ASARC Working Paper 2014/08

Panchayats and Household Vulnerability in Rural India*

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I. Introduction

India, particularly rural India, has been home to entrenched poverty for long. It is, therefore, imperative to understand people's vulnerability to poverty. Further, since the Government of India has invested considerable human and financial resources in Gram Panchayats it is important to understand to what extent these Panchayats have been successful in redressing vulnerability, especially since we establish that[1] ex-ante vulnerability has a significant effect on ex post poverty dynamics. We then identify the components of vulnerability to better focus policy. Finally the impact of coping strategies on household welfare is assessed. These are the broad themes of this paper.

We focus on six questions. a) Does gender of the elected representatives' matter; specifically do political reservations help in reducing vulnerability? b) What will be the impact of regime changes on resource re-allocation and on household consumption? Do all types of regime changes (based on Jati or gender) have similar impacts on household vulnerability? c) Do households fall into poverty traps, i.e. experience chronic poverty, due to inefficiencies associated with governance? d) Has local governance contributed to households undertaking less risky coping strategies in response to adverse shocks? (e) During periods of distress, are local governments able to provide insurance through welfare programs? (f) After experiencing adverse shocks, is the insurance that Panchayats provide sufficient to eliminate the need for households to cut their food consumption to less than two meals, and to avoid selling of productive assets, and thereby reduce both vulnerability and poverty?

Households experience two types of shocks – covariate (e.g. natural disasters, pest attacks on crops in the village) and, idiosyncratic (e.g. illness, job-loss). Both types of risk could render even non-poor members of villages vulnerable, particularly when household level coping mechanisms are either ineffective and/or constrained: e.g., if a preferred coping strategy of households is accessing welfare programs and participation is restricted or prevented either due to improper targeting or because of program capture. Hence coping mechanisms are constrained by inefficiencies associated with the Panchayati Raj institutions (PRI) or other institutions. If household income (consumption) is significantly covariate then informal sources of insurance such as family networks are likely to become ineffective and if these are the only sources of insurance, then such households are prone to become vulnerable due to covariate shocks.

By identifying vulnerability as a sum of underlying poverty, covariate or aggregate risks, idiosyncratic risks and unexplained risks, we can prescribe policies that will affect household incomes, and reduce such risks. We wish to examine whether in response to covariate shocks households tend to sell assets,

[1] In India the head-count ratio of poverty refers to a state in which consumption expenditure is less than some acceptable norm. Hence, poverty is an *ex post* concept.

or withdraw children from school. Do they attempt access the centrally sponsored welfare programs? Answers to such questions are important in the context of the PRI framework for such institutions have been designed to improve access by households to welfare programs and hence not resort to second best coping mechanisms that could have long term adverse consequences. With respect to idiosyncratic risks it is pertinent to ask whether households are unable to access credit, health facilities, or apply for a scheme like the MGNREGS in whose administration the panchayats have a strong role.

Coping strategies and their impact on economic welfare of Households

We examine the entire menu of coping strategies adopted by households, irrespective of whether such strategies were adopted as a reaction to idiosyncratic or covariate risks. The average probability of any one of the coping strategies adopted in response to an average shock is examined. We predict the probability of such coping strategies after controlling for various household, village and governance variables. Since coping strategies could be endogenous to consumption, we use predicted values to explain consumption. We compute difference between household consumption and certainty equivalent consumption (which quantifies exposure to risk) and estimate the ability of coping strategies to reduce this gap. We expect that with the progress in the reforms associated with PRI, households will resort less to strategies such as reducing consumption, not sending children to schools, or selling assets and land.

II. Literature

We now briefly review some of the papers relevant for the analysis of ex-ante vulnerability defined as 'Vulnerability as Expected Poverty' (VEP — e.g. Chaudhuri et al., 2002; Pritchett et al., 2000), and is defined in section 4. For the precise assessment of vulnerability, one needs to use panel data which is seldom available in developing countries. A VEP measure has the advantage that it serves as a measure of expected poverty. Further, if the expected poor actually turn out to be poor in a subsequent time period they can be identified as chronically poor. Thus, we explore the linkage between chronic poverty and vulnerability. Our approach is a generalization of the literature (e.g. Barrientos, 2007; CPRC 2008; McCulloch and Calandrino, 2003).[2] Furthermore, the link between chronic poverty and vulnerability has rarely been empirically explored.

Several papers examine Vulnerability as Expected Utility (VEU) as arising both from exposures to and management of risks (Chambers, 1989; Alwang et al., 2001; Heitzmann et al., 2002; Barrientos, 2007). Based on Chambers' distinction between 'external' (mainly referring to risks or shocks) and 'internal' (referring to the lack of means to manage risks) vulnerability, Alwang et al (2001) and

[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)

Heitzmann et al (2002) use the notion of a 'risk chain' in that those two components lead to an outcome given by a welfare loss.

There is also an extensive literature on measuring household vulnerability in developing countries (e.g. Kochar, 1999; Dercon and Krishnan, 2000; Chaudhuri et al., 2002; McCulloch and Calandrino, 2003; Ligon and Schechter, 2003; Gaiha and Imai, 2009; Jha et al., 2010; Kurosaki, 2010). However, these do not address vulnerability, risk sharing and coping strategies in an integrated manner. As represented by the 'risk chain' hypothesis, each element is related with the other elements. Therefore, to systemically analyze household welfare under uncertainty, one needs to investigate not only household vulnerability, but also the household's risk coping strategy and the effect of the strategy on household consumption.

The literature on coping strategies has two characteristics viz., a) it represents countries that are prone to shocks, b) all these countries have attempted to decentralize and devolve powers to local governments. Cameron and Worswick (2003) and Gabriella and Francesca (2009) using Indonesian data have found that that non-poor farmers are able to smooth consumption while nonfarm, and poor households try to find alternate employment during periods of distress in order to smooth consumption and also resort to dissaving. Rosenzweig and Binswanger, (1993) find for villages in semi-arid India that better-off farmers can have profit maximizing portfolios even in the face of covariate risk, because they are able to self-insure and rely on social networks, whereas poor farmers can't. Rosenzweig and Wolpin (1993) show for the same villages that saving in the form of bullock pairs and subsequent sale is one of the main self-insurance mechanisms. Tongruksawattana et al. (2010) use data from villages in Northern Thailand and show that the dominant coping strategies during distress periods include use of remittances, informal borrowing, use of savings, and sale of assets. They also find that the ability of households to access publicly sponsored programs is limited. Castellanos and Rahut (2006) found for rural Bolivia that 48% of households attempt to work more or increase their working days as a coping mechanism against harvest failures; 38% spend savings and engage in barter. Also 61% of respondents from the poorest three quintiles of expenditure distribution indicated that they spend savings during crises. Dercon (2002) shows that the type of shocks matter while trying to understand the ability of households to cope with these distress events. Using data from Ethiopia, he has shown that most households use informal borrowing to cope with covariate shocks which renders them more vulnerable than before. Okamoto (2011) finds that in Myanmar households that are able to anticipate distress events tend to save in kind (in particular in the form of gold and cattle). These are then sold during distress events. With insufficient accumulated assets households resort to informal borrowing. For Bangladesh, Rashid et al. (2006) have found that the nature of coping strategies reveal information about household characteristics such as diversity and stability of incomes, asset holdings, and education levels.

III. Data and Descriptive Analysis of Risk and Coping Strategies

Our analysis is based on household and village level data from the NCAER–REDS data from the 1999 and 2006 rounds. The number of sample households in 1999 and 2006 surveys is 7474 and 8659 respectively, of which 5885 households were interviewed in both rounds. We use data on these 5885 households. We use data on per capita consumption expenditure of the household, age and gender of the household head, dependency ratio, land owned, percentage of land owned that is irrigated, predicted household splits, share of household members who attended Gram Sabha (GS) meetings and, share of members who voted based on identity. At the village level we use information on whether the gender of the Pradhan has changed, whether the households in the village have access (i) to school, (ii) transport (iii) public hospital, (iv) public financial institution, and, (v) public tap for drinking water.

The following shock variables are used: (Covariate) whether the household had been affected by drought, floods, epidemics or animal epidemics; (Idiosyncratic) whether the household had been affected by death of member of household, sudden health problems or crop failures. The following coping strategies that households use are predicted using a number of household and village level controls: saving; government programs; transfers from friends and relatives; depletion of physical and/or human capital; reduced consumption and altered crop choice. These variables are then used for analyzing VEU.

Certainty equivalent consumption (CEC) is computed using Aufret (2000). This represents consumption in a risk free state. The difference between actual consumption and the CEC measures the exposure to risk. This difference is regressed on the predicted coping strategies with various variables associated with governance.

The profile of covariate and idiosyncratic shocks in the villages is reported in Table 1. All types of shocks occur with regularity each year. 52% of all households have experienced the effects of covariate shocks or have been affected by idiosyncratic shocks during 2007–2008 (the year of the community survey). Price fluctuations were high during 1999–2008 (approximately two Panchayat periods in most villages) implying significant seasonal variations in consumption expenditures. Although the cumulative losses are Rs 5194, the latest episode of general price increases accounts for 25% of these losses suggesting that the price increases have become more pronounced over time. Strategies for consumption smoothing therefore are important if households are to avoid poverty traps. Covariate shocks have a relative high incidence. The losses due to such shocks for the households are large. This suggests that local government must put in place mechanisms whereby households do not report to risky coping strategies such as selling assets or reducing savings.

