The University of Manchester

Economics
Discussion Paper Series
EDP-1412

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June 2014

Economics
School of Social Sciences
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Manchester M13 9PL

Workfare as "Collateral": The Case of the National Rural Employment Guarantee Scheme (NREGS) in India

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This Version: 22nd June 2014

Abstract

This paper argues that a major beneficial impact of workfare programmes is through their role in allowing participants to improve their access to "credit". Sustained programme participation over many years serves as "collateral" for households' acquisition of informal credit, leading to the improvement in economic security and poverty reduction. A conceptual framework using an infinitely repeated trilateral stage game among lenders, workfare participants, and local politicians is developed. This is used to underscore how participation in NREGS matters for securing informal credit from the local shop owners or moneylenders to tackle temporal adverse income spells and smooth out consumption shocks. Using a household panel dataset based on our primary surveys in West Bengal in 2009, 2010 and 2012, we produce robust evidence that continuous program participation significantly facilitates informal credit acquisition, increases income and consumption, and reduces consumption variability.

Key Words: NREGS, panel data, impact, consumption, income, credit, West Bengal, India
JEL Classification: I38, O12

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Acknowledgements
Authors acknowledge research grants from Institute of Social Studies (ISS), The Hague, Brooks World Poverty Institute and School of Social Sciences, University of Manchester for conducting three rounds of panel survey. They gratefully acknowledge comments and suggestions on earlier drafts from Dilip Mookherjee, Debraj Ray, Arjun S. Bedi, Abhiroop Mukhopadhyay, Armando Barientos, Kunal Sen, Matias Cortes, Raghav Gaiha, Juan Villa Lora and conference/seminar participants at the Indian Statistical Institute (Kolkata), University of Oxford, University College of London, University of Aberystwyth, University of Manchester.

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1. Introduction

The Safety Net Programme (or social assistance through Public Works Programme or Welfare through Workfare) has been in the discourse of governance in India for centuries. Jean Dreze and Amartya Sen in their influential book "Hunger and Public Action" cited 'Arthashastra' (written by Chanakya in the 4th century B.C.), which mentions welfare measures in the form of public works that a ruler needs to opt for in times of calamity. Such a workfare approach was already in operation in colonial India for famine relief. After independence there have been numerous endeavours put forward by the Indian government, as well as by a few of its provincial governments, to ensure livelihood security and protect vulnerable masses against famines and adverse consumption shocks. Among many attempts in the post-independence period, the longest enduring programme in India was the Maharashtra Employment Guarantee Scheme, which started in 1979 in Maharashtra and remained in operation for around 25 years. But the most ambitious program in the history of India's state-sponsored anti-poverty initiatives is the National Rural Employment Guarantee Scheme (NREGS), which is also named after Mahatma Gandhi- as MG-NREGS. Given India's dual problem of poverty and unemployment[1], its main objective is to enhance livelihood security by providing at least 100 days of guaranteed employment to every rural household that demands unskilled manual work to tackle poverty.

Beyond this immediate goal, the long-term aim is to address chronic poverty by creating durable infrastructures and empowering the poor by making employment a right. While the idea of using workfare to tackle poverty is not new, the NREGS is unique on several counts.

[1] The all-India head count poverty rate, based on US$1.25 a day, is 29.8% in 2009-10 (with a rural poverty rate of 33.8%, based on NSS 66th round). As per the census of 2011, India has more than 60% non-working population and, within the working population, most of them working in agriculture which contributes GDP in less than 15%.

First, its scale is unprecedented. According to Ambasta et al. (2008, p.41), it is the "largest ever public employment programme visualised in human history" and, in terms of household coverage, it is indeed the largest social protection intervention by any country.[2] Second, it embodies a rights-based approach, which has occupied an important place in international development discourse in the last decade (Cornwall and Nyamu-Musembi, 2004). Third, the issues of accountability are well incorporated into the programme design and the scheme calls for community-led social audits (Burra, 2008). For instance, *Gram Panchayats (GP)*, which constitute the lowest tier of rural governance, are entrusted with the implementation of the programme, and the funds are made available directly to them. The programme also makes unprecedented use of information technology.[3]

Our main purpose is to test whether working in NREGS programme has any effect on household's economic outcomes, such as informal credit access, income, food and non-food consumption expenditure, and consumption fluctuations, using the three rounds (2009, 2010 and 2012) of household level longitudinal data based on our primary surveys in one of the Indian states, West Bengal. This builds upon the empirical literature on the impact evaluations of employment guarantee schemes or rural public works in low-income countries (e.g. Devereux and Solomon, 2006; Subbarao, 1997, 2003) and the small but growing literature on impact evaluations of NREGS at household levels (e.g. Ravi and Englar 2009, 2013; Jha et. al 2011, 2012; Deininger and Liu, 2013).[4] Before introducing our

[2] Annual outlay of NREGS has expanded from 0.31% of GDP ($ 2.5 billion), covering 21 million households in 2006-7, to 1.29% of GDP ($8.91 billion), covering 54.95 million households in 2011-12, and has then reduced to 0.70% of GDP ($6.25 billion), covering 47.48 million households in 2013-14 (www.nrega.nic.in, section NREGA Statistics National Overview, see Online Appendix 1).

[3] See more detailed discussions about salient features as well as inherent problems of NREGS for Ambasta et al. (2008), Dey and Bedi (2010), and Shankar and Gaiha (2013).

