Impact of shocks on labour and schooling outcomes and the role of public work programmes in rural India

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Abstract

The effectiveness of the National Rural Employment Guarantee Scheme (NREGS) on rural labour market dynamics in India has been widely debated in the literature. However, the impact of NREGS on non-agricultural labour market and children schooling outcomes in reference to exogenous rainfall shock is unclear from the existing literature. This paper exploits the Indian National Sample Survey and rainfall measures from the precipitation archive of the University of Delaware to investigate the role of NREGS in labour market and schooling outcomes of children during shocks. Using a difference-in-differences methodology, we focus on disaggregated shock specification and find a shock-cushioning pattern for NREGS during negative shocks. However, there is an excess demand for labour during positive shock periods resulting from exposure to NREGS. The implication is that the excess informal labour market opportunity translates to a reduction in school engagement for children in recent times. These findings summarily distinguish the role of NREGS during positive and negative shocks respectively.

JEL classification: I38, J2, J46, J48

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1. Introduction

Vulnerability of rural households in developing countries is predominantly linked to incomplete informal insurance mechanisms in the face of shocks. Unexpected events within households and communities, such as health shocks and commodity price shocks, have proven to be strategic destabilising factors for micro-level welfare and consumption smoothing dynamics in these areas. Of greater importance is the income shocks linked to post-harvest agricultural yields, which is determined by exogenous variation in rainfall patterns across geographical locations for rural communities in developing countries.

While various intervention programs have been initiated to enhance consumption smoothing capacity and tackle intergenerational poverty cycle for rural households through conditional and unconditional cash-transfers respectively, but effectiveness of the intervention programs differ by implementation strategy, development level and institutional framework. Alternatively, in pursuit of poverty alleviation for rural households, public works programs have been engaged as an instrument to provide guaranteed employment and curtail unemployment trends in the developing countries. In this regard, substantial evidence show that public works programs have had both intended and unintended consequences on household and individual welfare outcomes. Galasso and Ravallion (2004) demonstrate that beneficiaries of Argentina's *Jefes de Hogar* are able to avoid plunging into extreme poverty as a result of receiving the workfare program assistance despite the leakages in its execution. Gilligan *et al.* (2009) reveal that Ethiopia's *Productive Safety Net Programme* enhances food security and credit access for participant households.

Studies on India's historical public works programs cut across evaluation of workfare program at the state and country levels respectively. Gaiha (1997) and Gaiha and Imai (2002) investigate the effect of Maharashtra's rural public works (Employment Guarantee Scheme – EGS) on poverty incidence and agricultural wages in the state. Notwithstanding that the simulated poverty alleviating potential of the EGS is limited in most cases in the later; there are indications that larger EGS and accurate targeting of poor areas have potentials for substantially greater welfare influence regarding poverty alleviation.

A more recent rural employment guarantee scheme, Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), was implemented in India beginning from February 2005. This has attracted keen interest in the literature especially as it relates to the welfare consequences of the workfare policy. This policy is different from previous workfare policies in India by virtue of its reserved quota for rural women and stepwise roll-out strategy. The implementation of MGNREGA has been exploited to investigate both direct and indirect economic outcomes which include child labour (Islam and Sivasankaran 2014), child schooling outcomes (Afridi *et al.* 2012; Li and Sekhri 2013; Shah and Steinberg 2015) consumption expenditures and labour market outcomes (Azam 2012; Imbert and Papp 2015; Murgai *et al.* 2016) and political influence (Gupta and Mukhopadhyay 2016). While public works may have welfare consequences on households as showcased in the evidence above, this paper focuses

on welfare implication of workfare programs in relation to employment dynamics resulting from shocks. In this framework, the ability to smooth consumption expenditure in periods of negative economic shocks may help achieve a poverty alleviation goal among rural households in the developing countries.

This paper contributes to the above-mentioned gap in knowledge to the literature on the impact of shocks on labour market engagements of adults and children; and the role of public policy programs on these outcomes. It is important to note that the child labour outcome is investigated in tandem with human capital predisposition of children in diverse shock periods. Using a disaggregated shock specification and staggered rollout of the implementation of MGNREGA in India, we use a difference-in-differences methodology for labour and schooling outcomes of rural dwellers. Our results show that while negative shock impedes labour engagements in periods of dry spells, NREGS helps to accommodate adults into the informal labour sector in a manner that sufficiently mitigates the impact of negative shocks. On the other hand, positive shock has no apparent impact on labour engagements. Meanwhile, NREGS communities, which are equally exposed to positive shock employ more female and child labour to ensure equilibrium within the informal labour market. We further find that schooling engagements of children during positive shocks reduces for early beneficiaries of the scheme.

The remainder of this paper is organised as follows. In section 2, we discuss the related literature while section 3 highlights the basic components of MGNREGA. Section 4 discusses the data sources and summary statistics while section 5 presents the empirical strategy used in this paper. Section 6 reports our results and section 7 discusses the core areas of our findings. Section 8 concludes.

2. Related Literature

Existing literature on the effects of previous workfare programs in Indian states is vast[1]. Similarly, studies on the welfare consequences of NREGS have emerged in recent times[2]. The emergence of the recent strand of literature is motivated by the diversified welfare implication of public works policy commonly adopted in the developing countries. Islam and Sivasankaran (2014) investigate the impact of NREGS adult works opportunities on child labour and schooling outcomes while Afridi *et al.* (2012) particularly focus on household female participation in NREGS and relative consequences on children schooling in India. Using repeated cross-section and panel data, findings from Islam and Sivasankaran (2014) unveil an asymmetric pattern on children's time use by age groups. While NREGS leads to an increase in time spent on education for younger children, the impact for older children follows a labour supply shock explanation from competitive opportunities of labour demand in beneficiary districts.

On the other way round, Afridi *et al.* (2012) reports asymmetric child welfare results by parent's gender in NREGS. While labour force engagement of mothers in the program translates to better educational outcomes for their children, father's participation has negative impacts on children education. This pattern connotes suggestive but strong evidence in support of women empowerment mechanism as an important determinant of human capital formation

of children in developing countries. In sharp contrast, the women empowerment story regarding implementation of NREGS is contradicted in an empirical evidence documented by Amaral *et al.* (2015) where domestic violence against women is positively related to NREGS implementation across districts. Although this contradicts women empowerment story within household bargaining model in Afridi *et al.* (2012), it seems to provide additional mechanism of a male backlash resulting from employment opportunities targeting females and ultimately reflects gender bias in India.