Cross country evidence on coping mechanisms provided here also points to the fact that local governments have played a minimal or no role during periods of distress. Tables 2, 3, and.4 provide insights into the coping strategies adopted during the previous Panchayat period by households. Table 2 deals with a first shock. It shows that up to 60% of all households used their own saving during distress periods while only 9% accessed any government programs. Access to welfare programs is higher for covariate shocks than for idiosyncratic shocks. Up to 6% of all households resorted to reducing meals (not having two meals per day) Thus dissaving is the most important coping mechanisms, followed by access to government assistance, with reductions in number of meals the third important mechanisms. Asset sales are uncommon with first shocks, with only 2.4% of households resorting to them. With repeat shocks in the next year, the role of the local governments is even less, with only 8% of all households having been able to access programs through Panchayats, and more so for covariate shocks than idiosyncratic shocks (table 3). For repeat shocks, only 4% of all households are able to use savings (their savings having been depleted by the previous episode), and instead 15% of households resort to reducing meals, while 23% attempt borrow and a full 19% have to sell assets. When shocks occurred after a gap of 5 years, the reliance on Panchayats for distress alleviation goes up to 12%, again mostly for covariant shocks. These suggest that Panchayats have on average not been a major source of support in response to distress events. Repeat events cannot be managed by households easily without resorting to asset sales and reducing the number of meals, suggesting that they are not adequately self-insured. However, when shocks are repeated five years later, the use of savings rebounds to 52% households, while sale of assets and reducing meals drop back to 8% and 2.3% respectively, indicating significant recovery of coping ability of the households.

Thus, household coping strategies are constrained, especially when shocks repeat within a short period of time. For the private responses the inabilities are likely to be associated with incomplete credit and labor markets. The limited ability of Panchayats to help could be attributed to lack of resources, or inefficiencies of the Panchayats terms of targeting, planning ahead for distress events, or in terms of pathologies such as elite and program capture. Our discussion of VEU noted that vulnerability is enhanced by such constraints. Limited ability to cushion especially against rapidly repeating shocks would make it more likely that households will fall into poverty traps after repeat shocks.

Tables 1, 2, 3 and 4 here.

IV. Methodology

Hoddinott and Quisumbing (2003) use three operational definitions of vulnerability: (i) VEP, (ii) VEU and (iii) vulnerability as uninsured exposure to risk (VER). We focus on the first two as this will

allow us to discuss policy germane to the determinants of these two types of vulnerability as well as articulate the impact of the local governments on reducing vulnerability and poverty.

Vulnerability measures

Ex-ante vulnerability is 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. We show that computed vulnerability can be a reliable predictor of future poverty. Specifically, we (i) quantify household vulnerability in rural India during two time periods using the 1999 and the 2006 rounds of the REDS data of NCAER, (ii) investigate the determinants of ex post poverty as well as ex-ante vulnerability, (iii) assess the role of ex-ante vulnerability on poverty shift 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.

We analyze whether greater participation in GS leads to higher household level consumption. By participating in GS households can influence financial allocations, hold elected officials to account and access information on welfare programs.

Participation in governance could affect both current and the expected growth in consumption. Electoral politics do much to allocate resources and influence consumption and growth in consumption. If parochial politics help, as Munshi and Rosenzweig (2008) suggest they do, then that could have positive effects on the villages. They show that even though the Pradhan elected in this manner reflects the preferences of a specific group or alliance, the spillover effects from this has a positive effect on all households.

Further, Deininger et al (2013) show that political reservations for women can influence certain key determinants of the quality of governance, e.g., improvements in the adherence to rules and targeting of centrally sponsored welfare programs — both of which can affect household level consumption.

VEU is defined as the difference between the utility derived from some level of certainty-equivalent consumption (i.e., consumption in a risk free state) and the expected utility derived from consumption. Households' income and consumption fluctuate due to exposure to shocks. To protect themselves from these shocks, households attempt to manage risks ex-ante(e.g. diversifying employment, crop diversification, etc.) or cope with the consequences of the risks ex post (e.g. precautionary savings, using transfer incomes, entering the labor market, etc.). Exposure to shocks in itself need not render a household vulnerable. A combination of exposure to risks and incomplete or lack of credit, factor, and insurance markets and other risk diffusion mechanisms make such households vulnerable. Additionally, the uncertainty associated with anticipating the timing of risks could lead to households undertaking coping strategies that are not optimal. For example inadequate forecast of monsoons

could lead to farmers postponing their nursery operations for rice cultivation with serious consequences for yield.

Consumption

Using consistent household data for both time periods we estimate the per capita consumption for the panel households. Wth cross-sectional data, a household consumption function is:

$$\ln c_i = X_i\beta + \varepsilon_i \quad (1)$$

$$\text{Where, } \varepsilon_i \sim (0, X_i\vartheta) \quad (2)$$

i indexes households, X_i represents control variables and β and ϑ are vectors of estimable parameters.

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.

Variance of the disturbance is given as:

$$\sigma^2_{\varepsilon,i} = X_i\vartheta \quad (3)$$

β and ϑ can be estimated using a three-step feasible generalized least squares (FGLS) procedure..[3]

Using $\hat{\beta}$ and $\hat{\vartheta}$, we can estimate the expected log consumption and the variance of log consumption for each household as follows:

$$\hat{E}[\ln c_i | X_i] = X_i\hat{\beta} \quad (4)$$

$$\hat{V}[\ln c_i | X_i] = X_i\hat{\vartheta} \quad (5)$$

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:

$$\hat{V}_i = \hat{\Pr}(\ln c_i < \ln z | X_i) = \Phi\left(\frac{\ln z - X_i\hat{\beta}}{\sqrt{X_i\hat{\vartheta}}}\right) \quad (6)$$

The right hand side is the measure of VEP and reflects the presumption that high volatility of consumption reduces vulnerability for those with expected consumption below poverty line whereas it

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

increases vulnerability for those whose expected consumption is above poverty line. Hence, if we reasonably assume that the poor are risk-averse (or credit constrained or both), they might have little chance to escape from poverty.

Probability of being poor

We use a Probit model to estimate whether, conditioned on a vector of household and village characteristics ($\mathrm{X_i}$). a household's monthly per capita consumption expenditure was below the poverty line,

$$\Pr(P_i=1)=\Phi(X_i\psi') \tag{7}$$

where $P_i=1$ if $\ln \mathrm{c_i} < \ln \mathrm{z}$ and $P_i=0$ otherwise. When 2006 data is used we address the association between households' vulnerability in 1999 and the probability of being poor in 2006 by adding VEP in 1999 as a covariate..[4]

Key hypotheses relating to poverty transitions tested are (i) whether the vulnerable poor in 1999 were more likely to stay in poverty in 2006 (i.e. poverty traps) and (ii) whether vulnerability was likely to increase the likelihood that the non-poor in 1999 slipping into poverty in 2006. We consider the following 4 unordered categories of poverty transition. 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

$$\Pr(P_i=j)=\frac{e^{(X_i\lambda_j+\tau_k V\hat{E}P_i)}}{1+\sum_{k=1}^{3}e^{(X_i\lambda_k+\tau_k V\hat{E}P_i)}},\quad j=1,2,3 \tag{8}$$

$$\Pr(P_i=0)=\frac{1}{1+\sum_{k=1}^{3}e^{(X_i\lambda_k+\tau_k V\hat{E}P_i)}},\quad j=0 \tag{9}$$

We need to capture the different association of factors on the households' vulnerability which might vary depending on the position of the household in overall distribution of estimated VEP. Hence, we use quantile regression techniques (Koenker and Basset, 1978).

$$V\hat{E}P_i = X_i\mu_\tau + \varepsilon_{\tau i} \quad \text{With} \quad Q_\tau(V\hat{E}P \mid X) = X\mu_\tau \tag{10}$$

[4] See also Imai, Gaiha and Kang (2011).

For any $0 < \tau < 1$, the coefficient μ_τ of the τ th regression quantile is estimated as a solution to:

$$\min_{\mu_\tau}\left\{ \sum_{y_i \geq x_i\mu_\tau} \tau\left|y_i - x_i\mu_\tau\right| + \sum_{y_i < x_i\mu_\tau} (1-\tau)\left|y_i - x_i\mu_\tau\right| \right\} . \quad (11)$$

In contrast to OLS where the parameters are estimated at the conditional sample mean of the dependent variable, the quantile regression enables determination of whether a household's location in the estimated vulnerability distribution differentially affects the relationship between VEP and household characteristics. We estimate the model for the 10th, 25th, 50th (median), 75th and 90th percentiles. The quantile regression approach has several advantages. Since it is estimated by minimizing the sum of (weighted) absolute values of the residuals as shown in (11), it is robust to outliers or asymmetric error as well as the presence of heteroskedasticity (Deaton, 1997; Koenker & Hallock, 2001). Furthermore, by using the entire sample to estimate each quantile, it avoids sample selection bias arising from OLS approach dividing the vulnerability distribution into several subsets (Hammarstedt & Shukur, 2007).

VEU

VEU is defined as the difference between the utility derived from some level of certainty-equivalent consumption and the expected utility derived from consumption. Consider two possible states. In the first state, a risk-averse household is certain that its expected consumption in the next period will be just below the poverty line. Therefore, the probability of poverty (i.e. vulnerability) in that state is one. In the second state, while its mean expected consumption remains unchanged, there is probability of 0.5 that the household will have consumption just above the poverty line (and above the mean) and probability of 0.5 that the household's consumption will be below the mean. Being risk averse, the household would prefer the first state with the certain consumption to the second state with the expected consumption despite lower vulnerability in the second state. This perverse feature of VEP is overcome by VEU measure which can be written as:

$$V_i = U_i(z) - EU_i(c_{it}) \quad (12)$$

Where z is certainty-equivalent consumption at and above which a household would not be considered vulnerable, analogous to the poverty line where, U_i is a weakly concave and, strictly increasing function.