[4] Ravi and Englar (2009, 2013) used the household panel in Andhra Pradesh found that NREGS participation significantly increases food and non-food expenditure as well as savings. Using the household panel in 2004-8 from Andhra Pradesh, Deininger and Liu (2013) found significant impact of NREGA participation on consumption expenditure, protein intake and calorie consumption. Jha et al. (2011) used the cross section data in 2007-8 in Rajasthan, Andhra Pradesh and Maharashtra and found a significant positive effect of NREGS on nutrient intakes.

econometric findings related to impact analysis of NREGS participation, we present a conceptual framework using the infinitely repeated trilateral game among lenders, scheme participants, and local politicians, to underscore how participation in NREGS matters for securing informal credit from the local shop owners or moneylenders, primarily to tackle temporal adverse income spell and smooth out consumption shock. In the empirical part, specific attention has been paid to the issue of self-selection bias and endogeneity associated with participation in a self-selected employment guarantee programme. By applying versions of Fixed-Effects model (with/without IV or PSM) to take account of the endogeneity issue, we have shown that cumulative days of participation in NREGS significantly increase credit, consumption expenditure (food expenditure in particular) and income, as well as reduce consumption variability, which is consistent with our conceptual framework. Our study has thus made a unique contribution to the empirical literature of impact evaluations of NREGS by using the household panel data which are rarely available in the Indian context.

The rest of the paper is organised as follows. Section 2 provides a conceptual framework to motivate the empirical section. Using an infinitely repeated trilateral game among lenders, scheme participants, and local politicians, we show how NREGS participation can enhance the creditworthiness of the programme participants. In Section 3 we discuss the design of the survey and data. Section 4 emphasises the empirical/estimation methodologies and underlying intuition of our reduced form econometric model. Results and findings are summarised in Section 5. Section 6 offers the concluding observation.

2. A Conceptual Framework

In a rural agrarian economy of a developing country, a poor household whose main income earners work in the casual labour market tends to face a great degree of uncertainty in the

stream of future earnings due to the temporary/seasonal nature of the work, lack of job securities, and fluctuations in wages in both agricultural and non-agricultural sectors. Then under adverse income shocks, household's possibility of no collateral borrowings against future earnings is restricted. Therefore, the poor households cannot signal themselves as credible borrowers who could eventually repay the loan. Under this situation the "informal" lenders, such as money lenders or grocery shop owners, will not provide loans to poor households even for consumption smoothing unless they are convinced about the borrowers' future income streams,[5] although the basic behavioural information regarding household (e.g. place of work, any history of participation in public works or of political activity) are well known to the money lenders or grocery shop owners in a small village setting. The potential borrower thus needs to send a signal to the informal credit market to prove that he is a credible borrower to secure the informal credit. The sustained participation in NREGS over the past years, as if a proxy for collateral, will serve as a signal for the potential borrower to relax this constraint in the informal credit market. Also, politicians are in charge of assigning NREGS works, but they need the political support from the potential participants in their constituencies to get re-elected in the next election.[6] To feature these aspects more clearly, we develop a game theoretic model in which, through strategic interactions among players (viz. '*Participant', 'Lender', and 'Politician'*), they can mutually solve the problem of credit constraints with NREGS participation served as

[5] This typical scenario can also be discussed in light of the wider literature on credit market and imperfect information in the context of the developing countries (e.g. Hoff & Stiglitz 1990). The set-up is also similar to Scandizzo et al. (2009a) who, in a dynamic optimization framework, focused on the option value of employment in EGS with relatively stable wages when the agricultural wages are highly volatile.

[6] Consistent with our conceptual framework, we have found the statistically significant correlation between the political support (proxied by the variable called "Political", whether household members took part in the last political campaign) and the NREGS participation days in our data (see Table 1 in the next section).

"collateral", so that the poor household (i.e. the NREGS participant) can obtain the informal credit for consumption purposes and can smooth out consumption shocks.

Our model consists of three players, namely *Participant* (i.e. the NREGS participant), *Politician* (i.e. the local government peoples' representative) and *Lender* (i.e. the person who could provide small financial credit to confront consumption shocks; here this lender could be the local grocery owner or non-poor relative or friend or neighbour).[7] We will set the following assumptions to characterise the strategic interactions of these players. These are motivated by our field observations.

Assumption 1: Participant has no collateral. *Participant* has aspiration to obtain a part of free public goods from Panchayat by explicitly lobbying (or supporting) with *Politician*.

Assumption 2: *Politician* values the support of *Participant* and wants to get re-elected or wants to see his party to get re-elected in the following election. Accordingly, he wants to distribute the free public goods (including NREGS work) earmarked for his ward preferentially, to maximise the chances of getting re-elected.

Assumption 3: *Lender* (grocery owner) has an incentive to sell his grocery items on credit because, in that case, he can charge an extra price margin for credited transaction, resulting in a higher price of the items, compared to the price as paid by the buyers in cash.

Assumption 4: *Participant* values an opportunity to make a grocery transaction on credit, even at higher prices, in the lean period or during the spell of unemployment.

[7] The main programme implementing agency (i.e. PIA) for NREGS is called the *Gram Panchayat* (GP) i.e. rural municipality or rural local government in the Indian context. There are normally 10 to 15 wards or village level constituencies within each GP, and one political representative is chosen by electoral vote by the residents of the ward as their representative every 5 years. This politician (i.e. the people's representative after election) is primarily responsible and assigned for distribution of all public goods which are implemented through GP including NREGS work. Our NREGS participant is one of the voters of this ward and can choose his or her representative. One ward (called *Gram Sansad*) is a village which is a habitation of a small number of households, ranging from 200 to 300. The lender in this field setting is typically a local grocery owner who could lend small or petty financial help to NREGS participants to make petty transactions for food and non-food required on a daily basis, i.e. providing such transactions from the grocery on credit.

Assumption 5: Participant also values NREGS jobs as he has sporadic job opportunities in the farm and non-farm sector, with the wages less than the programme wages on average.

Assumption 6: Credit is used mainly for smoothing consumption.

Assumption 7: Assumptions 1 to 6 are common knowledge among the three players in a small village setting.