Complementing the aforementioned child welfare evidence for NREGS as above, Shah and Steinberg (2015) investigate the human capital accumulation effect of the program. The paper exploits universal test scores of children in India as a unique human capital accumulation proxy; which transcends childhood consequences and indeed reflects adulthood welfare potentials. Their main results reveal that subsequent year of exposure to NREGS decreases school enrolment by 2 percentage points and math scores by 2 percent of a standard deviation amongst children between the ages of 13 and 16 years. This result is premised on the theoretical proposition of an increased opportunity cost of schooling as a result of thriving informal labour opportunities, which lowers human capital investment in tandem. More importantly, the impact is more prevalent among adolescent boys who are primarily substituting into paid labour market at the expense of school while adolescent girls are substituting into unpaid domestic work. While Shah and Steinberg (2015) complement Afridi *et al.* (2012) and Islam and Sivasankaran (2014), its adoption of test scores deviates from the tradition in related literature and carves a unique trajectory of unintended consequences of a workfare program on children.

Consistent with the deleterious child schooling impact of NREGS above, Li and Sekhri (2013) examine the consequences of increasing rural employment opportunities for the human capital accumulation of children in rural areas. Their findings show that the introduction of NREGS results in lower relative enrolment rate in beneficiary districts. Further estimation unveils an asymmetric effect across school ownership with public school enrolment demonstrating the negative trend while private schools enrolment increases with the program. Notwithstanding increase in enrolment rate, grade repetition and pass rates worsen in private schools even though there is an increase in the number of teachers. It is important to reiterate the role of contexts in the literature documenting the impact of NREGS on children's welfare in India. The contrasting empirical evidence of welfare consequences of NRGEGS on children may be attributed to widely varying outcome variables across studies. While Afridi *et al.* (2012) and Islam and Sivasankaran (2014) explore time use dynamics of children across beneficiary districts by year of exposure, the use of school enrolment rate, test scores and class repetition outcomes (adopted in Li and Sekhri 2013; Shah and Steinberg 2015) as dependent variables depict stronger human capital accumulation measures with potentially longer term implications.

In a recent paper, Imbert and Papp (2015) exploit the staggered introduction of NREGS to evaluate the employment and wage rate effect of NREGS. Using DiD which exploit spatial distribution of the implementation of the NREGS across districts, their results reveal a

crowding-out effect of the private sector hiring from public sector labour engagements. This eventually led to an increase in equilibrium wage rate which subsequently leads to household welfare gains demonstrated in the use of consumption quintile regression of the poor.

Whilst the literature has established various dimensions of the welfare impact of NREGS within Indian rural communities, it is unclear how plausibly rural exogenous demand shocks will impact access to employment opportunities for beneficiary districts. This insight becomes imperative following the main purpose of establishing the act, which is to cushion the impact of negative agricultural shocks[3]. The interaction between NREGS and district shock realization may affect flexibility of informal labour sector.

The closest literature to this paper is Imbert and Papp (2015) which investigates employment and wage dynamics of NREGS for beneficiary districts. Nevertheless, we differ by focussing on the role of exogenous rural demand shock (caused by rainfall shocks) in connection with informal rural labour movements by time of exposure of districts to the works program. In the same vein, while Imbert and Papp provide some insights with regard to the dynamics of equilibrium labour and wage rate respectively, the consequences on child labour and schooling are unclear and would be an additional component of labour market dynamics important for policy purpose. More importantly, our disaggregated shock framework and interaction with NREGS help to complement human capital stories in the literature (Afridi *et al.* 2012; Li and Sekhri 2013; Islam and Sivasankaran 2014; Shah and Steinberg 2015).

3. Background

The Indian public works program, MGNREGA, is designed to complement the government's efforts at sustaining household welfare in periods of negative agricultural shock in rural areas. The various components of the MGNREGA are commendable, especially in relation to gender equity for public works compared to previous public works policies in the same country[4]. While there are potentials for women's labour force engagements to improve thereby empowering them overtime, there may be spill over effects on rural labour force equilibrium in a manner that could trigger unexpected consequences of this policy on child labour and schooling. For instance, general equilibrium state of labour may be altered to favour child labour and/or reduce child schooling due to the associated boom in labour demand which is unaccompanied by corresponding expansion in rural labour force. Similarly, increase in equilibrium wage as a result of this imbalance as demonstrated in Imbert and Papp (2015) may encourage children to engage in more wage labour at the expense of attending school.

Opting for child labour during minimum wage regimes for adult labour may drive informal sector activities in a bid to maintain equilibrium. Usually, children's wages are unregulated and are largely determined by the employer as deemed suitable. Also, there are flexible rules at play for engaging child labour as employing and laying-off a child in the developing countries is not regulated by necessary authorities. We conjecture that this dynamics can lead to preference for child labour in agricultural driven economies with public works schemes. The implementation of public works scheme in periods of agricultural shocks is capable of stimulating substitution between adults and children labour engagements as

argued above. However, agricultural boom may have more prominent effect. This is because child labour may be an important source of labour force for non-agricultural informal sector labour demand.

Our research complements current efforts in the literature which focuses on credit rationing and lack of insurance mechanisms on the impact of household shocks on child vulnerability in the developing countries (Guarcello *et al.* 2010). While substantial literature have evaluated the impact of different types of idiosyncratic and covariate shocks on child labour (Beegle *et al.* 2006; Congdon Fors 2012; Fabre and Pallage 2015), little is known about how the interaction between this and labour market policies affects school attendance and labour market choices of children in the developing countries. In a different perspective, while related literature addresses the impact of welfare packages on children labour choices with or without shocks (de Janvry *et al.* 2006; Ebeke 2012; de Hoop and Rosati 2014), examining public works program impacts of child engagements during shocks is yet another important aspect of child welfare.

4. Data

In this paper, we use (I) Indian National Sample Survey (NSS) employment-unemployment rounds from 2004-05, 2007-08 and 2009-10, (II) Rainfall data from Terrestrial Precipitation: 1900-2010 Gridded Monthly Time Series (version 3.01), Center for Climatic Research, University of Delaware. The 2004-05, 2007-08 and 2009-10 employment-unemployment rounds of the Indian NSS correspond to 61st, 64th and 66th rounds of national representative labour participation data for Indian households. While these are labour surveys, it is imperative to note that the questionnaire also collects data on schooling participation of children. These are nationally representative household surveys conducted by the Ministry of Statistics and Program Implementation (MoSPI) in India. These surveys provide information on labour engagements and wages for each household member in the seven days preceding the interview period.