Eq. (12) can be further decomposed as follows:

$$V_i = U_i(z) - U_i(Ec_{it}) \quad \text{(Poverty)}$$

$$+ \{ U_i(Ec_{it}) - EU_i[E(c_{it}\left|\overline{X}_t\right.)] \} \quad \text{(Covariate or aggregate risk)} \quad (13)$$

$$+ \{ EU_i[E(c_{it}|\overline{X}_t)] - EU_i[E(c_{it}|\overline{X}_t, X_{it})] \} \quad \text{(Idiosyncratic risk)}$$

$$+ \{ EU_i[E(c_{it}|\overline{X}_t, X_{it})] - EU_i(c_{it}) \} \quad \text{(Unexplained risk \& Measurement error)}$$

As in Ligon and Schechter (2003), the following form of utility function is assumed:

$$U(c) = \frac{c^{1-\kappa}}{1-\kappa} \tag{14}$$

Where κ denotes the household coefficient on relative risk aversion and is set to 2.

We normalize the expenditure and per capita income so that the average expenditure and per capita income over all households would be unity and set the poverty line to be one by choosing z to equal average consumption.[5] Therefore, household vulnerability will be zero if resources are allocated so that households receive the expected consumption expenditure with certainty (Ligon and Schechter, 2003).

$E(c_{it}|\overline{X}_t)$ is the aggregate risk component and $E(c_{it}|\overline{X}_t, X_{it})$ the idiosyncratic risk component are estimated by:

$$E(c_{it}|\overline{X}_t) = \alpha_i + \eta_t \tag{15}$$

$$E(c_{it}|\overline{X}_t, X_{it}) = \alpha_i + \eta_t + \beta X_{it} \tag{16}$$

In (16), if income is used as the explanatory variable for consumption as in our case, it might be endogenous (Gaiha and Imai, 2009). Hence, we use instrumental variable (IV) estimation for (16) in which income is endogenous.

Household responses to shocks

To investigate households' response to shocks, a multivariate Probit model is applied because households often choose different coping instrument at the same time in the face of risks and the model allows correlation between such choices.

The latent decision variable for coping instruments R_{im}^* is assumed to be a function of household characteristics, X_{im} and an error term ε_{im}.

[5] Household consumption expenditure and income in 2006 data were adjusted at 1999 value using state wise CPI for agriculture and rural labourers.

$$R_{im}^{*} = \vartheta_m X_{im} + \varepsilon_{im} \quad (17)$$

The error term ε_{im} has a multivariate normal distribution, each with a zero mean and variance-covariance matrix V, where V has values of 1 on the principal diagonal and correlations $\rho_{mn} = \rho_{nm}$ as off-diagonal elements (Cappellari and Jenkins, 2003).

$$R_{im} = 1 \text{ If } R_{im}^{*} > 0 \text{, and 0 otherwise} \quad (18)$$

Since a household's decision on coping strategies relies not only on household characteristics but also the nature of the risks faced, a vector of shock variables (dummy) is included for both covariate and idiosyncratic risk. The estimation is carried out on the 2006 data only because of lack of information on coping mechanisms in 1999. Household response to shocks include (i) Saving, (ii) participating in government program, (iii) Borrowing/Transfer, (iv) capital depletion and, (v) other responses.

Finally, we estimate the impact of coping strategies on the economic welfare of households. We estimate the growth of household consumption expenditure, certainty equivalent consumption and difference between these two as impacted by the various coping strategies. A two stage IV strategy is used. In the first stage various coping strategies e.g. savings, help from government, wage employment, borrowing from relatives, technological improvement, selling assets, starvation and borrowing from formal and informal sources are regressed on measures of the number of idiosyncratic and covariate shocks and a number of household, village and village level revenue and expenditure characteristics. In the second stage the predicted values of these coping strategies are used as explanatory variables along with other household and village characteristics to explain consumption growth, certainty equivalent consumption growth and the difference between the two.

V. Results

The results of the estimation (with village fixed effects) of ex-ante per capita consumption, (4) and (5), show: Households with older heads have lower ex-ante per capita consumption, however this effect becomes insignificant in 2006. When the share of members with more than primary education rises, expected consumption is higher. Coefficient estimates are strongly significant in both years. In both years the coefficients of the share of female members in the household are positive and significant and of its square — negative and significant. While per capita consumption with more female members is positive, the variance induced by more number of female members on household consumption is also larger. — confirming that having more female members substantially decreased per capita consumption, but the relationship was nonlinear. Having more land increased per capita consumption but marginal change gets smaller with land size. Higher share of irrigated land tended to increase household consumption in both years.

Variables associated with voting, participation in the process of governance, as well as regime changes (male to female through elections) are significant in explaining per capita consumption. Greater participation in GS and IBV increase per capita consumption in both periods. IBV significantly influences the process of governance, as well as providing access to welfare programs. Per capita consumption expenditures grew as a consequence of IBV as did expected consumption. Both regime changes as well as political reservations had a positive impact, but only in 2006.

Estimates of consumption and variance of disturbance term from this estimation, allow us to calculate each household's vulnerability using (6). As the result is sensitive to the choice of poverty line, we applied 100%, 120% and 80% of the poverty line of each year. For 100% poverty line we obtain mean vulnerability of 28.3% in 1999 and 16.5% in 2006, i.e. a rural Indian household, on average, had 28.3% probability of falling into poverty in 1999 but this declined to 16.5% in 2006.

Select results of estimating (7) are shown in Table 5. The respective marginal effects reveal that ex-ante vulnerability in 1999 translated into ex post poverty in 2006, i.e. 1% increase in the ex-ante probability of falling into poverty would increase ex post probability of poverty by 0.32%. Regardless of the poverty line used, the coefficients of vulnerability are strongly significant in all cases. Female headed households had relatively lower probability of poverty in 2006 than male-headed households. The coefficients of age of household head are positive (i.e. increase probability of poverty) and significant in 1999 but not in 2006. Higher share of more educated members, larger size of land and more irrigated land tend to reduce household probability of poverty

Deininger et al (2012) point out that women inheriting land has positive effects on some of the constituents of expenditure. Our results of the estimation of (4) and (5) shows that land inheritance had a positive impact on expected per capita consumption of the household (by as much as 4%), as well as reducing poverty — whatever be the poverty line chosen (probability of the household being poor in 2006 reduces by 3.2%). But inheritance may not have an instantaneous effect. Thus, women who inherited land in 1999 provided externalities to households in 2006.

Table 5 here

Results pertaining to the variables associated with governance are significant. IBV reduced probability of being vulnerable by up to 19.8%. The ex post impact of IBV varied between 6.4% and 8%. The long term impact of political reservations and regime change (male to female) on poverty was limited and became insignificant in 2006. The impact of participation in GS was the largest when we consider 120% poverty line. During periods of economic downturn when more people are likely to be poor, participation in GS meetings by households helped access resources, welfare programs and improved quality of village governance. The ex post probability of poverty declined by 13.6%.

Access to public services like school and hospitals was more important for ex-ante vulnerability as opposed to ex post poverty. However access to transportation affected both. This is consistent with the impact of access to transportation as opposed to schools and hospitals on per capita consumption (9.6% as compared to 8.6% and 3.2% for schools and hospitals). Panchayats have been mandated to improve transportation services by increasing access (e.g. bus stops in villages). Doing so reduced the ex post probability of poverty by 6.1%.

Table 6 presents the results of estimating (8) and (9) for poverty transitions. Our main interests are (i) the coefficient of the vulnerability in the third column (P_3) of each of cases: 100% poverty line, 120% poverty line and 80% poverty line. (ii) The difference between the second and the first columns (P_2-P_1). The log odds of former to the base group (the chronically non poor) represents relative probability of poverty for those who were not poor in 1999 but poor in 2006 to the non-poor over 1999–2006 whereas the latter gives relative probability of moving out of poverty to the probability of staying in poverty. Therefore, the positive sign in the third columns indicates higher probability of falling into poverty while the negative sign of the difference (P_2-P_1) implies less likelihood of moving out of poverty.

The coefficient of vulnerability in the third column, i.e., differences between the coefficients in the third column and the base group, range from 1.93 to 4.81, and are strongly significant, implying that a rise in vulnerability tends to increase relative probability of slipping into poverty. Besides, the difference in coefficients between the second and first columns, which is negative, in each case suggests that relative probability of escaping poverty decreased as vulnerability increased.[6] Hence, reducing vulnerability does not only prevent a household from falling into poverty (i.e. protective effect), but also promotes a household's escape from poverty (i.e. promotional effect).

Inheritance of land by women on poverty transitions retards moving into poverty by up to 30.7 % but does not do much for escaping from poverty. The same is true for participating in GS. This maybe because those that attend GS are usually the non-poor and not all the vulnerable groups.[7] IBV allows households to move out of poverty but the 'protective effect' of IBV is insignificant (although signs are 'correct').

All public services help in transiting out of poverty. It is important to understand the existence of vulnerability distributions. Policies intended to reduce vulnerability might be found to be insignificant on an average but are significant for specific groups of households. A household that is most

[6] We carried out statistical test and confirmed that the differences in the coefficients are statistically significant at 1%. Also the Hausman tests for the IIA assumption with respect to our multinomial logit model support the hypothesis that omitting one of the categories will not change the coefficient estimates systematically.