First, we will present two simple games, namely (i) *Patron-Client game* and (ii) no-collateral *Lender-Borrower game,* to show that *Politician* can facilitate no-collateral lending between *Lender* and *Participant* by conditioning *Participant*'s access to NREGS, contingent on repayment of his loan. In return, *Participant* provides political support for the politician in the form of vote, party donation, attending election campaign or party meeting or rallies, postering or wall writing. We aim to develop this game as an *infinitely-repeated stage game* between *Participant, Lender* and *Politician* and derive the condition under which *access of credited transaction, access of NREGS job* and *access of political support* can be obtained as equilibrium. Each stage game has two components: a *bilateral Patron-Client game* and a *bilateral Lender-Borrower game.* Under the *bilateral Patron-Client game, Politician* chooses whether to give *Participant* access to NREGS work and *Participant* chooses whether to support the *Politician*. Here we assume that *Politician* serves as a patron and *Participant* as a client and hence the game called a bilateral *Patron-Client* game. On the other hand, in the *bilateral Lender-Borrower game, Lender* chooses whether to make no-collateral credit to *Participant* and *Participant* chooses whether to repay the loan or credited amount. We will first show how, under these two bilateral stage games, the adoption of a bilateral grim trigger strategy can lead to an optimal solution separately for *Politician* and *Participant* in Patron-Client game and for *Participants* and *Lender* in Lender-Borrower game. But to get Pareto efficient equilibrium for all three

players, we have to consider a *Trilateral community enforcement game* with a trilateral trigger Strategy.

Structure of the game[8]

We have three actors in our game settings: a *Politician*, a *Participant* and a *Lender*. The *Participant* has his value parameters characterized as: the value of NREGS Job as $V_N \in [0,\infty)$, the value of credit as a borrower as $V_B \in [V_L(1-r),\infty)$, discount factor as $\delta^B \in [0,1)$. We assumed that the poorer the household is, the higher are V_N and V_B. On the other hand, *Politician* is characterized by his value parameter: the value of political support by *Participants* as $V_P \in [0,\infty)$ and discount factor as $\delta^P \in [0,1)$. We assume, the severer the competition in the last election was, the higher the V_P is.

Lender offers uncollaterised small credit in the form of credited transaction with an implicit interest rate, *r*. This credit is only for adjusting temporary income shock and smoothing out consumption for the borrower, who is also a prospective participant of NREGS in this game. Here '*r'* is a price mark-up or extra price margin already included in the price of goods under credited transaction from the local grocery.[9] All the three players have complete information about the parameter of the values $V_N, V_B, V_P, \delta^B, \delta^P, r$, and can observe all the past actions.

[8] Our model draws upon a 'community enforcement' game (Kandori 1992; Takahashi 2010) in which any mutually-beneficial outcome of a stage game can be sustained as a subgame-perfect equilibrium in an infinitely-repeated game between the same set of players. Folk theorem in the repeated game literature (Rubintein 1979; Fudenberg and Maskin 1986) provides a formal model of personal enforcement showing that any mutually beneficial outcome can be sustained as subgame-perfect equilibrium if the same set of players frequently plays the same stage game infinitely. In our setting, the mutually beneficial outcome is for three players simultaneously instead of two players, and it refers to an equilibrium where *access of credited transaction, access of NREGS job* and *access of political support* are taking place at same point of time. The idea is similar to Goldston (2012) and Besley and Coate (1995).

[9] Alternatively, it could represent a psychological cost of borrowing.

As a baseline, the following two separate bilateral games are presented. Game A is played between *Lender* and *Participant* as *Bilateral patron-client game,* where *Lender* decides whether to give uncollaterised loan to *Participant,* and *Participant* decides whether to repay that loan to *lender*. Game B is played between *Politician* and *Participant* as Bilateral lender-borrower game, where *Politician* decides whether to provide NREGS jobs to prospective *Participant,* and *Participant* decides whether to extend explicit support to *Politician* to increase his chance of getting re-elected.

Game A: Bilateral lender-borrower game

Lender chooses whether to give V_L unit of money's worth of credit (or credited goods) to *Participant* with a price mark-up r (or the interest rate). *Participant* then simply consumes V_L money volume of credited goods and accrues a value of $V_L(1-r)$ out of that consumption. *Participant* repays V_L to *lender* during the period with positive temporal income shock (i.e. during the spell of NREGS work). In this game, *Participant* receives credit for the present consumption. For simplicity, we collapse this process of lending and borrowing into a single-stage game, where *Lender* chooses whether or not to lend uncollaterised credit, and where at the same time *Participant* chooses his repayment strategy. The following is the payoff matrix for this *bilateral lender-borrower game*.

Bilateral lender-borrower game: The payoff matrix

		Lender	
		L	NL
Participant	R	$V_L(1-r), (V_L)r$	*0,0*
	NR	$V_L, -V_L$	*0,0*

In the bilateral lending-borrowing stage game, *Lender* chooses either to lend (as 'L') or not to lend ('NL') and *Participant* chooses either to repay ('R'), or not to repay ('NR'). Note that (NL, R) and (NL, NR) have the same outcome, since participant's choice to repay

is only relevant if the lender gives credited good (or credit) in the first choice. This stage game is then repeated infinitely with the participant's discounting between each round at factor δ^B. We assume here that the players will adopt their *grim trigger strategy* profile i.e. *Lender* chooses 'L' if and only if *Participant* has chosen 'R' in all previous rounds, and Participant chooses 'R' if and only if the lender has chosen 'L' in all previous rounds, making (L,R) as cooperation. Now we are imposing individual rationality (IR) constraint for both the players under infinitely repeated game. IR constraint with the grim trigger strategy profile for *Participant* is described as follows: 'the sum of present discounted values of defection must be lower than the sum of the present discounted value of cooperation'. Alternatively, V_L i.e. the sum of the present discounted values of defecting to (L, NR) from cooperation (L,R) in the current round and then receiving the (NL,NR) i.e. '0' in subsequent rounds, must be lower than $\frac{V_L(1-r)}{1-\delta^B}$, the present discounted value of cooperation in the current round and also in all future rounds. *IR* for *Participant* is written as:

$$V_L \leq \frac{V_L(1-r)}{1-\delta^B} \Rightarrow 1 \leq \frac{1-r}{1-\delta^B} \Rightarrow (1-\delta^B) \leq (1-r) \Rightarrow r \leq \delta^B \qquad (1)$$

Since grim trigger strategy profile results in (L,R) and sanctions the maximum possible punishment for deviation, therefore if (L,R) is not a sub-game perfect Nash equilibrium then (L,R) cannot be the result of such an equilibrium. On the other hand, IR for *Lender* is to stick to (L,R), as he could receive a higher pay-off from cooperation (L,R) than he does from defecting outcome to (NL,R). This implies the equation (1) is necessary and sufficient to ensure that (L,R) can occur only under bilateral equilibrium.