We use rainfall data from Terrestrial Precipitation: 1900-2010 Gridded Monthly Time Series (version 3.01) collected by Center for Climatic Research, University of Delaware. The rainfall data is available for 0.5 by 0.5 degree latitude-longitude grids and this is matched to the Global Positioning System (GPS) of each district. The rainfall measure used in this paper is the rainfall in the previous agricultural year. For example, to correspond to the employment-unemployment data from July 2004 to June 2005, we use rainfall measures from January 2004-December 2004. This lag nature gives time to respond to demand shocks arising from the effects of rainfall on the local economy in the informal sector (agricultural and non-agricultural sectors). The monsoon rainfall during June to December is used for planting during India agricultural seasons. During this period, public workfare projects are not active within the rural areas. However, after the monsoon, the quantum of public works projects implemented at the local level reflect informal labour demand as a response to agricultural sector capacity to provide sufficient employment for the informal sector labour.

We use quantified rainfall shock which we disaggregated into dry shock and wet shock regimes to further showcase the relevance of the major components of weather shocks on the Indian rural labour dynamics. Quantified rainfall shock obtained this way is calculated as a deviation of the yearly rainfall measure from the long-term average in a district. We use a 61-year district level rainfall average from 1950-2010 to capture a long-term rainfall variation recommended in the literature[5]. We focus on quantified rainfall shock measure similar to Maccini and Yang (2009), Björkman-Nyqvist (2013) and Rocha and Soares (2015) for our analyses[6]. The quantified rainfall shocks used in this paper are specified as follows:

Rainfall Shock Components[7]

$$\text{Wet shock}_{\text{dt}-1} \quad = max\{0\ ,\ ln\ \text{Rainfall}_{\text{dt}-1} - ln\ \overline{\text{Rainfall}_{\text{d}}}\} \tag{2}$$

$$\text{Dry shock}_{\text{dt}-1} \quad = \text{abs}\ \{min(0\ ,\ ln\ \text{Rainfall}_{\text{dt}-1}\ - ln\ \overline{\text{Rainfall}_{\text{d}}})\} \tag{3}$$

Where ln is the natural logarithm; and $\text{Rainfall}_{\text{dt}-1}$ and $\overline{\text{Rainfall}_{\text{d}}}$ each represent district level rainfall measures for the previous agricultural season and 61-years average respectively. As previously mentioned, the construction of $\text{Rainshock}_{\text{dt}}$ in equation (1) (See endnote vi) follows rainfall shock measures used for similar studies in the development literature (Maccini and Yang 2009; Björkman-Nyqvist 2013; Rocha and Soares 2015). These quantified rainfall shocks are suitable to measure the impact of the deviation of district level rainfall pattern on harvests and agricultural performance for rural households. Our disaggregated shock components in equations (2) and (3) respectively are constructed to measure positive and negative (absolute) deviations from historical rainfall norm. We expect Wet shock and Dry shock to affect rainfed agricultural yields from crop production differently[8]. This may play important role in designing response programs to flood or drought events in rural areas.

4.1 Definition of Outcomes

We construct the outcome variables as follows. The NSS Employment Survey includes detailed questions about the daily activities for all persons over the age of four in surveyed households for the most recent seven days. We restrict the sample to persons aged 5 to 18 for child outcomes. We then compute for each child the percentage of days in the past seven days spent in each of schooling and child wage work respectively. Generally, the construction of outcome variables follow Imbert and Papp (2015), while gender dynamics and children responsive engagements in periods of labour shocks triggered by exogenous weather shocks in rural India are additional consideration in our setting.

4.2 Summary Statistics

The summary statistics for the main variables from the three rounds of the Employment/Unemployment datasets can be found on Table 1. Wet and dry shock components of quantified rainfall shock in the later part of the table show that there are more positive rainfall shock regimes across Indian districts than negative shocks within the three rainfall shock years

engaged in this paper. Similarly, interaction terms of NREGS with positive and negative rainfall shocks demonstrate similar magnitudes as above.

Table 1: Summary Statistics

Variable	Mean	Standard Deviation
Male Dummy	0.5101	0.4999
Age	28.8036	18.7068
Household Size	6.0067	2.8890
Scheduled Caste Dummy	0.7329	0.4424
Expenditure ('000 Rupees)	4.2981	3.3220
Adult categories		
Married Dummy	0.8387	0.3678
No Formal Education	0.4214	0.4938
Primary	0.2543	0.4354
Lower Secondary	0.1217	0.3270
Higher Secondary	0.1070	0.3091
College and above	0.0957	0.2941
Engagement Ratios		
Labour Engagement Ratio	6.7270	1.3536
Labour Engagement Ratio (Children)	0.9546	2.3702
School Engagement Ratio (Children)	5.3527	2.9581
Shocks		
Wet Shock	0.4185	0.7539
Dry Shock	0.3573	0.4870
Wet Shock(Interaction)	0.2345	0.6255
Dry Shock (Interaction)	0.1977	0.4027

Notes: Table 1 above reports summary statistics for 946,862 individuals and 316,222 children respectively. Adult categories for married dummy and education status in the above table report the summary statistics for adults above 25 years of age. Wet Shock is measured as actual values of deviations for positive log deviation from mean rainfall values while Dry Shock is the absolute values of negative log-deviation measures.

The identification strategy for the impact NREGS on child schooling and labour outcomes relies on changes at the district level. The NREGS is implemented in phases at the district level within states. We follow Imbert and Paap (2015) to drop districts that are completely urban and use only data for persons located in rural areas because the workfare program is applicable only to persons living in rural areas. We are able to match rainfall data to individual engagements in the past 7 days for 568 districts of the 594 baseline districts in 2004-05 employment-unemployment data (representing 95.6 percent). We follow Impert and Paap (2015) by using data for July 2004 to June 2005 to form the pre-program period while data spanning July 2007 to June 2008 are attributed the post-program period. In a more comprehensive dimension that ensures complete implementation of the NREGS program across all Indian districts, we complement the empirical analysis of this paper with data from July 2009 to June 2010 to document response in outcomes to rainfall shock after the program had been introduced in the entire country.