[7] In Jha et al (2012d) investigates the role of IBV voting on program participation. One of the findings of that paper is that if the Jati of household is the same as that of the elected representative (the Pradhan in particular) then such a household is likely to attend 3.2 more gram Sabha meetings compared to all others.

vulnerable is likely to benefit more by access to health compared to less vulnerable (upper 50% in the distribution). These findings are of significant importance to the Panchayats especially given that both vulnerability status and location in the distribution are unobservable to the Panchayats. Table 7 reports results of quantile regressions described in (10) and (11). We focus on a few of the results related to public services and issues related to individual empowerment and governance.

Table 6 here.

Access to schools and health care are important determinants of vulnerability for households in the bottom half of the distribution. Their importance to reducing vulnerability increases as we move from 1999 to 2006. The same is true of access to transportation. However changes in magnitudes are not as significant as for schools and hospitals. Some of the identifiers of governance such as regime change and participation in GS are also important. Participation in GS benefits some of the more vulnerable groups to a greater extent, e.g., it reduces vulnerability of households at the 50 percentile of the distribution by as much as 10 % in 1999 and the benefits increase by 3% between 1999 and 2006. For elected representatives at the level of the Panchayat this finding is important since it is quite possible that certain groups (not necessarily the less vulnerable groups) participate more actively in GS and consequently either crowd out participation by other groups or capture benefits via access to information.

Land inheritance by women and the impact of women headed households provide some interesting insights. In both cases, such households are more vulnerable in 1999 across all vulnerability classes. Table 6 shows that the impact of inheritance takes place with a lagged effect. Households are significantly less vulnerable in 2006 as a consequence of inheritance in 1999. Similarly, women headed households whose transition into poverty is retarded the most (Table 6) are less vulnerable in 2006. Thus, legislations that empower women through either political reservations or by enabling inheritance affect the ex-ante vulnerability with a lagged effect.

Table 7 here.

Turning now to VEU we estimate (15) and (16).[8] The four components of VEU are shown in Table 8. The estimate of average VEU (0.3016) implies that the average rural Indian household has experienced about 30% of utility loss due to poverty and various risks during 1999–2006. The negative sign of covariate risk component suggests that the utility loss would have been higher had there been no economic growth in rural India during the sample period.

Table 8 here.

[8] Definitions of all variables used and summary statistics there on are given in Jha et al (2012b)

Estimates of covariate risk and idiosyncratic risk using Panel IV methods are reported in Tables 9 and 10. The coefficient estimate, negative and strongly significant, of time dummy for year 1999 indicates that aggregate risk is mostly explained by a positive covariate shock. Political reservations increase per capita consumption over time. The dummy variables of agro climatic condition (arid region is the reference) show that humid and semi-arid tropics are positively associated with household consumption.[9] Thus, if there are poor quality weather forecasts then households could resort to reducing consumption. Evidence points to the complete lack of capacity on the part of Panchayats to intervene in this process.

Estimation of (15) and (16) shows up two interesting results.[10] Political reservations for women have a delayed impact on income. Second, effective provision of public services affects consumption. Since we try to understand consumption via changes in income, if idiosyncratic shocks have a significant influence on income then strategies to minimize these effects on income must be explored.

Tables 9 and 10 here.

In the first stage estimation, female headship is positively associated with a household's income and its coefficient is significant at 5%. The coefficient of female share in the household is positive and significant. The negative and significant coefficient estimate of square term suggests a non-linear association. We cannot find any evidence of life cycle effects. The negative coefficient of share of members with high secondary or higher education, and the positive coefficient of its square term suggests that education has a positive but convex impact on household income. There is evidence of a hump-shaped relationship between a household's productive assets and household income. Higher share of irrigated land to total land increased household per capita income.

In the second stage estimation, the estimate of predicted per capita income is significant suggesting that a household's consumption is determined largely by its income. The supply of public services is positively associated with household consumption. This, together with the negative association, though insignificant, between public services and household income, implies that the provision of public good tends to promote household consumption but not necessarily household income.

Turning to coping strategies Table 11 provides results of multivariate Probit estimation using (17) and (18) using 2006 data. Panel (A) uses idiosyncratic and covariate shocks whereas panel (B) uses shock variables and other household and village level variables as in (15) and (16).[11] We used Huber-White

[9] We use the ICRISAT definition of agro climatic zones.

[10] Income is instrumented in the first stage by the per capita number of productive assets (e.g. tractors) and the share of the area of irrigated land to total land a household owned. Although the possible effects of these variables on household consumption cannot be denied, it might be reasonable that they first affect household income (Gaiha and Imai, 2009).

[11] For example, if a household has experienced any shock among drought, floods, livestock epidemic and epidemic, then the dummy of covariate shock in panel (A) takes one. Similarly, idiosyncratic shock takes one if the household has in the past faced either death of its members, sudden health problem or crop failure.

sandwich estimator to overcome heteroskedasticity. Panels A and B reveal that the main coping mechanism is running down its own saving. Panel (A) shows that the household is likely to choose borrowing or transfer from its relatives or friends in the face of idiosyncratic shocks whereas it relies on capital depletion when it faces covariate shocks.[12] This choice of coping strategy seems to be sensible since covariate shocks affect other residents within the village as well as the household under consideration; it is less likely that this household will use transfers as a coping strategy. The household would be forced to sell its assets, reduce consumption or withdraw children from school. Similar findings are observed from panel (B) where disaggregated shock variables are included. Third, although the household is less likely to choose a government provided coping program when it faces idiosyncratic shock, the probability sharply increases in the case of covariate shocks. The fact that governments programs are not relied upon as much as other measures concerning..[13]

Table 11 here

A useful way to investigate the effectiveness of mutual insurance is to estimate the following model:

$$\Delta \ln c_{ivt} = \phi + \gamma \Delta \ln y_{ivt} + \psi \Delta(\overline{\ln y_{vt}}) + \delta X_{ivt} + \Delta \varepsilon_{ivt} \qquad (19)$$

Where $\Delta \ln c_{ivt}$ and $\Delta \ln y_{ivt}$ denote the growth rate of household consumption and income respectively $\Delta(\overline{\ln y_{vt}})$ represents the growth rate of average village (or state) income and is treated as a proxy of aggregate shocks (Townsend, 1994)

The estimate of γ ,on which much of the empirical literature, focuses indicates whether the insurance mechanism is effective within villages (states). If complete insurance or risk sharing exists, γ is expected to be zero and significant. Thus, the higher values of γ would be evidence of weak consumption insurance against income risks.[14]

[12] Capital depletion is defined if a household chooses, as a coping strategy, either selling assets, withdrawal of children education, reducing consumption or change crop choice. The elements of capital depletion all would affect household future income. For example, reducing consumption would lower labour productivity through inadequate nutrition intake. Change in crop choice would also result in low risk and low expected income. Therefore, these strategies are aggregated as capital depletion as its consequence is likely to different from other coping strategies.

[13] Some might argue that this is not the right interpretation. Households rarely have to reduce food consumption in the case of idiosyncratic shocks (Rosenzweig and Binswanger (1993). While it is true that households have some access to access to borrowing and transfers from neighbors, what is of concern is the propensity to reduce meals. This has serious consequences for households becoming vulnerable to other shocks. While it may be deemed appropriate to let them self insure, and the Panchayats should focus on covariant shocks- which is exactly what it seems to be doing albeit incrementally-nevertheless given that some households reduce cooked food consumption paints Panchayats in a rather adverse light. If Panchayats actually reflect household preferences then it seems illogical that programs actually available with the Panchayats to provide incomes and food during times of distress are not being utilized. Is this a symptom of 'Bureaucratic Dysfunction'? It certainly seems so.

[14] We interpret γ as a measure of consumption insurance rather than a measure of vulnerability done in VER measure. VER model assumes that positive and negative shocks have symmetric effects. However, ability dealing with positive shocks (e.g. accumulating assets or saving etc.) compared to negative shocks (selling

Food consumption is frequently used as a measure of welfare in regions where a substantial fraction of the population devotes more than three quarters of their expenditure to food (Deaton, 1997). Households are expected to be conservative in maintaining the level of consumption expenditure and hence, expenditure devoted to food is likely to be less covariate with income than other components of expenditure as often reflected by the Engel curve in developing countries.

Further, shares of food consumption to total consumption expenditure are quite high (57.7% in 1999 and 53.8% in 2006) suggesting the possibility that households might be keen to insure their food consumption against negative shocks. Therefore, we use three different dependent variables (total consumption, food consumption, non-food consumption expenditure).

Results in Table 12 show that growth of consumption is positively related to growth of income. Although households rely mainly on informal risk-coping instruments such risk-coping is not able sufficiently smoothen the impact of shocks. Furthermore, the negative and significant coefficient estimate for the change of village mean of log income suggests that there is no risk sharing mechanism within villages.[15] The constrained access to efficient risk management mechanisms among households implies that there is substantial risk of increase in ural transient poor in the face of shocks. Besides, our finding from Table 11 that one of the significant households coping strategies is capital depletion might induce prolonged consequences for household welfare, and may trap them in poverty.

Comparing the coefficients of estimates for food consumption and non-food consumption estimations, the smaller coefficient estimates of the change of log income in food consumption, suggests that households are keener to insure food consumption than non-food consumption from income shocks. Further participation in GS meetings, engaging in IBV, and, regime changes (gender and Jati based) lead to insuring food consumption more than overall consumption. Given that Panchayats are responsible for the management of PDS this result is unsurprising.

Table 12 here.

Parochial politics at the level of the Panchayats provide many benefits including accessing food articles through the PDS.