Game B: Bilateral patron-client game

In this game, *Politician* is the patron and *Participant* is the client. *Politician* as patron chooses whether to provide NREGS work to potential participant or job seeker who values

NREGS job as $V_N \geq 0$. On the other hand, *Participant* chooses whether to extend political support to the politician who values political support as $V_P \geq 0$. The programme participation incurs opportunity costs for both the *Politician* and *Participant,* which can be set as 1 for both for simplicity. The pay-off matrix for the bilateral patron-client game is as follows.

Bilateral Patron-client game: the pay-off matrix

		Politician	
		P	NP
Participant	S	*(V_N-1), (V_P-1)*	*-1, V_P*
	NS	*V_N, -1*	*0,0*

In this bilateral game *Politician* as patron chooses whether to provide (P) or not provide (NP) NREGS job and *Participant,* as client chooses whether to support (S) or not support (NS) to the politician. As in Game A, this is played infinitely, with discount factors δ^B and δ^P for participant and politician respectively. We assume *grim trigger strategy* is taken by both players. In this game (P,S) is the cooperative solution and we can see that, if (P,S) is not an equilibrium, then (P,S) cannot be a sub-game perfect solution. Like the previous bilateral game, each player will adopt their rational choice considering their opponent's trigger strategy. IR constraint for both players is similar in the sense that the sum of the present discounted value of defection cannot be greater than the sum of the present discounted value of cooperation. Accordingly, we will get the following two conditions to reach (P,S) as equilibrium solution.

IR for Politician: $$V_P \leq \frac{V_P - 1}{1-\delta^P} \Rightarrow (1-\delta^P) \leq \frac{V_P - 1}{V_P} \Rightarrow (1-\delta^P) \leq (1-\frac{1}{V_P}) \Rightarrow \delta^P \geq \frac{1}{V_P} \qquad (2)$$

IR for Participant: $$V_N \leq \frac{V_N - 1}{1-\delta^B} \Rightarrow (1-\delta^B) \leq \frac{V_N - 1}{V_N} \Rightarrow (1-\delta^B) \leq (1-\frac{1}{V_N}) \Rightarrow \delta^B \geq \frac{1}{V_N} \qquad (3)$$

Under (2) and (3), (P,S) is a Pareto efficient outcome.

(1) is the necessary and sufficient condition for (L, R) to be equilibrium solution for Game A, and (2) and (3) are the necessary and sufficient condition for (P,S) to be the equilibrium solution in Game B. Conditions (1), (2) and (3) are the rationality conditions for 3 different players in two separate games. We have so far considered these two bilateral games separately, but for the NREGS participation to ensure provision of credit, we need to have {(L,R),(P,S)} as a single sub-game perfect Nash equilibrium solution with no other Pareto-efficient equilibria. In a proper institutional context, we could assume that *Politician-Participant* cooperation outcome (i.e. having sustained NREGS job against assured political support) could be used as 'collateral' in the lender borrower game and thereby the politician (the PRI member in the village) can act as credible negotiator between *Participant* and *Lender*. We can show that, using the *Trilateral game,* if *Politician* values the participant's support, then, with respective *trilateral trigger strategy* in response to a defection, there is a single Pareto-optimal sub-game perfect Nash equilibrium for all the three players.

Game C: Trilateral Community Enforcement game

In Game C, in each round, all the three actors simultaneously play both bilateral stage games (sub-games A and B) in such a way that they play "the community game" involving three players. Our objective is to find the condition under which (L,R) in Game A and (P,S) in Game B will be achieved simultaneously. This is possible under a trilateral game with *trilateral trigger strategy* profile, resulting in the fully cooperative outcome (L,R,P,S). This trilateral grim trigger strategy assumes that *Lender* chooses 'L' if and only if the participant has chosen 'R' and 'S' in all previous rounds, and if *Politician* has chosen 'P' in all previous rounds. *Participant* chooses 'R' and 'S' if and only if *Lender* has chosen 'L' and politician has chosen 'P' respectively in the previous rounds. Likewise, *Politician* chooses

'P' if and only if lender has chosen 'L' and participant has chosen 'R' and 'S' in all previous rounds. Essentially, this trilateral grim trigger strategy imposes a restriction that trustworthiness is not only important between two players but important at the community level, to reach community level optimal solution. This can be reasonably justified in our settings of the small village community. To use these strategy profiles to reach equilibrium, each player must satisfy his respective IR constraint defined earlier.

The IR for *Lender* is always to choose 'L' over 'NL' to run the game. *Politician* suffers the same consequence from defection in trilateral game as he does in the bilateral patron-client game, so his IR constraint will remain the same as (2) i.e. $\delta^P \geq \frac{1}{V_P}$. But *Participant* will face a new IR constraint as follows, where defection of either game (i.e. defaulting loan and taking out support from *Politician*) causes *Participant* to be penalised or lose the potential benefits of all future cooperative outcomes in both the games. New IR for *Participant* is:

$$V_L + V_N \leq \frac{V_L(1-r)+(V_N-1)}{1-\delta^B} \Rightarrow (1-\delta^B) \leq \frac{V_L + V_N - V_L r - 1}{V_L + V_N}$$

$$\Rightarrow (1-\delta^B) \leq 1 - \frac{(1+V_L r)}{V_L + V_N} \Rightarrow \delta^B \geq \frac{1+V_L r}{V_L + V_N} \qquad (4)$$

(2) and (4) are the conditions for the fully cooperative solution i.e. {(L,R),(P,S)}which is also a sub-game perfect Nash equilibrium of this trilateral game, where participation in NREGS contingent on extending political support ensures no-collateral credit from *Lender*.