5. Empirical Strategy

The main objective of this paper is to estimate the responsive change in adult labour, child labour and children schooling choices associated with the implementation of NREGS policy associated with shocks while controlling for a host of time and geographic fixed effects and linear trends. To implement this objective, we merged the district level precipitation data for India with employment-unemployment data to calculate associated district level exogenous shocks facing each community and examine the effect of NREGS. Because we have information on individual engagements in early NREGS districts after they received NREGS only, we are able to control for unobservable time-invariant characteristics affecting labour choices that are associated with the implementation of NREGS. The NREGS implementation was staggered across the Indian districts in three phases, so we adopted a standard DID methodology where we interact a dummy for NREGS implementation[9] across districts with the exogenous rainfall shock attributed to the districts prior to public works season. We also include district fixed effects to control for additional time-invariant spatial heterogeneity.

$$\mathrm{Y_{idt}} = \beta_1\ \mathrm{Wet\ Shock_{dt-1}} + \beta_2(\mathrm{Wet\ Shock_{dt-1}} \times\ \mathrm{NREGS_{dt}}) + \beta_3\ \mathrm{Dry\ Shock_{dt-1}} + \beta_4(\mathrm{Dry\ Shock_{dt-1}} \times\ \mathrm{NREGS_{dt}})\ +\ X'_{idt}\Gamma +\ \eta_d + \mu_t + \epsilon_{idt} \quad (4)$$

where $\mathrm{Y_{idt}}$ denotes the labour and schooling outcomes for individual respondent *i* residing in district *d* in year *t*, $\mathrm{NREGS_{dt}}$ is an indicator variable equal to one if a district is categorised as belonging to early NREGS districts and zero otherwise. $\mathrm{Wet\ Shock_{dt-1}}$ measures quantified rainfall attributed to positive rainfall shock in a district for the past planting season while $\mathrm{Dry\ Shock_{dt-1}}$ measures quantified rainfall loss attributed to negative rainfall shock in a district for the past planting season. $\mathrm{Wet\ Shock_{dt-1}} \times \mathrm{NREGS_{dt}}$ is the interactive term between district level positive rainfall shock and NREGS dummy while $\mathrm{Dry\ Shock_{dt-1}} \times \mathrm{NREGS_{dt}}$ is the interactive term between district level negative rainfall shock and NREGS dummy. Wet Shock and Dry Shock components of eq. (4) disintegrate the role of favourable and unfavourable agricultural season on average labour engagements at the district level and their interaction terms show the effect of the workfare policy on these outcomes. X_{idt} is a vector of individual and household level demographic controls (where individual controls are gender, age, marital status and education categories for individual respondents while household controls include household head gender, household size, number of children below age 5, indicator for household caste. η_d are district fixed effects and μ_t are year fixed effect. ϵ_{idt} is the individual error term. Errors are clustered at the district level to address the issue of spatial correlation between rainfall shock and outcome variables in eq.(4) above. As documented in Cameron *et al.* (2008), a panel of 568 districts in the employment-unemployment data after mergers with UDEL rainfall data indicates satisfies standard asymptotic tests.

We estimate the parameters of eq. (4) for non-agricultural labour market outcomes from a shock specification designated to equations (2) and (3). As in a standard DID methodology, we interpret β_1 as the causal effect of positive shock on average labour market engagements within the district and β_2 as the causal effect of NREGS on average labour market engagements within a district during for positive shocks. β_3 represents the causal effect of negative shock on average labour market engagements within the district while β_4 measures the causal role of NREGS in this regard.

There exist at least one potential threat to identifying the causal effect of NREGS policy on welfare outcomes in section 5. It is understandable from the implementation of the program that the early implementations focused on poorer districts in order to ameliorate poverty trends in such locations quickly. In alignment with our concern stated above, different patterns in child schooling and labour choices between districts by poverty level may already exist and this could bias our results unless addressed. To address this concern, we applied two approaches: First, early NREGS districts may have fundamentally comparable background characteristics with those who received NREGS later. This would satisfy the quasi-random assignment of districts to early and late NREGS districts. This would enhance the interpretation of our results as causal since random assignment of treatment is an important econometric requirement for causal interpretation of estimates from intervention programs. Second, we performed a placebo test using the 1999-2000 NSS wave and focussing on the same outcome variables. In this strategy, we superimpose early and late exposure to NREGS to relevant districts for the 1999-2000 wave to check if shock and interaction estimates will show any unique pattern. The results from this regression are discussed later in this paper.

6. Results

6.1 General Labour Outcomes

Our regressions focus on informal labour market variables and schooling activities of individual respondents in the past seven days. However, we restrict our sample for the schooling engagements to children between 5 and 18 years of age to capture human capital accumulation impacts of the different categories of shocks and corresponding NREGS impacts. Table 2 presents estimates of different components of rainfall shocks and their respective interaction terms with NREGS for labour market engagements in the past seven days. Columns 1 and 2 of Table 2 report estimates with and without controls respectively. Whilst estimates are not exactly the same across these two columns, they are not significantly different.

We now focus on Table 2 Column 2, where we execute our estimation with controls. The results show that a one-standard deviation positive rainfall shock decreases the ratio of labour market engagement of an average individual in the village by 0.6 percentage points (not significant at traditional levels). The interaction term of positive shock and NREGS presents an estimate of 0.02 representing a 2.0 percentage point increase in labour market engagements for NREGS exposed communities. Combined together, these results can be interpreted as meaning that there is an insignificant impact of positive rainfall shock on labour market

activities of villages yet to be exposed to NREGS while there is an overall 1.4 percentage point increase for exposed villages. However, negative rainfall shock estimate and its interaction term significantly evens out when compared to each other. Specifically, the negative rainfall shock estimate indicates that a one-standard deviation negative rainfall shock decreases the ratio of labour market engagement of an average individual in the village by 4.2 percentage points while its interaction term lessens the deleterious effect of negative rainfall shock by an increase in labour market engagement of 6.0 percentage points. Coefficient estimates of dry shock and its interaction with NREGS are both at 1 percent level.

Table 2: The Impact of Wet Shock and Dry Shock (and Interaction with NREGS) on Rural Labour Engagement in India (2004 - 2011).

	Dependent Variable: Ratio of Days Worked Per Week	
Variables	(1)	(2)
Wet shock	-0.0165	-0.0058
	(0.0104)	(0.0099)
NREGS * Wet shock	0.0280	0.0238
	(0.0185)	(0.0147)
Dry shock	-0.0365***	-0.0420***
	(0.0108)	(0.0100)
NREGS * Dry shock	0.0582***	0.0604***
	(0.0181)	(0.0165)
Constant	6.9994***	6.9332***
	(0.0070)	(0.0347)
District Fixed Effect	YES	YES
Year Fixed Effect	YES	YES
Controls	NO	YES
Observations	946,574	946,574
R-squared	0.0650	0.2068

Notes: Table 2 above presents estimates of wet shock and dry shock along with estimates of their corresponding interactive terms with National Rural Employment Guarantee Scheme (NREGS) dummy. Results reported capture rural communities in 568 Indian districts. Controls used in Column 2 include gender, age, marital status and education categories for individual respondents while household controls include household head gender, household size, number of children below age 5, number of adults in paid wage employment, caste group and expenditure of the household in the previous twelve months. Labour force fraction of the district sample is included as an additional district level control. All regressions are clustered at the district level.