We find that participation in government programs administered through the Panchayats is assisted by there being a female Pradhan, voting in local elections, and participation in GS. If governments programs are the preferred option for certain classes of households (such as asset poor, or those with

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assets or receiving transfers etc.) is likely to different among households. Therefore, in order to interpret γ as a measure of vulnerability it is suggested to replace $\Delta \ln y_{ivt}$ with two covariates denoting absolute values of the size of positive and negative income changes (Hoddinott and Quisumbing, 2003).

[15] As our results are based on rural representative data, it is not necessarily contradict from the finding of partial risk sharing in other studies of which many draws upon the selected sample village data with mostly annual consumption and income data. Our results are similar with the findings observed in Shirapur and Kanzara villages in Gaiha and Imai (2009).

low savings) then such households are likely to transit into poverty if access is either denied or provided with conditions. Of all coping strategies, adopting newer technologies has the largest impact on consumption growth. Panchayats should therefore pay attention to agricultural extensions programs. Depletion of savings (adopted by nearly 60% of all households affected by shocks) leads to a 74% growth in consumption compared to all other coping strategies. But such growth cannot be sustained since depletion of savings cannot take place over a lengthy time period. The growth impact of government programs is 64% on consumption growth. Often government programs such as the MGNREGS have been poorly targeted with participants not being paid the guaranteed minimum wage. In that case even after accessing such programs income and consumption growth will be smaller compared to other sometimes riskier strategies of coping.

VI. Conclusions and some lessons for policy

During 2007–08, 52% of households have been affected by covariate or idiosyncratic shocks, with covariant shocks much more frequent and leading to much higher losses than idiosyncratic shocks (except for individual-specific crop losses or drying up of own wells). Estimate of average VEU implies that the average rural Indian household has experienced about 30% of utility loss due to poverty or inequality, and various risks during 1999–2006

With respect to first time shocks, using up savings is by far the most important coping mechanism, with around 60% of households using it, followed by help from local government (9%) and reducing meals (2.4%). If the shock repeats, only 4% of households can use remaining savings, while 23% borrow in cash or in kind or rely on transfers; fully 15% have to reduce meals; and a full 19% have to sell assets. When shocks are repeated five years later, the use of savings rebounds to 52% of households, while sale of assets and reducing meals drop back to 8% and 2.3% respectively, indicating a significant, but not full, recovery of coping ability of the households. It is therefore clear that the limited ability to cushion especially against rapidly repeating shocks would make it more likely that households will fall into poverty traps after repeat shocks.

Households are likely to choose borrowing or transfer from relatives or friends in the face of idiosyncratic shocks whereas they have to resort to capital depletion when they face covariate shocks. Thus, covariate shocks are not only more frequent and cause higher losses but also more difficult to insure against. It has long been recognized that it is appropriate to let households primarily rely on self-insurance for idiosyncratic shocks, while the government should focus on covariate shocks. However, this strategy is likely to be suboptimal given that households resort to two rather negative coping strategies — reducing consumption of meals, and selling assets — both with significant long term consequences. Within their limited resources, Panchayats appear to be providing only limited cover for both covariate and idiosyncratic shocks.

Thus coping strategies are constrained, especially when shocks repeat within a short period of time, and/or when the shocks are covariant. For the private responses, the inabilities are likely to be associated with incomplete credit and labor markets. The limited ability of Panchayats to help could be attributed to lack of resources, or inefficiencies of the Panchayats terms of targeting, planning ahead for distress events, or in terms of pathologies such as elite and program capture.

Negative income shocks reduce food consumption less than non-food consumption, though the difference is not large. We also find that participation in GS meetings, engaging in IBV, and, regime changes (gender based as well as Jati based) lead to insuring food consumption more than overall consumption.

We estimate a mean vulnerability of 28.3% in 1999 and 16.5% in 2006. A rural Indian household, on average, had 28.3% probability of falling into poverty in 1999 but this declined to 16.5% in 2006. This is primarily associated with the fairly rapid income growth in the villages. We also find that ex-ante vulnerability in 1999 translates into ex post poverty in 2006, i.e. 1% increase in the ex-ante probability of falling into poverty would increase ex post probability of poverty by 0.32%. Clearly a rise in vulnerability tends to increase relative probability of slipping into poverty considerably. We also show that it reduces the probability of escaping from poverty.

Local governments are able to assist an average of 9% of households in the face of an initial shock, 8% of households when a shock repeats in the next year, and 12% when shocks reoccur after 5 years. While households have a low probability to access a government provided coping program when they faces idiosyncratic shock, the probability sharply increases for covariate shocks

During periods of economic downturn when more people are likely to be poor, participation in GS meetings by households will help access resources, welfare programs and improve quality of governance at the level of the villages. The ex post probability of poverty declines by 13.6%.

Participation in GS meetings benefits some of the more vulnerable groups to a greater extent. Less vulnerable groups also seem to participate actively in GS meetings to ensure that they are adequately served.

IBV reduces probability of vulnerability by up to 19.8%. The ex post impact of IBV on poverty varies between 6.4% and 8%.[16] The long term impact of political reservations and regime change (male to female) on poverty is limited and becomes insignificant in 2006.

A household headed by a female has a relatively lower probability of poverty in 2006 than a household headed by a male: We also find that female headship is positively associated with a household's income. This remarkable result shows that a woman as head of the household reduces both ex-antev ulnerability and ex post poverty. It also helps in significantly retarding the transitions

[16] IBV allows households to move out of poverty but the 'protective effect' is insignificant.

into poverty. In contrast, the coefficient estimate of female share in the household is negative and strongly significant, implying that a household with many female members tends to have lower per capita income. Clearly, different mechanisms are at work in determining the impact of gender on household income when we consider the gender of an adult woman head of household than when we consider female children.

Land inheritance by a woman in 2006 had a positive impact on expected per capita consumption of the household, by as much as 4%. Households are significantly less vulnerable in 2006 as a consequence of inheritance in 1999. As a consequence, inheritance retards moving into poverty of vulnerable households but does not do much for escaping from poverty. Therefore those women who inherited land in 1999 provided externalities to the household in 2006.

One of the pathways of local government impact is via better public services. Improved access to schools and hospitals is more important for reducing ex-ante vulnerability as opposed to ex post poverty. However, access to transportation affects both ex-ante vulnerability and ex post poverty: the ex post probability of poverty is reduced by as much as 6.1%. This may be on account of better access to labor and other markets that come from improved transport. Improved transportation, schools and hospitals lead to increases in consumption of 9.6%, 8.6% and 3.2% respectively.

Access to schools and health care are important determinants of vulnerability for more vulnerable households (bottom half of distribution) with the impact increasing from 1999 to 2006. The same is true of access to transportation (bus).All the public services help in transiting out of poverty. Of the public services, improved quality of health provides poor households an increased probability of escape out of poverty by 42%.

Panchayats are given adequate powers to help in vulnerability reduction. They are already vested with emergency powers to help families during crisis and disasters[17]. In a land mark judgment, the Supreme Court of India has conferred legitimacy to the GS. Therefore, by being able to voice opinions in such legally constituted bodies, citizens can help put in place mechanisms to ward off the adverse effects of events involving covariate and idiosyncratic risk. The capacity of Panchayats hence needs to be strengthened**.**

Often, decisions related to prevention of expected adverse events such as floods or droughts are taken based on data compiled at district level. However, the presence of real-time and continuously updated household data is essential for effective disaster management, local level planning, service provision, and, management of vulnerability. The quality of such data needs to be improved with continuous interaction between Panchayats and the agency collecting data at the aggregate district level.

[17] Such powers include provision of training to citizens for undertaking preventive measures as part of a wider community initiative, effective disaster management, taking initiatives for developing micro plans for reconstructions post disasters, putting in place long term measures to minimize the intensity of impact from future disasters etc (for a longer list please refer Pazhanithurai (2009))

Although households have to resort to inferior means of risk diffusion such as sale of assets and reducing meals Panchayats still provides some insurance, focusing primarily on covariate risks. Households try to obtain Panchayat assistance by participating in GS meetings, as they should in a democracy, and via IBV. In addition, the ability of local government to provide assistance improves with female reservation of the Pradhan position, as well as with the ability of women to inherit land. Again the political and the individual empowerment mechanisms are complementary. Finally better public services are one of the pathways via which ex-ante vulnerability and ex-post poverty are reduced. Hence, the first best policy measure is to extend and enhance insurance mechanisms to enable households to deal with idiosyncratic shocks even as the Panchayats devise more effective measures to deal with covariate shocks without reference to identity either as caste or in terms of gender. During the process that these policy initiatives are put into place and made effective political reservations and greater democratic engagement through GS meetings will need to be nurtured.

The desirability of empowerment of women as a policy tool to reduce is a recurrent theme in this paper. Empowering women though inheritance, political reservations for women at the level of the Panchayats are important policy decisions. Women headed Panchayats need to be strengthened and wherever capacity building for enhancing the ability to take decisions is an issue it must be taken up with urgency. In many cases it is not only the households that need to be made aware of the enabling provisions of certain empowering amendment (such as the HSSA) but also the elected representatives (in the case of political reservations). Political reservations though they have an effect on income do not do much for consumption growth other than via income. Further, this is a delayed effect. Political reservation unlike a regime change is meant to bring about structural changes to the quality of governance and is expected to leave a permanent mark on empowerment of women. Hence, this must be strengthened.

Access to land (not inheritance) for cultivation by women will have significant positive effects on the economic welfare of households (Deininger et al ,2013). Access to land improves women's productivity improves and they are able to contribute monetarily to households. Ownership of land by households reduces vulnerability.

Reducing the constraints on participation is critical. Our results have indicated evidence of constraints on coping strategies leading to households undertaking inferior coping strategies. Targeting of welfare programs in villages needs to be looked into and fine-tuned.