The right hand side of (2) i.e. ($\delta^P \geq \frac{1}{V_P}$) can be interpreted as:

$$\frac{1}{V_P} = \frac{(\text{opportunity cost of providing NREGS job by Politician})}{(\text{Politician's value of political support by Participant})}$$

Now we set $0 \leq \delta^P \leq 1$, i.e. δ^P is a fraction. This implies $\frac{1}{V_P} \prec 1 \Rightarrow 1 \prec V_P$.

This implies that the opportunity cost of providing a NREGS job for *Politician* is smaller than *Politician*'s value of political support by *Participant.* This will be more likely to hold, e.g., if *Politician* needs more political support from *Participant,* e.g. in case he won the land last election with only a narrow margin. The right hand side of (4) can be interpreted as:

$$\frac{1+V_L r}{V_L+V_N} = \frac{(\text{Opportunity cost of Political support})+(\text{cost of credit in terms of implicit interest rate})}{(\text{Volume of lending in credit})+(\text{Value of NREGS job})}$$

Now we set $0 \le \delta^P \le 1$, i.e. δ^P is a fraction, this implies $\frac{1+V_L r}{V_L+V_N} \prec 1 \Rightarrow (1+V_L r) \prec (V_L+V_N)$

That is, the aggregate cost for *Participant* (the sum of opportunity cost for political support and the cost of credit, in terms of implicit interest rate) is smaller than the aggregate benefit for *Participant* (the sum of value of lending and the value of the NREGS job). This condition is more likely to hold, for instance, if *Participant* is poor, and thus values the NREGS job or credit more, and his opportunity cost for political support is low, or the implicit interest rate is low.

To conclude, the conditions (2) and (4) are more likely to hold, if, for instance, *Politician* needs more political support from *Participant*, *Participant's* valuation of NREGS job is high, and/or cost of credit is low. Under these conditions, the community's cooperative outcome will result where *Participant* will continuously obtain NREGS jobs from *Politician* and informal credit from *Lender*, while he supports *Politician* over time. This infinitely repeated trilateral game supports our empirical and field findings and explains why continuous participation in NREGS can lift the credit constraint of the poor participating households and could smooth out consumption.

3. Design of Survey and Data

Household panel surveys were carried out by one of the authors during the period from July to November in 2009, 2010 and 2012. The data were collected for sample of 500

households and 2249 individuals, drawn from 49 villages (in the local context it is called *Gram Sansad,* which is a ward of a rural municipality) of 13 rural municipalities (called *Gram Panchayat* or village council in the Indian context, the lowest tier of decentralised democratic governance structure in India) located in Birbhum district of West Bengal, India. Out of 500 households, we could get the same sets of information all across the rounds for 477 households. For 11 households, we obtained information for the first round and the third round only. For 10 households, we got information for the first two rounds only, and for 2 households we got information for only the first round. Thus, we have only 4.6% (i.e. 23 households) attrition rate between the first and the last round. The major focus of this survey was to collect data on the functioning and participation in NREGS by the responding households as well as on households' livelihood, income, expenditure, saving, indebtedness, average monthly volume of regular transactions on credit, livestock, assets (including production and households durable) and other socio-economic variables.

The sampling approach within the district was designed to yield a sample which is representative at the district level. First, Gram Panchayats (GPs) were chosen on the basis of a stratified sampling procedure and thereafter, within each stratum, households were chosen on the basis of random sampling. There was no eligibility restriction for the responding households to be a participant of the NREGS programme, as this programme was a self-selected universal programme where everyone in the village can participate in the scheme. However, as the scheme requires unskilled manual labour, only the poor are supposed to participate in the scheme if the local government sets a work requirement in such a way that only the poor have incentives to participate and the non-poor do not (*screening argument*, Besley and Coate 1992). The poor will have to apply for a job card from the local government to be able to work which will help us to identify the participation status.

Among the respondents we had a good mixture of participants and non-participants in each round.[10]

Given the low attrition rate, we will use a balanced panel in this study. In the pooled data, we have 1475 observations, which comprise of 98.33 % of all the households. The main explanatory variable which we have used is *cumulative days of participation (CD),* the total cumulative days worked since inception. We analyse the effect of *CD* on the following outcome variables: log of monthly per-capita consumption expenditure (*lnmpce*), log of monthly food expenditure (*lnmfe*), log of monthly non-food expenditure (*lnmnfe*), log of gross volume of monthly credited transaction (*lngvc*)[11] and log of monthly per-capita income adjusted after NREGS earnings (*lnmpi_nregs*).[12] [13] In our data set, out of 500 households in the first round, we had 304 households who had participated at least for one day in NREGS work, i.e. 304 were participants and 196 were non-participants. Within the latter, 91 households were involuntary non-participants who applied for NREGS jobs but did not get it and 105 were voluntary non-participants who did not apply for NREGS work. In the second round, out of 487 households, 312 households were participants, with at least

[10] Households can be classified by four categories in terms of whether they hold a Job Card or not, whether they applied for the job, and whether they got the job. That is, there are households without any job card (Category A), those with a job card who did not apply for a job (B), those with a job card who applied for a job but did not get a job (C), and those with a job card who applied for a job and got a job (D). Now, in the context of the NREGS programme, Category D households can be treated as the '*Participants*' and categories A and B are '*Voluntary non-participants'* in the programme, as they intended not to participate in the programme. Category C households are *'Involuntary non-participants'* as they opted for the programme but did not end up receiving the jobs.

[11]This is the sum of the total monetary volume of average monthly transactions (for monthly food and non-food items) which the households made on credit from local grocery or tiny shops. This is different from debt because this captures items purchased on credit and repaid once the household earns income. We collected the gross monthly volume of credited transactions, not the net amount of credit remaining at the end of each month after repaying a portion of that. During our survey we managed to trace this credited transaction data from a credit register (in Local language called BAKIR KHATA), available with most of the households as well as with a duplicate copy with the respective local grocery/shop owners.

[12] The description and definitions of the all other independent variables are presented in Appendix 1.