* indicates significant at 10%

** indicates significant at 5%

*** indicates significant at 1%

Table 3 presents the estimates for the labour engagement variable by gender. Column 2 for Panel A for male observations indicate that positive rainfall shock and its interaction do not have any meaningful effect on male's labour market engagements in rural India. On the other way round, the negative rainfall shock and interaction term shows estimates significant at 1 percent for both. This indicates that there is an important role for negative rainfall shock on male's labour dynamics with an attendant intervention of NREGS to cushion such shocks.

The negative rainfall shock estimate indicates that a one-standard deviation negative rainfall shock decreases the ratio of labour market engagement of a male in the village by 5.0 percentage points while its interaction term matches the deleterious effect of negative rainfall shock by an increase in labour market engagement of 6.0 percentage points for males. However, for estimates presented in Table 3 Panel B (for female observations), results show that that a one-standard deviation positive rainfall shock decreases the ratio of labour market engagement of an average female in the village by 0.3 percentage points (not significant at traditional level). The interaction term between positive rainfall shock and NREGS reports an estimate of 0.03 which indicates a 3.0 percentage points increase in labour market engagement of females for early exposure communities. For the negative rainfall shock counterpart, the negative rainfall shock estimate indicates that a one-standard deviation negative rainfall shock decreases the ratio of labour market engagement of females in the village by 4.0 percentage points. This estimate is counteracted by an interaction term estimate of 7.0 percentage points. Both estimates are significant at 1 percent level.

Table 3: The Impact of Wet Shock and Dry Shock (and Interaction with NREGS) on Rural Labour Engagement in India by Gender (2004 - 2011).

	Dependent Variable: Ratio of Days Worked Per Week			
	Panel A: Males		Panel B: Females	
Variables	(1)	(2)	(1)	(2)
Wet shock	-0.0168	-0.0082	-0.0168*	-0.0029
	(0.0130)	(0.0131)	(0.0093)	(0.0085)
NREGS * Wet shock	0.0186	0.0179	0.0381**	0.0295**
	(0.0215)	(0.0184)	(0.0173)	(0.0134)
Dry shock	-0.0439***	-0.0492***	-0.0290**	-0.0359***
	(0.0134)	(0.0124)	(0.0115)	(0.0110)
NREGS * Dry shock	0.0505**	0.0553***	0.0664***	0.0660***
	(0.0204)	(0.0191)	(0.0199)	(0.0181)
Constant	7.0054***	6.9177***	6.9932***	6.9014***
	(0.0080)	(0.0417)	(0.0071)	(0.0418)
District Fixed Effect	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES
Controls	NO	YES	NO	YES
Observations	482,827	482,827	463,747	463,747
R-squared	0.0681	0.2133	0.0633	0.2084

Notes: Table 3 above presents estimates of wet shock and dry shock along with estimates of their corresponding interactive terms with National Rural Employment Guarantee Scheme (NREGS) dummy for male and female respondents respectively. Results reported capture rural communities in 568 Indian districts. See Table 2 for a list of controls. All regressions are clustered at the district level.

* indicates significant at 10%

** indicates significant at 5%

*** indicates significant at 1%

The results for overall labour engagement in Table 2 above re-establishes the interventionist role of NREGS in generating more informal labour opportunities during shocks that threaten livelihood in the rural areas. This is also the case for both male and female labour market opportunities in NREGS villages. However, it is important to note an oversaturated

labour market dynamics for rural dwellers living in the NREGS communities in periods of positive shocks. While this pattern is not particularly revealed for all observations and male observations, it appears for the female counterparts (Table 3 Panel B). The favourable economic trajectory provided by positive rainfall shocks provides more room for expansion when combined with NREGS projects within a village. Hence, the usual informal employees may be overwhelmed by the new opportunities creating a unique platform for females to engage in non-agricultural labour activities within the informal sector.

6.2 Child Schooling and Labour

Following our findings with the overall labour market outcome during shocks and the differential role of NREGS in the disaggregated shock specification, we now investigate human capital dimension of the impact of wet shock and dry shock and the role of NREGS. Table 4 presents shocks and interaction terms estimates for schooling engagements of children between the age of 5 and 18 years. The focus on this age range is informed by possible labour supply substitution effects that diverse shocks may prompt in rural communities where children are susceptible to child labour.

Table 4 Column 2 reports significant estimates for wet shock and its interaction with the NREGS indicator. These estimates are respectively 0.07 and -0.13 (significant at 5 and 1 percent levels). Interpreting the estimates implies that a one-standard deviation positive shock increases average school engagements of children by 7 percentage points while there is 13 percentage points decrease for children resident in early exposed villages. This means that positive shocks enable children in non-NREGS villages to increase their schooling engagements by 7 percentage points while this effect is reversed for NREGS villages. Combining the positive shock effect and its interaction term yields an overall negative impact for early exposed villages with a decrease of schooling participation of approximately 6 percentage points - The increase of 7 percentage points is counteracted by the negative 13 percentage points of the interaction term. While it is expected to have human capital accumulation for villages with prosperous economic outlook, the deleterious impacts for villages exposed to NREGS is unanticipated and indeed contradicts the overall objective of the policy. Estimates of dry shock and its interaction term are smaller and insignificant at traditional levels. This indicates that dry shock have no apparent effect on children's schooling engagements neither does NREGS play any important role on children's schooling engagements during periods of dry shocks.

Table 4: The Impact of Wet Shock and Dry Shock and Interaction with NREGS on Children's School Engagements in Rural India (2004 - 2011).

	Dependent Variable: Ratio of Days in School Per Week	
Variables	(1)	(2)
Wet shock	0.0856**	0.0708**
	(0.0366)	(0.0339)
NREGS * Wet shock	-0.1711***	-0.1261***
	(0.0476)	(0.0477)
Dry shock	0.0423	0.0444
	(0.0446)	(0.0381)
NREGS * Dry shock	-0.1161*	-0.0793
	(0.0626)	(0.0573)
Constant	5.2128***	2.7251***
	(0.0236)	(0.2023)
District Fixed Effect	YES	YES
Year Fixed Effect	YES	YES
Controls	NO	YES
Observations	316,138	316,138
R-squared	0.0511	0.2731

Notes: Table 4 above presents estimates of wet shock and dry shock along with estimates of their corresponding interactive terms with National Rural Employment Guarantee Scheme (NREGS) dummy for children aged 5 – 18 years. Results reported capture rural communities in 568 Indian districts. See Table 2 for a list of controls. All regressions are clustered at the district level.