Finally, access to public services like schooling and hospitals are crucial for reducing vulnerability. Local democracy in the form of GS meetings needs to be strengthened and be made more inclusive.

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Table 1: Profile of Covariate and Idiosyncratic Shocks

Variables	Household experience the effects of such distress events	Percentage of households affected by such distress events	Average number of impacts per year (1999-2008)	Average cumulative losses (1999-2008)	Average losses in the latest episode
General/covariate Shocks					
Shocks 1: Crop loss, water borne diseases, loss of property, cyclone/floods/hailstorm	3,199	36.94	2.22	13136.08	7857.74
Shocks 2: Bore wells dried up, pucca/ kucha wells dried up, public-taps non-usable, drought	2,077	23.99	1.61	13683.53	7457.83
Idiosyncratic Shocks					
Shocks 3: Mounting debt associated with education/health/cultivation, starvation & suicide	171	1.97	2.01	4981.11	7085.61
Shocks 4: Sudden health problems/accidents	640	7.39	1.32	8591.82	5047.63
Shocks 5: Crop failure, bore well/open wells for irrigation purposes dried up	775	8.95	1.77	12130.19	7502.71
Shocks 6: Price increase	1,191	13.75	8.40	5194.82	1537.30
Not experienced the effects of shocks	4,156	48.00	-	-	-
Total number of households		8659			

Table 2: Relationship between shocks and coping strategies (first shock)

Variables	Use saving	Help provided from local/village government	More wage employment, withdraw children from school and send them for wage employment	Transfers: Borrowings from relatives/friends, received financial help from relative	Technology: Change crop choices to avoid bad weather or pest attack, improve technology	Sell off assets	Reducing meals per day	Formal and informal borrowing	Total
General/covariate Shocks									
Shocks 1: Crop loss, water borne diseases, loss of property, cyclone/floods/hailstorm	22.74	5.18	1.56	1.53	2.78	1.39	1.98	1.92	39.08
Shocks 2: Bore wells dried up, pucca/kucha wells dried up, public-taps non-usable, drought	15.55	3.35	1.47	1.17	1	0.67	2.05	0.81	26.08
Idiosyncratic Shocks									
Shocks 3: Mounting debt associated with education/health/cultivation, starvation & suicide	0.17	0.01	0.15	0.18	0.01	0.01	0.07	1.35	1.97
Shocks 4: Sudden health problems/accidents	5.76	0.11	0.1	1.38	0	0.2	0.13	0.77	8.44
Shocks 5: Crop failure, bore well/open wells for irrigation purposes dried up	6.01	0.14	0.52	0.35	2.26	0.06	0.07	0.29	9.7
Shocks 6: Price increase	9.22	0.21	0.87	2.11	0.01	0.07	2.06	0.18	14.74
Total	**59.45**	**9.01**	**4.67**	**6.71**	**6.06**	**2.4**	**6.36**	**5.33**	**100**

Table 3: Relationship between household shocks and their coping strategies (shocks occurred next year)

Variables	Use saving	Help provided from local/village government	More wage employment, withdraw children from school and send them for wage employment	Transfers: Borrowings from relatives/friends, received financial help from relative	Technology: Change crop choices to avoid bad weather or pest attack, improve technology	Sell off assets	Reducing meals per day	Formal and informal borrowing	Total
General/covariate Shocks									
Shocks 1: Crop loss, water borne diseases, loss of property, cyclone/floods/hailstorm	1.76	3.26	7.08	2.44	0.47	6.65	4.37	7.46	33.49
Shocks 2: Bore wells dried up, pucca/kucha wells dried up, public-taps non-usable, drought	1.63	3.9	2.06	2.02	2.36	4.29	1.2	4.55	22
Idiosyncratic Shocks									
Shocks 3: Mounting debt associated with education/health/cultivation, suicide	0.04	0.13	0.17	0.26	0.04	0	0.21	4.25	5.1
Shocks 4: Sudden health problems/accidents	0	0.04	7.46	0.21	0.04	0.17	1.42	2.36	11.71
Shocks 5: Crop failure, bore well/open wells for irrigation purposes dried up	0.26	0.69	0.34	0.39	1.2	7.46	0.17	1.72	12.22
Shocks 6: Price increase	0.43	0.17	1.89	1.93	0	0.51	7.68	2.87	15.48
Total	**4.12**	**8.19**	**19**	**7.25**	**4.12**	**19.08**	**15.05**	**23.2**	**100**

Table 4: Relationship between household shocks and their coping strategies (when shocks occurred after 5 years)

Variables	Use saving	Help provided from local/village government	More wage employment, withdraw children from school and send them for wage employment	Transfers: Borrowings from relatives/friends, received financial help from relative	Technology: Change crop choices to avoid bad weather or pest attack, improve technology	Sell off assets	Reducing meals per day	Formal and informal borrowing	Total
General/covariate Shocks									
Shocks 1: Crop loss, water borne diseases, loss of property, cyclone/floods/hailstorm	19.16	5.98	1.08	3.89	3	1	1.58	2.56	38.24
Shocks 2: Bore wells dried up, pucca/kucha wells dried up, public-taps non-usable, drought	14.39	4.45	0.96	3.61	1.77	0.49	0.83	1.41	27.91
Idiosyncratic Shocks									
Shocks 3: Mounting debt associated with education/health/cultivation, suicide	1.44	0.44	0.13	0.21	0.04	0.15	0.07	0.2	2.68
Shocks 4: Sudden health problems/accidents	4.29	0.24	0.11	0.83	0.03	0.27	0.09	0.64	6.48
Shocks 5: Crop failure, bore well/open wells for irrigation purposes dried up	4.57	0.47	0.24	0.6	2.89	0.25	0.13	0.97	10.12
Shocks 6: Price increase	7.71	0.39	1	2.4	0.05	0.16	2	0.88	14.58
Total	**51.55**	**11.96**	**3.51**	**11.53**	**7.78**	**2.32**	**4.7**	**6.66**	**100**

Table 5 Determinants of Poverty

	Whether poor in 1999: Probit (dF/dx)			Whether poor in 2006: Probit (dF/dx)		
	100% poverty line	120%	80%	100%	120%	80%
VEP99_100				**0.32**		
				(9.02)* **		
VEP99_120					**0.401**	
					(10.63)* **	
VEP99_80						**0.181**
						(5.42)* **
Age_head	**0.015**	**0.024**	0.004	0.003	-0.007	-0.002
	(3.99)* **	**(5.60)*** **	(1.61)	(0.66)	(1.60)	(0.62)
(Age_head)2	**0**	**0**	0	**0**	0	0
	(3.53)* **	**(5.04)*** **	(1.41)	**(1.67)***	(0.42)	(0.29)
seconedushare	**-0.55**	**-0.676**	**-0.241**	-0.015	**-0.087**	0.001
	(11.49)* **	**(12.78)*** **	**(7.69)*** **	(0.45)	**(2.21)** **	(0.04)
femaleshare	**1.206**	**1.515**	**0.424**	**0.37**	**0.637**	0.101
	(5.27)* **	**(5.57)*** **	**(3.04)*** **	**(1.68)***	**(2.59)*** **	(0.65)
femaleshare2	**-1.044**	**-1.346**	**-0.373**	-0.302	**-0.583**	-0.055
	(4.62)* **	**(4.97)*** **	**(2.70)*** **	(1.46)	**(2.50)** **	(0.38)
dependency	**0.236**	**0.254**	**0.073**	**0.227**	**0.124**	**0.104**
	(4.87)* **	**(4.36)*** **	**(2.62)*** **	**(5.14)*** **	**(2.39)** **	**(3.62)*** **
Tot_land	**-0.016**	**-0.024**	**-0.006**	**-0.016**	**-0.015**	**-0.012**
	(7.14)* **	**(10.06)*** **	**(4.30)*** **	**(3.55)*** **	**(3.57)*** **	**(4.30)*** **
(Tot_land)2	**0**	**0**	**0**	**0**	**0**	**0**
	(5.10)* **	**(6.87)*** **	**(3.15)*** **	**(3.09)*** **	**(2.82)*** **	**(3.37)*** **
land_irrshare	**-0.168**	**-0.169**	**-0.097**	**-0.072**	**-0.074**	**-0.049**
	(9.02)* **	**(7.86)*** **	**(8.34)*** **	**(3.81)*** **	**(3.50)*** **	**(3.76)*** **
hhsplit	**-0.034**	**-0.065**	-0.011	-0.023	-0.026	**-0.046**
	(2.21) **	**(3.53)*** **	(1.16)	(1.36)	(1.29)	**(4.03)*** **
inherit	0.027	-0.05	-0.004	**-0.032**	**-0.057**	**-0.021**
	(0.80)	(1.30)	(0.21)	**(1.77)***	**(2.77)*** **	**(1.82)***
Prop_GS	**-0.108**	-0.08	**-0.095**	-0.091	**-0.136**	**-0.081**
	(1.74)*	(1.00)	**(2.77)*** **	(1.58)	**(2.04)** **	**(1.94)***
Prop_IBV	**-0.174**	**-0.198**	**-0.059**	**-0.08**	-0.046	**-0.064**
	(4.74)* **	**(4.43)*** **	**(2.79)*** **	**(2.29)** **	(1.15)	**(2.64)*** **
RC	**-0.031**	**-0.038**	-0.013	-0.023	-0.015	**-0.019**
	(1.92)*	**(1.94)***	(1.37)	(1.44)	(0.81)	**(1.83)***
bus_d	**-0.093**	**-0.114**	**-0.029**	**-0.061**	**-0.051**	**-0.06**
	(5.08)* **	**(5.23)*** **	**(2.67)*** **	**(3.37)*** **	**(2.48)** **	**(5.13)*** **
school_d	**-0.061**	-0.023	**-0.019**	-0.039	-0.013	**-0.059**
	(4.08)* **	(1.34)	**(2.07)** **	(1.00)	(0.33)	**(1.97)** **
hospital_d	**-0.079**	**-0.073**	**-0.057**	**-0.052**	-0.037	-0.019
	(3.30)* **	**(2.59)*** **	**(3.74)*** **	**(2.43)** **	(1.60)	(1.27)
Observations	4743	4743	4443	3618	3782	3618
Pseudo R^2	0.3	0.3	0.26	0.16	0.15	0.18
Joint significance	Wald chi2(34) = 1213.64	Wald chi2(34) = 1335.86	Wald chi2(34) = 790.23	Wald chi2(36) = 556.00	Wald chi2(37) = 677.56	Wald chi2(36) = 458.43
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Source: REDS 1999 and 2006