[13] All the outcome variables we analysed are in real terms (i.e. adjusted with consumer price index) and presented in logarithm form to show the effect in percentage terms.

one day NREGS work, and 175 were non-participants, including 84 involuntary non-participants and 91 voluntary non-participants. In the third round, out of 488 households, 299 were participants and 189 were non-participants (116 involuntary non-participants and 73 voluntary non-participants). Therefore, in the pooled data, we have 915 households as participants who worked for at least one day in NREGS in each round and 560 households were non-participants (291 involuntary non-participants and 269 voluntary non-participants). In our surveyed region we observed a significant number of involuntary non-participants.[14] In impact evaluations, such involuntary non-participants can serve as a control group. In Table 1 we have presented the mean values of our main variables for these three categories of households, viz. '*participant'*, '*involuntary non-participant*', and '*voluntary non-participants*'. [15] The sixth column shows the standard error of t test to see whether difference in mean value of the variables for *'participants'* (P) and '*involuntary non-participants'* (INP) is statistically significant. Table 1 shows that expenditure (both food and non-food) and income of the voluntary non-participants are much higher than those of the NREGS participants and involuntary non-participants. This indicates that those who remained as voluntary non-participants are actually non-poor, and they may not need this kind of fall-back income support programme. On the other hand, the differences of expenditure and income between NREGS participants and involuntary non-participants are not as large as those between participants and voluntary non-participants. The values for involuntary non-participants are slightly higher than those for participants for most of the outcome variables.

[14] *Voluntary* non-participants are those who did not actually opt for or demand this self-targeted NREGS programme, while *involuntary* non-participants opted for or demanded NREGS work but were either denied or not provided NREGS jobs due to insufficient supply of the programme. The latter should not happen, as this is a demand driven programme. However, Dutta et al. (2014) have shown that such denial of NREGS job provision was traced out in Bihar, where jobs were eventually rationed due to insufficient supply.

[15] See Online Appendix 2 for mean values for each round.

[Table 1 to be inserted]

Mean values of main variables are also compared within NREGS participating households between participating household being political (i.e. *Political*=1) and participating household being apolitical (i.e. *Political*=0) in Table 2. '*Political*=1' identifies the households whose member/s took part in the election campaign in favor of at least any one political party which fought in that election, and '*Political*=0' refers to the subset of households (Appendix 1). Consistent with our conceptual framework, *CD* (Cumulative Days of NREGS Participation) or *D* (Current period days of participation) is significantly larger for politically active households than those apparently apolitical (Table 2). However, there is no statistically significant difference for landholding, consumption expenditure, food or non-food expenditure, income (adjusted by subtracting own NREGS income) or the number of non-NREGS days of employment. Though statistically insignificant, the mean of credit is higher for "*Political*" households, consistent with the theory. In sum, households which supported the political party explicitly through campaign participation eventually obtained the larger number of participation days over the years and obtained the larger amount of credit.

[Table 2 to be inserted]

4. Methodology and Econometric model

Our conceptual framework implies that sustained or cumulative participation in NREGS is likely to lift the credit constraint of the poor participating households and could help households smooth out consumption, as credit is used for consumption smoothing purposes.

If the prediction of our model has any validity in our empirical settings, the following hypotheses can be empirically tested. Here we assume that the household behaviour can represent the aggregate behaviour of individual members.

H_A: Cumulative NREGS household participation days increase informal credit.

H_B: Cumulative NREGS household participation days decrease consumption fluctuation of the household.

As an extension of these, in light of our interest in poverty reducing effects of NREGS, we will examine the effect of cumulative participation days on income as well as on total food and total non-food consumption expenditure.

It should be noted that- for a number of reasons related to the non-random placement of the programme (Ravallion 2007) and the self-selection nature of the programme, in which the poor are more likely to participate in the programme with work incentives properly designed to attract only the poor (Besley and Coate 1992) - a simple statistical comparison of the outcome variables between participants and involuntary non-participants cannot be used as evidence of the impact. Moreover, the direction of causality may be reversed in which the lower consumption (or a higher level of poverty) results in longer days of participation, making the interpretation of the coefficient estimate for the NREGS participation days difficult. To address the issues of endogeneity or self-selection, we will employ the household fixed-effects model, household fixed-effects IV model, and household fixed-effects IV model using the sample where 'Participants' are matched with 'Involuntary non-participants' by Propensity Score Matching (PSM) applied for each round so that the observations outside the region of common support are dropped.

Fixed Effects Model

To analyse the effect of NREGS days of participation on the household level economic variable, we start with the following model specification:

$$y_{it} = \beta_1 CD_{it} + \beta X_{it} + \eta_t + \gamma_r + \mu_i + \varepsilon_{it} \quad (5)$$

Here, y_{it} is the main outcome variable, which could be one of the five different objective variables (viz. monthly per-capita consumption expenditure, monthly per-capita food expenditure, monthly per-capita non-food expenditure, monthly per-capita income adjusted by subtracting own NREGS income, and gross volume of monthly credit); *i* refers to household, and *t* refers to year. All these outcome variables are in real terms, after adjusting against the consumer price index, and also expressed in a logarithmic scale. We use *CD*, cumulative days of NREGS participation as the main explanatory variable[16]. X_{it} is the vector of other explanatory variables (see Appendix 1). η_t is the year dummy which captures time fixed-effect. γ_r is a region or GP level fixed effect to capture the geographic heterogeneity. μ_i is the household specific time-invariant heterogeneity term. ε_{it} is an idiosyncratic error term. As the baseline case, we use the household *Fixed Effect* (FE) estimation.

Fixed-effects IV Model

[16] A question may arise as to whether the use of *CD* as a main explanatory variable is a proper specification. As robustness checks, we have tried *D* (current days of participation), *LD* (lagged days of participation) and *LCD* (lagged cumulative days participation) as alternative specifications. The coefficient estimates for *D* are mostly negative and statistically significant in a few cases, such as, the case where a dependent variable is monthly food consumption. This may simply suggest a good targeting performance of the program, that is, the effect of the poor households' self-selection into the program may be dominant or their participation just in the current period is insufficient for alleviating poverty in the same period. The coefficient estimates for *LD* are mostly insignificant, as cumulative effects are not captured in this case. The results for *LCD* are mostly similar to those for *CD*. As our primary focus is on the effect of sustained participation on poverty, only the results for *CD* are presented. The results for *D, LD* and *LCD* will be provided on request.