* indicates significant at 10%

** indicates significant at 5%

*** indicates significant at 1%

Table 5 presents estimates of the schooling engagements of children by age categories. As expected wet shock and interactive term estimates for children between 5 and 9 years of age are inconsequential and insignificant at conventional levels. On the other way round, the estimates for the 10 – 14 years category have magnitudes comparable to those unveiled for the overall children regression in Table 4 Column 2 but the interaction term is not significant at traditional levels. However, the most important finding from this disintegration estimation is the heterogeneous results as showcased from column 3 where wet shock and interaction term estimates are larger compared to baseline schooling estimates and significant at 1 percent level. Interpretation of estimates in column 2 for children between 10 – 14 years of age reflect exactly the same pattern in the overall school engagement outcome. Interpreting the estimates for the eldest category of children indicate that a one-standard deviation positive shock increases average school engagements of 15 – 18 years children in our sample by 18 percentage points while there is a decrease of 20 percentage points for this category of children who are resident in early exposed villages.

Table 5: The Impact of Wet Shock and Dry Shock (and Interaction with NREGS) on Children's School Engagements in Rural India by Age Group (2004 - 2011).

	Dependent Variable: Ratio of Days in School Per Week		
	Panel A: 0 – 9 years	Panel B: 10 – 14 years	Panel C:15 – 18 years
Variables	(1)	(2)	(3)
Wet shock	-0.0115	0.0578*	0.1839***
	(0.0475)	(0.0351)	(0.0508)
NREGS * Wet shock	-0.0807	-0.0866	-0.1977***
	(0.0692)	(0.0530)	(0.0663)
Dry shock	0.0490	0.0239	0.1295**
	(0.0485)	(0.0413)	(0.0644)
NREGS * Dry shock	-0.1146	-0.1264**	-0.0305
	(0.0803)	(0.0607)	(0.0991)
Constant	-2.1066***	5.7784***	8.3070***
	(0.2853)	(0.2091)	(0.3418)
District Fixed Effect	YES	YES	YES
Year Fixed Effect	YES	YES	YES
Controls	YES	YES	YES
Observations	112,703	115,784	87,651
R-squared	0.2719	0.2314	0.4102

Notes: Table 5 above presents estimates of wet shock and dry shock along with estimates of their corresponding interactive terms with National Rural Employment Guarantee Scheme (NREGS) dummy for children by their age groups respectively highlighted in Columns 1 – 3 above. Results reported capture rural communities in 568 Indian districts. See Table 2 for a list of controls. All regressions are clustered at the district level.
* indicates significant at 10%
** indicates significant at 5%
*** indicates significant at 1%

The heterogeneous pattern in the impact of wet shocks and the resultant role of NREGS is intuitive given the background that the eldest category of children are prone to partake in labour market activities in exchange for money where there is reportedly a shortage of labour supply due to abounding opportunities. While similar estimates may be plausible for the category of children between 10 – 14 years of age due to their capacity to engage in wage work, it is unexpected for those in youngest category – 5 to 9 years of age. However, the heterogeneous effect of shocks and interactive terms with NREGS by gender of children which is reported on Table A1 does not reveal any significant heterogeneous pattern. Indeed, the wet shock and its interaction term estimates are very closely related to estimates revealed in the overall regression reported on Table 4 above.

Table 6 presents estimates of diverse shocks and their corresponding interaction terms with NREGS for child labour engagements in the past 7 days. Column 1 of Table 6 shows that wet shock in the previous agricultural season causes children to reduce their engagement in labour market activities while the presence of NREGS program will counteract this effect. The estimates are significant at 1 percent level. Estimates for dry shock and corresponding

interaction term are similar in magnitude but insignificant at traditional levels. Whilst we lose precision for the interaction term of wet shock when controls are introduced into our estimation in column 2, it does not necessarily overrule the pattern revealed in column 1. The findings from Table 6, as expected, corroborates the schooling engagement patterns of children especially as it relates to the implementation of NREGS policy during positive shocks. Rather than founding our schooling engagement outcomes on general labour markets alone, results from Table 6 reveal a unique child labour market behaviour associated with wet shocks in a way that is consistent, on one hand, with general labour market and, on the other hand with children schooling engagements.

Table 6: The Impact of Wet Shock and Dry Shock (and Interaction with NREGS) on Children's Labour Market Engagements in Rural India (2004 - 2011).

	Dependent Variable: Ratio of Days in Child Labour Per Week	
Variables	(1)	(2)
Wet shock	-0.0746***	-0.0607***
	(0.0225)	(0.0206)
NREGS * Wet shock	0.0776***	0.0411
	(0.0275)	(0.0262)
Dry shock	-0.0558	-0.0586*
	(0.0343)	(0.0311)
NREGS * Dry shock	0.0695	0.0429
	(0.0446)	(0.0420)
Constant	1.0189***	-0.2422**
	(0.0146)	(0.1117)
District Fixed Effect	YES	YES
Year Fixed Effect	YES	YES
Controls	NO	YES
Observations	316,138	316,138
R-squared	0.0279	0.3606

Notes: Table 6 above presents estimates of wet shock and dry shock along with estimates of their corresponding interactive terms with National Rural Employment Guarantee Scheme (NREGS) dummy for children aged 5 – 18 years. Results reported capture rural communities in 568 Indian districts. See Table 2 for a list of controls. All regressions are clustered at the district level.
* indicates significant at 10%
** indicates significant at 5%
*** indicates significant at 1%

7. Discussion

Our major finding in relation to child labour and schooling outcomes in rural India is that public works policies play some crucial roles in agricultural dependent communities. However, NREGS reveals asymmetry pattern in the intermediation of public works policies for the components of rainfall shock in rural India. These results are logical with an explanation that each of wet shock and dry shock expose rural communities to different dynamic economic forces respectively. Wet shocks depict a substantially thriving agricultural sector where informal labour would be gainfully employed aftermath of the harvesting season. Informal

employment opportunities in agricultural dependent areas usually focus on men within the labour force age bracket. Women who are not engaged in non-agricultural activities and children are the usual categories of individuals to cover for the shortage of labour supply in periods of labour shortage in informal markets of the developing economies. Engagement of school-age children in the labour market may distort school enrolments and performance of children due to distractions encountered from undue labour opportunities for the children. While this setting reflects the common features in rural areas of most developing countries, the resultant role of public works during shock periods cannot be generalised[10]. To perform a placebo test, we assigned relevant communities to NREGS program before commencement of the workfare policy using 1999 – 2000 wave of the NSS data and rainfall from UDEL. Estimates from the regression show that our main results (See Table A2) are not replicated for the placebo implementation of staggered NREGS implementation contrary to the actual implementation of this program. This result reinforces the fact that our results on Tables 2 – 6 are not coincidence. Table A3 also shows that most of the background characteristics are not different across the early and late NREGS districts.

