koenker, R. and Bassett, G. (1978) 'Regression Quantiles', *Econometrica*, 46(1), pp. 33–50.

Koenker, R. and Hallock, K. (2001) 'Quantile Regression', *Journal of Economic Perspectives*, 15(4), pp. 143–56.

McCulloch, N. and M. Calandrino (2003) 'Vulnerability and Chronic Poverty in Rural Sichuan', *World Development*, 31(3), pp. 611–28.

Ravallion, M. (1988) 'Expected Poverty under Risk-Induced Welfare Variability', *The Economic Journal*, 98(393), pp. 1171–82.

Suryahadi, Asep, Sudarno Sumarto, Yusuf Suharso, and Lant Pritchett (2000), *The Evolution of Poverty during the Crisis in Indonesia, 1996 to 1999 (Using FullSusenas Sample)*, SMERU Working Paper, March, Social Monitoring & Early Response Unit, Jakarta.

Townsend, R. (1994) 'Risk and Insurance in Rural India', *Econometrica*, 62(3), pp. 539–91.

Udry, C. (1990) 'Credit Markets in Northern Nigeria: Credit as Insurance in a Rural Economy', *World Bank Economic Review*, 4(3), pp.251–69.