Panel fixed-effect can address only household-specific time-invariant heterogeneity terms. But if the main explanatory variable is endogenous, e.g. through self-selection (i.e. Cov($CD_{it}, \varepsilon_{it}$) $\neq 0$), its coefficient estimate may be inconsistent. To address this problem, we have estimated the fixed-effects IV model. The first stage equation is specified as:

$$CD_{it} = \beta_1' Z_{1it} + \beta_2' Z_{2it} + \beta_3' X_{it} + \delta_t + \upsilon_r + \lambda_r + e_{it} \quad (6)$$

Here, CD_{it} is instrumented by two instrumental variables- Z_{1it} and Z_{2it}, requiring exclusion restrictions $Cov(Z_{1it}, \varepsilon_{it}) = 0$, $Cov(Z_{2it}, \varepsilon_{it}) = 0$ and $Cov(CD_{it}, Z_{jit}) \neq 0$, while the time effect (δ_t), the regional fixed effect (υ_r), and the household fixed effect (λ_r) are included. In our study, the first instrument, Z_{1it} is a time-variant response dummy (0, 1) variable (named as *sansad_meeting*) that shows whether the household (i.e. at least a member from the household) regularly attends the *Gram Sansad*[17] *(and/or Gram UnnayanSamity)* meeting i.e. the *ward council (and/or village development committee)* meeting. Ward council meetings are normally held two to four times (possibly more) in a year in each ward of the village council (i.e. Rural Municipality), to share and disseminate information to all residents of the ward about the funds and programmes which the village council (or *Gram Panchayat* in this context) is assigned to implement. So this is an important meeting place or common platform for the village people to get to know about all the running and forthcoming rural development schemes, their central and provincial budget allocation, implementation strategy etc. NREGS is one of the most important rural schemes that the *Gram Panchayat* is implementing. Our assumption is that if a person regularly attends ward-level ward council meetings (i.e. *Gram Sansad* or *Gram Unnayan Samity* meeting) then he will get to know more about the many schemes, along with NREGS, which could in turn facilitate him in

[17] Convening regular Gram Sansad meetings is a constitutionally mandated obligation for Gram Panchayat as per India's 73rd Constitutional amendment which among others also stresses the democratic decentralisation.

obtaining NREGS jobs. However, attending such meetings will not directly influence the household's daily consumption or income level. This is because the meeting is well advertised and is held normally in the village centre in the small village setting in the evening time and so the actual cost (e.g. transportation) and the opportunity cost are negligible, that is, all the villagers can attend the meeting very easily if they wish regardless of their income, or of where they live. The agenda of the meetings (e.g. implementing various projects for the overall economic development of the region) is a main concern for most of the villagers regardless of their characteristics (e.g. income or political convictions), as has been confirmed by the field observation. Our argument is broadly supported by the coefficient of correlation between *sansad_meeting* and *CD* (0.167) higher than those between *sansad_meeting* and the main outcome variables (y_{it}) (0.021 to 0.118 in absolute terms) (Appendix 3), which will be reflected in the statistical validations of our instruments as will be discussed later.

The second instrumental variable (i.e. *village_avgCD*), Z_{2it} , is a continuous variable that shows the village-level average of CD where the household's own CD is not included (see Appendix 1 for its derivation). Given the small size of the village, *village_avgCD* well proxies the outlay of the programme the village level, that is, roughly how much budget the politician has allocated to each village over the years.[18] If a household member comes to know that many people outside its own household in the village have participated in NREGS, he or she may have more incentives to participate, e.g., through networking with friends in the village, than in the case where the programme has not become much available. However, the availability of NREGS work outside the household is unlikely to influence the

[18] Though this is a demand driven programme, village-level budget allocation of fund heavily depends on the ward-level politician's own discretion and his relation with the village council president. See Dutta et al. (2014) for the evidence of rationing and politically-biased allocations of NREGS jobs in Bihar.

individual income or consumption *directly*. This is also consistent with the coefficient of correlation between *village_avgCD* and *CD* (0.514) higher than those between *village_avgCD* and the main outcome variables (y_{it}) (0.017 to 0.206 in absolute terms) (Appendix 3).

For a robustness check , we use the third instrument, '*Political*' as an alternative to the second instrument, Z_{2it} , which is a dummy variable that takes 1 implies member/s from the household took part in the election campaign/s in favor of at least any one political party which fought in that election. This is motivated by our conceptual framework implying that the cooperative outcome in the community where *Politician* provides NEEGS job for *Participant* and *Participant* gives his or her support for Politician in the infinitely repeated games under certain assumptions. Interestingly, this is supported by a coefficient of correlation between Political and CD significantly higher than those between Political and the economic outcome variables (Appendix 3). In general, particularly in developed countries, there may be some correlation between political awareness or activity and income or consumption for various reasons. However, this is not the case in rural India because (i) this is related to an informal support for a political party that can be provided by anybody, including the poor, with relatively low opportunity costs (e.g. writing a candidate's name on the wall, joining a rally) and (ii) politicians do not have means to *directly* and *instantly* influence their supporters' income or employment except providing NREGS jobs because the poor typically depend on casual or manual labor in agricultural or non-agricultural sector and do not obtain any direct benefit in these everyday livelihoods by being 'Political', but they expect to increase the chance of obtaining NREGS jobs through their political support. This idea is also broadly supported by the coefficient of correlation between *'Political'* and *CD* (0.195) much higher than those between '*Political*' and the main outcome variables (y_{it}) (0.018 to 0.058 in absolute terms) (Appendix 3).