Although maternal labour supply have yielded positive outcomes for children's human capital tendencies, the literature on the impact of NREGS on child labour and schooling outcomes have revealed mixed findings depending on the type of data and identification method adopted. The positive impact of adult labour opportunities is indeed consistent with the underlying initiatives of public works policies (Afridi *et al.* 2012) and for other labour market variations in favour of women (Marchand *et al.* 2013). Furthermore, the literature on the impact of public works programs on children schooling and labour outcomes reveal contrasting findings using India and Argentina as case studies (Islam and Sivasankaran 2014; Juras 2014). In another context, Shah and Steinberg (2015) reveal that each year of exposure to NREGS decreases school enrolment by 2 percentage points and math scores by 2% of a standard deviation amongst children aged 13-16. The pathway established for this negative impact of NREGS on child labour is the attendant increase in the opportunity cost of schooling which subsequently lowers human capital investment for additional years of exposure to NREGS.

Our findings extends the above literature by integrating female and child labour engagements alongside children school engagements within a disaggregated shock model. While each of the above outcomes have been investigated in the diverse contexts in the literature, our contribution exploits on simultaneously investigating labour and human capital accumulation outcomes in India[11]. We focus on the responsive role of NREGS for each of the disaggregated shock on diverse outcomes as against directly investigating the impact of NREGS on these variables. Interestingly, we find that while NREGS helps smoothing labour in dry shocks, excessive informal labour engagement appears to be the major consequence of successful agricultural season. While on one part, we find that this helps to integrate women in the wage labour subsector of the informal sector as against unpaid agricultural and domestic labour, we equally find that this hurts schooling engagements of children within the communities. These findings are consistent with similar literature which used phase roll-out of NREGS in India to investigate children human capital outcomes (Islam and Sivasankaran 2014; Shah and Steinberg 2015). Furthermore, our setting provides a unique framework for

considering the efficacy of NREGS in combating poverty dynamics in rural economies without compromising human capital accumulation of children.

8. Conclusion

Public works policies are established in the developing countries to help curb poverty propensities of vulnerable households. These policies most times also play an insurance role to cushion shocks from rural economic activities. Given that the implementation of the public works program is effected through the provision of alternative labour market opportunities for rural households whose livelihood depends on rainfed agricultural practices, not incorporating community-specific shock dynamics of rural communities may lead to unintended welfare consequences of workfare policy per time. This paper incorporates two important shock components of rainfall pattern into the implementation of NREGS in rural India to investigate resultant labour market outcomes and children outcomes respectively. We use the phase roll-out of NREGS in Indian villages in addition to exogenous variation in rainfall shocks across Indian districts in a DID framework to identify the impact of NREGS on wet shock and dry shock respectively. This approach differentiates our study from existing literature on the impact of public works policies in general. Our main focus is basically on the impact of each of the shocks on labour market and children schooling outcomes while NREGS is incorporated to visualise the resulting intervention role or otherwise of the policy.

Our results show that NREGS helps mitigate the deleterious impact of negative rainfall shocks in rural Indian districts. In this regard, our baseline estimates indicate that while one standard deviation negative rainfall shock decreases the labour market engagements by 4 percentage points for communities not exposed to NREGS, this effect is counteracted by an estimate of 6 percentage points for communities exposed to NREGS. On the other hand, there is no prevalent effect of wet shock and its interaction term on labour market engagements of individuals. Further results show that the expansion in informal labour engagements during wet shocks is particularly driven by integration of females and children. While these findings are not in themselves deleterious, what becomes worrisome is the pervasive impact they have on schooling engagements of children especially between the age groups of 10 – 18 years.

This paper contributes to the literature on the suitability of public work policies in sustaining welfare indicators for rural households. In a different perspective, climate change is commonly viewed as a change in the weather parameter in either direction - increase or decrease. The asymmetric pattern revealed in our findings is an important pointer to approaches required to resolve welfare distortion resulting from climate change.

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[1] Some of the literature aimed at investigating the impact of previous versions of rural employment guarantee schemes in Indian states include Gaiha (1997); which investigates the role of rural public works program on long-term wage formation in the agricultural sector of Maharashtra, Gaiha and Imai (2002); which investigates the poverty implication of Maharashtra's employment guarantee scheme, and Jha *et al.* (2011); which compares the relative effectiveness of public works and food for work programmes on household welfare in Maharashtra.

[2] It is perceived that its staged rollout across districts and final nationwide coverage of NREGS makes it uniquely attractive for welfare investigations.

[3] The NREGS offers 100 days of guaranteed work to adults from rural households with the intention to help households to smooth consumption during lean agricultural seasons.

[4] The MGNREGA reserves one-third of the public works opportunities for rural women. This is the first ever move aimed at ensuring gender equity in a public works program in India.

[5] The literature recommends at least 30 years weather variation to capture potential deviation and recovery of weather parameters.

[6] While district-referenced categorical rainfall shock measures adopted in Jayachandran (2006), Adhvaryu *et al.* (2013), Kaur (2014) and Chaurey (2015) are plausible shock measures, deviation from the historical average fits the current analytical framework more accurately. The linear rainfall shock is constructed using the following equation: $\text{Rainshock}_{\text{dt}-1} = ln\,\text{Rainfall}_{\text{dt}-1} - ln\,\overline{\text{Rainfall}_{\text{d}}}$ (1)

[7] Wet shock is measured as actual value if there is positive rainfall deviation from the historical norm and 0 otherwise. Dry shock is measured as absolute value of deviation if negative deviation exists between rainfall deviation from the historical norm and 0 otherwise.

[8] While it is common knowledge that extreme weather conditions in drought and flood respectively malign agricultural yields, our categorised rainfall shock definitions follow from the basic logic that higher (lower) rainfall is associated with higher (lower) crop yields as is clearly elucidated in Chaurey (2015) and Kaur (2014) for India.