Table 6 Poverty transitions

	Poor -> Poor	Poor -> Not poor	Not poor -> Poor	Poor -> Poor	Poor -> Not poor	Not poor -> Poor	Poor -> Poor	Poor -> Not poor	Not poor -> Poor
VEP99_100	**5.874**	**4.559**	**2.783**						
	(17.37)* **	**(18.39)*** **	**(9.31)*** **						
VEP99_120				**5.812**	**4.314**	**1.93**			
				(15.73)* **	**(18.35)*** **	**(7.67)*** **			
VEP99_80							**8.274**	**6.886**	**4.881**
							(14.85)* **	**(14.05)*** **	**(8.51)*** **
fhead	-0.152	0.024	**-0.715**	-0.191	0.008	**-0.716**	-0.104	0.101	**-0.663**
	-0.63	-0.12	**(2.87)*** **	-0.79	-0.04	**(2.89)*** **	-0.44	-0.53	**(2.68)*** **
Tot_land	**-0.165**	0.022	**-0.07**	**-0.163**	0.03	**-0.068**	**-0.197**	-0.004	**-0.086**
	(4.21)* **	-0.59	**(2.79)*** **	**(4.10)*** **	-0.78	**(2.69)*** **	**(5.15)*** **	-0.11	**(3.40)*** **
(Tot_land)2	**0.001**	-0.003	0	**0.001**	-0.003	0	**0.001**	-0.004	0
	(2.14) **	-1.4	-1.09	**(2.21)** **	-1.26	-1.11	**(2.38)** **	-1.46	-1.28
hhsplit	0.006	0.088	-0.086	-0.02	0.076	-0.084	0.072	0.14	-0.077
	-0.04	-0.75	-0.67	-0.14	-0.65	-0.65	-0.51	-1.22	-0.6
inherit	-0.193	-0.115	**-0.294**	-0.214	-0.115	**-0.307**	-0.214	-0.14	**-0.294**
	-1.3	-0.94	**(2.24)** **	-1.44	-0.94	**(2.34)** **	-1.48	-1.17	**(2.25)** **
Prop_GS	-0.338	-0.247	**-0.837**	-0.086	-0.093	**-0.774**	-0.531	-0.23	**-0.843**
	-0.68	-0.64	**(1.90)***	-0.17	-0.24	**(1.75)***	-1.08	-0.61	**(1.93)***
Prop_IBV	0.189	**0.753**	-0.365	0.188	**0.734**	-0.381	0.056	**0.663**	-0.421
	-0.64	**(3.31)*** **	-1.35	-0.64	**(3.21)*** **	-1.42	-0.2	**(3.01)*** **	-1.57
RC	**-0.297**	**-0.199**	-0.097	**-0.261**	**-0.182**	-0.093	**-0.294**	**-0.18**	-0.078
	(2.25) **	**(1.88)***	-0.84	**(1.97)** **	**(1.71)***	-0.8	**(2.29)** **	**(1.75)***	-0.68
bus_d	**-0.833**	**-0.317**	-0.151	**-0.825**	**-0.301**	-0.135	**-0.846**	**-0.339**	-0.179
	(5.19)* **	**(2.71)*** **	-1.17	**(5.08)*** **	**(2.53)** **	-1.04	**(5.46)*** **	**(3.00)*** **	-1.4
school_d	**0.832**	**0.425**	-0.364	0.584	0.375	-0.382	**0.841**	0.329	-0.384
	(2.00) **	**(1.77)***	-1.42	-1.44	-1.57	-1.49	**(2.07)** **	-1.44	-1.5
hospital_d	**-1.073**	**-0.65**	**-0.261**	**-1.041**	**-0.616**	-0.237	**-1.035**	**-0.602**	**-0.267**
	(5.34)* **	**(4.65)*** **	**(1.75)***	**(5.15)*** **	**(4.37)*** **	-1.58	**(5.29)*** **	**(4.44)*** **	**(1.79)***
Constant	-2.99	-4.503	-1.185	-4.4	-5.573	-1.385	-2.044	-3.6	-0.795
	(2.56)**	(4.81)***	-1.14	(3.74)***	(5.88)***	-1.33	(1.80)*	(3.98)***	-0.77
Observations	3,782	3,782	3,782	3,782	3,782	3,782	3,782	3,782	3,782
Pseudo R^2		0.25			0.25			0.23	
Joint significance		LR chi2(111) = 2255.68			LR chi2(111) = 2286.03			LR chi2(111) = 2070.76	
Prob > chi2		0.0000			0.0000			0.0000	

z-statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7 Vulnerability distributions and determinants

	Dept. variable: VEP in 1999					Dept. variable: VEP in 2006				
	0.1	0.25	0.5	0.75	0.9	0.1	0.25	0.5	0.75	0.9
fhead	**0.015**	**0.014**	0.008	**-0.025**	**-0.032**	**-0.011**	**-0.013**	**-0.017**	**-0.033**	**-0.036**
	(2.79)***	**(2.43)****	(1.12)	**(2.88)*****	**(3.25)*****	**(4.72)*****	**(5.04)*****	**(5.70)*****	**(7.22)*****	**(4.11)*****
Tot_land	**-0.016**	**-0.014**	**-0.014**	**-0.012**	**-0.01**	**-0.006**	**-0.006**	**-0.004**	-0.001	0
	(10.80)***	**(8.12)*****	**(6.86)*****	**(7.74)*****	**(6.16)*****	**(7.20)*****	**(5.39)*****	**(2.32)****	(0.57)	(0.08)
land_irrshare	**-0.112**	**-0.104**	**-0.096**	**-0.103**	**-0.12**	**-0.091**	**-0.092**	**-0.096**	**-0.099**	**-0.101**
	(23.98)***	**(25.52)*****	**(20.95)*****	**(20.96)*****	**(19.34)*****	**(26.66)*****	**(30.48)*****	**(27.65)*****	**(25.57)*****	**(17.01)*****
inherit	**0.034**	**0.024**	0	**-0.014**	-0.009	**-0.021**	**-0.024**	**-0.027**	**-0.031**	**-0.037**
	(11.74)***	**(5.70)*****	(0.05)	**(1.67)***	(0.68)	**(13.05)*****	**(13.52)*****	**(10.88)*****	**(8.94)*****	**(7.33)*****
Prop_GS	**-0.071**	**-0.079**	**-0.104**	**-0.09**	**-0.084**	**-0.066**	**-0.063**	**-0.071**	**-0.08**	**-0.096**
	(5.59)***	**(6.92)*****	**(6.89)*****	**(6.00)*****	**(4.88)*****	**(9.08)*****	**(9.70)*****	**(7.00)*****	**(7.29)*****	**(5.30)*****
Prop_IBV	**-0.134**	**-0.132**	**-0.126**	**-0.123**	**-0.116**	**-0.106**	**-0.104**	**-0.103**	**-0.102**	**-0.099**
	(15.65)***	**(17.21)*****	**(13.98)*****	**(13.88)*****	**(10.61)*****	**(20.65)*****	**(22.76)*****	**(20.15)*****	**(15.40)*****	**(10.03)*****
RC	**-0.004**	-0.002	-0.002	**-0.009**	**-0.016**	**-0.024**	**-0.024**	**-0.024**	**-0.026**	**-0.024**
	(1.72)*	(0.80)	(0.61)	**(1.91)***	**(2.92)*****	**(17.58)*****	**(16.72)*****	**(11.69)*****	**(8.66)*****	**(5.43)*****
school_d	**-0.02**	**-0.021**	**-0.017**	**-0.006**	**-0.01**	**-0.096**	**-0.091**	**-0.09**	**-0.082**	**-0.076**
	(9.89)***	**(8.02)*****	**(4.41)*****	**(1.69)***	**(2.05)****	**(20.04)*****	**(27.00)*****	**(18.38)*****	**(12.91)*****	**(7.50)*****
hospital_d	**-0.041**	**-0.037**	**-0.045**	**-0.053**	**-0.042**	**-0.021**	**-0.02**	**-0.019**	**-0.017**	**-0.014**
	(12.08)***	**(9.48)*****	**(7.65)*****	**(6.92)*****	**(5.55)*****	**(12.46)*****	**(11.44)*****	**(7.18)*****	**(4.85)*****	**(2.87)*****
Constant	-0.198	-0.155	-0.146	-0.164	-0.095	0.489	0.535	0.655	0.835	0.971
	(8.92)	(7.40)	(5.65)	(5.62)	(1.95)	(28.43)	(30.76)	(27.91)	(28.87)	(22.14)
Observations	4743	4743	4743	4743	4743	4532	4532	4532	4532	4532
Pseudo R^2	0.47	0.56	0.66	0.73	0.73	0.47	0.55	0.64	0.72	0.76
Joint significance	F(165, 4708) = 950.12					F(180, 4495) = 494.58				
Prob > F	0.0000					0.0000				

t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Decomposition of average vulnerability

VEU	=	Poverty	+	Covariate risk	+	Idiosyncratic risk	+	Unexplained risk
0.3016		**0.2103**		**-0.1996**		**0.196**		**0.0949**

Table 9: Covariate risk component (Panel Random effect)

	Per capita household consumption
yr99	**-0.125**
	(11.59)* **
once_res	0.029
	(1.14)
twice_res	**0.058**
	(1.87)*
Humid area	**0.201**
	(2.18) **
Semi-Arid temperate	0.071
	(0.61)
Semi-Arid tropic	**0.229**
	(2.15) **
Constant	0.862
	(9.09)
Observations	11727
R-squared	0.03
Observations	11729
Joint significance	F(6, 5839) = 30.52
Prob > chi2	0.0000
Hausman Test: fixed vs. random effect	chi2(6) = 73.54 Prob > chi2=0.0000

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

1. village never reserved is the reference group

2. Arid area is the reference group

Source: REDS 1999 and 2006

Table 10: Idiosyncratic risk component (Panel fixed effects IV model)

	First stage p. c. income	Second stage p.c. consumption
lpcincome		**0.408 (11.12)*** **
fhead	**0.212 (2.00)** **	-0.042 (0.79)
age	0.013 (1.06)	-0.008 (1.32)
age2	0.000 (0.82)	0 (1.09)
femaleshare	**-2.553 (3.51)*** **	0.418 (1.09)
femaleshare2	**2.578 (3.76)*** **	-0.574 (1.56)
dependency	-0.124 (1.12)	**-0.242 (4.34)*** **
seconedushare	**-1.144 (4.94)*** **	**0.236 (1.86)***
seconedushare2	**0.944 (4.48)*** **	-0.035 (0.31)
yr99	**-0.133 (1.88)***	0.052 (1.44)
pubgoods_hh	-0.009 (1.07)	**0.01 (2.50)** **
once_res	0.120 (1.55)	0.023 (0.61)
twice_res	**0.280 (2.89)*** **	-0.008 (0.17)
Humid	-0.233 (0.82)	**0.432 (3.09)*** **
SA_temperate	-0.015 (0.04)	0.233 (1.28)
SA_tropic	-0.243 (0.74)	**0.428 (2.64)*** **
pcasset	**0.227 (13.19)*** **	
(pcasset)2	**-0.001 (11.03)*** **	
land_irrigate	**0.189 (2.94)*** **	
Constant	1.001 (2.04)	0.266 (1.05)
Observations	10828	
Joint significance	F(18, 4959) = 20.02 Prob> F=0.0000	Wald chi2(16) =18406.58 Prob>chi2=0.0000
Hausman Test: fixed effects vs. random effect	Wald chi2(15)= 34.63 Prob>chi2=0.0028	
Sargan-Hansen test for overidentification restriction	Chi2(2) = 0.996 Prob>ch2 = 0.6077	

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Source: REDS 1999 and 2006

Table 11: Managing risks: household coping strategies

HH coping strategy	Saving	Government	Transfer	Capital depletion	Other
			Panel (A)		
idiosyncratic	1.516 (28.63)***	0.239 (3.46)***	0.825 (14.58)***	0.505 (9.12)***	-2.553 (27.72)***
covariate	1.626 (35.11)***	0.873 (12.87)***	0.326 (6.45)***	0.948 (18.15)***	-2.608 (30.14)***
			Panel (B)		
death	1.516 (14.39)***	-	0.362 (3.99)***	-	-1.919 (15.26)***
health	1.363 (14.59)***	-	0.891 (10.16)***	0.213 (2.10)**	-2.252 (14.02)***
cropfail	0.982 (12.21)***	-	0.205 (2.49)**	0.599 (7.74)***	-1.468 (14.43)***
drought	1.329 (23.76)***	0.125 (1.65)*	0.333 (5.56)***	0.603 (10.66)***	-1.906 (23.15)***
floods	1.089 (16.45)***	0.99 (14.08)***	-	0.898 (14.24)***	-2.155 (21.03)***
livestk	1.265 (9.15)***	0.543 (3.64)***	0.605 (5.68)***	0.295 (2.30)**	-1.799 (9.95)***
epidemic	0.761 (5.47)***	-	-0.439 (2.70)***	0.267 (2.04)**	-
Observations	5,558	5,558	5,558	5,558	5,558
Joint significance	(A) chi2(65) = 4765.61, (B) chi2(75) = 3752.18, (C) chi2(90) = 3263.79				

Robust z-statistics in parentheses

Table 12:. Measure of consumption insurance (IV estimation)

First stage	Δlpcincome	Δlpcincome	Δlpcincome
Δ mean of lpcincome	**0.625**	**0.625**	**0.625**
	(30.33)* **	**(30.33)*** **	**(30.35)*** **
Age	0.003	0.003	0.003
	(0.45)	(0.45)	(0.45)
Age2	0.000	0.000	0.000
	(0.21)	(0.21)	(0.2)
Δ Femaleshare	**-1.486**	**-1.486**	**-1.484**
	(4.53)* **	**(4.53)*** **	**(4.52)*** **
Δ Femaleshare2	**1.475**	**1.475**	**1.473**
	(4.84)* **	**(4.84)*** **	**(4.84)*** **
Δ Dependency	-0.013	-0.013	-0.014
	(0.17)	(0.17)	(0.19)
Δ Seconedushare	**-0.550**	**-0.550**	**-0.549**
	(5.16)* **	**(5.16)*** **	**(5.15)*** **
Δ Seconedushare2	**0.520**	**0.520**	**0.518**
	(5.35)* **	**(5.35)*** **	**(5.33)*** **
Δ no_GS	-0.008	-0.008	-0.008
	(0.29)	(0.29)	(0.29)
Δ no_voting	**-0.031**	**-0.031**	**-0.031**
	(3.32)* **	**(3.32)*** **	**(3.33)*** **
Δ regime_jati	-0.046	-0.046	-0.046
	(0.73)	(0.73)	(0.74)
Δ regime_gender	-0.036	-0.036	-0.035
	(1.29)	(1.29)	(1.27)
Δ pcasset	**0.113**	**0.113**	**0.113**
	(15.69)* **	**(15.69)*** **	**(15.7)*** **
(Δ pcasset)2	**-0.001**	**-0.001**	**-0.001**
	(13.26)* **	**(13.26)*** **	**(13.27)*** **
Δ land_irrigate	-0.034	-0.034	-0.035
	(0.68)	(0.68)	(0.69)
Constant	0.017	0.017	0.017
	(0.09)	(0.09)	(0.09)
Joint significance	F(15, 5141) = 87.41	F(15, 5140) = 87.38	F(15, 5139) = 87.50
Prob> F	0.0000	0.0000	0.0000

Second stage	Δlpcex	Δlpcex_f	Δlpcex_nf
Δlpcincome	**0.677**	**0.657**	**0.692**
	(13.73)* **	**(13.48)*** **	**(11.92)*** **
Δ mean of lvillpcincome	**-0.431**	**-0.406**	**-0.45**
	(12.59)* **	**(11.98)*** **	**(11.15)*** **
Age	0.004	0.004	0.004
	(0.75)	(0.68)	(0.64)
Age2	0	0	0
	(0.81)	(0.69)	(0.71)
Δ Femaleshare	0.353	**0.527**	0.08
	(1.29)	**(1.95)***	(0.25)
Δ Femaleshare2	**-0.489**	**-0.601**	-0.288
	(1.90)*	**(2.36)** **	(0.95)
Δ Dependency	-0.062	-0.062	-0.044
	(1.08)	(1.09)	(0.64)
Δ Seconedushare	**0.331**	**0.269**	**0.492**
	(3.66)* **	**(3.00)*** **	**(4.62)*** **
Δ Seconedushare2	**-0.146**	-0.116	**-0.251**
	(1.75)*	(1.41)	**(2.56)** **

Δ no_GS	**0.049**	**0.037**	0.065
	(2.38)**	**(1.83)***	**(2.67)*****
Δ no_voting	**0.014**	**0.021**	0.002
	(1.84)*	**(2.78)*****	(0.20)
Δ regime_jati	0.054	**0.12**	-0.012
	(1.12)	**(2.52)****	(0.21)
Δ regime_gender	**0.059**	**0.065**	**0.055**
	(2.77)***	**(3.07)*****	**(2.19)****
Constant	-0.267	-0.327	-0.199
	(1.83)	(2.27)	(1.16)
Observations	5157	5156	5155
Joint significance	F(13, 5143) = 22.05	F(13, 5142) = 20.33	F(13, 5141) = 18.59
Prob> F	0.0000	0.0000	0.0000
Durbin-Wu-Hausman test of Endogeneity	chi2(1) = 270.89	chi2(1) = 241.65	chi2(1) = 152.26
Prob> chi2	0.0000	0.0000	0.0000
Anderson canonical correlation LR statistic	chi2(3)= 241.700	chi2(3)= 241.653	chi2(3)= 242.11
Prob> chi2	0.0000	0.0000	0.0000
Sargan test statistic	Chi2(2)= 2.672	Chi2(2)= 3.677	Chi2(2)= 2.023
Prob> chi2	0.2629	0.1590	o.3637

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Source: REDS 1999 and 2006