[9] We construct the indicator NREGS variable to focus on response in outcomes by early versus late NREGS communities where early adopters are the initial 200 communities where the NREGS is first implemented in 2005. Communities that fall within first implementation coverage are classified as 1 while others are classified as 0 for the NREGS indicator.

[10] There is a need to consider the underlying elements of the implementation of particular public work program and the role of institution for suitability and survival of a public work program for each setting for an effective welfare delivery.

[11] One major advantage of using the approach that considers a variety of outcomes in our paper is that it paints a comprehensive welfare picture that complements one another. This approach is required to make holistic conclusion of welfare role of NREGS after shocks.

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Appendix

Table A1: The Impact of Wet Shock and Dry Shock (and Interaction with NREGS) on Children's School Engagements in Rural India by Gender (2004 - 2011).

	Dependent Variable: Ratio of Days in School Per Week	
	Boys	Girls
Variables	(1)	(2)
Wet shock	0.0551	0.0870**
	(0.0382)	(0.0379)
NREGS * Wet shock	-0.1179**	-0.1357**
	(0.0503)	(0.0564)
Dry shock	0.0240	0.0647
	(0.0433)	(0.0473)
NREGS * Dry shock	-0.0446	-0.1188*
	(0.0623)	(0.0675)
Constant	3.2868***	2.2828***
	(0.2184)	(0.2374)
District Fixed Effect	YES	YES
Year Fixed Effect	YES	YES
Controls	YES	YES
Observations	169,233	146,905
R-squared	0.2387	0.3088

Notes: Table A1 above presents estimates of wet shock and dry shock along with estimates of their corresponding interactive terms with National Rural Employment Guarantee Scheme (NREGS) dummy for children by gender. Results reported capture rural communities in 568 Indian districts. See Table 2 for a list of controls. All regressions are clustered at the district level.

* indicates significant at 10%

** indicates significant at 5%

*** indicates significant at 1%

Table A2: Placebo Test for the Impact of Rainfall Shocks and NREGS on Adult Labour, Children's Schooling and Labour Outcomes in Rural India (1999 - 2000).

	Dependent variables:		
	Labour	School	Child-labour
VARIABLES	(1)	(2)	(3)
Wet shock	0.0001	-0.1454	-0.0507
	(0.0008)	(0.1370)	(0.0858)
NREGS * Wet shock	0.0006	0.2721*	0.0452
	(0.0010)	(0.1499)	(0.0861)
Dry shock	0.0001	-0.0632	-0.0361
	(0.0005)	(0.1026)	(0.0734)
NREGS * Dry shock	0.0010**	-0.0800	-0.0249
	(0.0005)	(0.1535)	(0.0796)
Constant	6.9999***	7.7120***	-2.7653***
	(0.0010)	(0.1683)	(0.0774)
Controls	YES	YES	YES
Observations	143,903	51,982	51,982
R-squared	0.0006	0.1720	0.3545

Notes: Table A2 above presents Ordinary Least Square (OLS) estimates of wet shock and dry shock along with estimates of their corresponding interactive terms with National Rural Employment Guarantee Scheme (NREGS) dummy on general labour market, schooling and child labour outcomes respectively. This table focus on a placebo test which allocates Indian districts to NREGS policy before commencement of the implementation. Results reported capture rural communities in 226 Indian districts. Each column report result with the full set of controls. See Table 2 for a list of controls. All regressions are clustered at the district level.
* indicates significant at 10%
** indicates significant at 5%
*** indicates significant at 1%

Assignment of Indian Districts to NREGS

While rainfall shock is exogenous, concerns regarding non-random assignment of NREGS may affect the causal interpretation of our estimates. The background section presents that NREGS phase roll-out takes poverty level of the rural communities into consideration in the initial implementation of the program. This implementation strategy may lead to a bias in the treatment effect. More elaborately, the approach essentially violates random assignment in a manner that may lead to our treatment effect being driven by other factors other than the availability of job opportunities relative to other rural communities in the country. To investigate if the sample divisions between early and late implementation communities represent some form of quasi-random sampling framework, we compare the baseline characteristics of the concerned communities at the individual, household and community levels respectively. These include demographic characteristics and wealth indices of early and late NREGS communities. Results on Table A3 reports differential test statistics of aforementioned attributes by time of implementation to see if these samples are comparable in any way. As revealed in Table A3 Column 5, there is no significant difference in the baseline characteristics of the early exposed communities to late exposed communities. This indicates

that while treatment may not have been randomly assigned across Indian districts, they systematically have similar features and can be explored in terms of this quasi-random quality with respect to assignment to either early or late NREGS community.

Table A3: Individual, Household and District Level Characteristics (2004 – 2010)

	Early Treatment		Late Treatment		Norm-Difference
Variable	Mean	SD	Mean	SD	
Sex	0.5106	0.4999	0.5093	0.4999	0.0019
Age	28.3287	18.5100	29.4908	18.9671	-0.0439
Household size	5.9798	2.8885	6.0456	2.8894	-0.0161
Caste	0.7611	0.4264	0.6921	0.4616	0.1097
Consumption expenditure ('000 Rupees)	0.3900	0.2883	0.4874	0.3797	-0.2045
No of children	0.7543	1.0317	0.7011	1.0136	0.0367
No of adults in wage labour	0.5549	0.9213	0.6299	0.9628	-0.0564
Value of land (ln)	5.3946	2.3311	5.3463	2.3987	0.0144
District Labour force ratio	0.5725	0.0573	0.5833	0.0540	-0.1377
Adults					
Married	0.8568	0.3503	0.8419	0.3649	0.0132
No formal education	0.5454	0.4979	0.4655	0.4988	0.1133
Primary	0.2458	0.4306	0.2769	0.4475	-0.0501
Lower Secondary	0.0971	0.2960	0.1177	0.3222	-0.0471
Higher Secondary	0.0689	0.2532	0.0877	0.2828	-0.0495
College&above	0.0428	0.2025	0.0522	0.2224	-0.0310

Notes: Information on household land asset worth is only available in the 2004-2005 and 2010-2011 waves respectively. The p-value is reported from a test on the equality of the mean between the treatment and control groups (independent samples). As the sample size is sufficiently large the results for using a classical t-test deliver very similar results. Since the group size between the groups differ, approximate t using individual sample variances instead of the pooled variance and Welch's approximation of the degrees of freedom have been used. The normalized difference is computed as $\text{norm-difference} = \frac{X_1 - X_2}{\sqrt{S_1^2 + S_2^2}}$.