The validity of these instruments is statistically verified. First, the instruments are not weak in a sense that they are statistically significant in all the cases in the first stage (Appendix 4), reflecting the coefficients of correlation between each instrument and *CD* significantly higher than those between the instrument and y_{it}. Second, the instruments have passed specification tests, such as Sargan test for over-identification [19], the under-identification test, and the test of endogeneity (i.e. the Davidson and Mackinnon (1993) test and the Durbin-Wu-Hausman test), which shows that *CD* is endogenous (Table 4 and Appendix 4). Given these results, we will focus mainly on the results of fixed-effects IV estimation (with PSM) in discussing the effect of NREGS participation days on objective variables.

Fixed Effects IV Model with PSM

We also deploy the fixed-effect IV estimation techniques after running Propensity Score Matching (PSM) between participants and involuntary non-participants in each round by controlling for the initial conditions as well as for time-varying factors that would influence the availability of NREGS jobs (i.e. the program placement) and subsequent change of outcome variable over time (Ravallion and Chen 2007; Chen, Mu, and Ravallion 2008, Imai and Azam 2012). PSM will reconstruct the control group by running the probit model for control and treatment groups in the first stage and using the propensity score based on the first stage results, two groups are matched e.g. by Kernel matching (which we have adopted in this paper) among many alternatives (Becker and Ichino 2002). PSM is applied for each round and we have dropped the households outside the common support region in all of the three rounds. The balanced panel has been reconstructed for 1050 households in the

[19] Sargan test statistics are statistically insignificant (that is, over-identifying restrictions are valid) validating our instruments in most cases. However, it is significant in Column (4) of Cases A, B and D of Table 4 where the results should be interpreted with caution.

common support region for all the three rounds, for which Fixed Effect-IV has been applied.[20] [21]

OLS & IV for the cross-sectional data for examining the consumption smoothing effect

As an extension of NREGS effect on said outcome variable, we examined the effect of NREGS days of participation on the variability of household's consumption expenditure, food and non-food expenditure, gross volume of monthly credit, or household income. We have first constructed the proxy for variability of these variables by taking their standard deviations (*sd*) and coefficient of variation (*cv*) across different years. We have generated the cross-sectional data by using the time-series means of all the covariates ('*mean'*) as well as '*sd'* and '*cv'* for the outcome variables. Then we run OLS and IV - using the same instruments - to see how NREGS participation over time influences the variation in consumption, food and non-food expenditure, gross volume of monthly credit and income.

5. Results

Before presenting our main econometric results, we will briefly examine the relation between the days of NREGS participation and the proxies for household's economic prosperity. In Table 3 we have first examined how the average 'Current Days of NREGS participation' (i.e. *D*) and the average 'Cumulative Days of NREGS Participation' (i.e. *CD*) change for different classes of monthly per-capita consumption expenditure (MPCE) as well as land holding. It has been observed that the days of participation in both current and

[20] We did not follow simple PSM techniques to get the Average Treatment on Treated (ATT) by comparing the treatment effect between participants and involuntary non-participants after PSM because we did not have any pre-programme data.

[21] We have also carried out PSM Fixed effects model (without IV) for all the cases and have obtained broadly similar results.

cumulative terms decrease with the rise in the consumption expenditure as well as in land holding, which suggests the good targeting performance of NREGS.

[Table 3 to be inserted]

Table 4 summarizes the effect of NREGS participation - proxied by cumulative days (*CD*) of NEEGS participation - on five different objective variables namely Case (A): *'monthly per-capita consumption expenditure',* (B): *'monthly food expenditure',* (C): *'monthly non-food expenditure',* (D) *'monthly per-capita income adjusted by subtracting NREGS earnings'*, and (E) '*gross volume of monthly credit'* by the household. In each table, four cases are shown - Fixed-effects (FE) model, FE IV model, and FE-IV-PSM models (a) and (b) for two different cases of IV. A full set of econometric results for FE-IV-PSM (a) for all the covariates are reported in Appendix 2.[22]

[Table 4 to be inserted]

In the case of Fixed-effects model (Column (1) of Cases A to E, Table 4), the effect of cumulative days of NREGS participation is positive and significant on *'monthly per-capita consumption expenditure', 'monthly food expenditure', 'monthly per-capita income adjusted after NREGS earnings', 'gross volume of monthly credit by the household'* but the coefficient is statistically insignificant but positive on *'monthly non-food expenditure'*.

Below our attention will be mainly drawn to "FE-IV-PSM" (Columns (3) and (4) of Cases A to E, Table 4), our preferred cases in which possible biases in the estimate for NREGS participation days are deemed minimised. In the third column of each case, *sansad_meeting* and *village_avgCD* are used to instrument CD. In the fourth column,

[22] The first stage regression results of IV estimations (FE-IV and FE-IV-PSM (a) and (b)) are shown in Appendix 4. In the first stage, all the instruments are statistically significant. A full set of the second stage regression results are shown in Online Appendices 4-7.

sansad_meeting and *Political* are used as IV. Strikingly, the effect of cumulative days of NREGS participation is found to be positive and significant in all the cases except for *'monthly non-food expenditure'.* It is observed, for instance, from Columns (3) and (4) of Case (A), that if cumulative NREGS days of participation increases by 1 day then their monthly per-capita consumption expenditure (which include food and non-food expenditures) would increase by 0.7 to 0.9 %, other things being equal. Table 1 indicates that the average monthly per-capita consumption expenditure for participating households is INR 663.25. Now 0.7% - 0.9% increase of this average value will be INR 4.64 - 5.97. This implies that if a household has 5 members then their monthly consumption expenditure would rise by INR 23.18 to INR 29.85. On the other hand, one extra day of work in NREGS can transfer on average roughly around INR 105.40 during our survey time (Table 1). In other words, if politicians transfer INR 105.40 through NREGS, a participating household by working one additional day in NREGS after forgoing other opportunity, can increase monthly consumption by around INR 23 to INR 30. It should be noted that this is 'a net effect' derived as the mean conditional marginal change of consumption expenditure in response to one day increase in NREGS participation after considering the foregone income, which was estimated to be non-negligible for participants in workfare scheme in the literature (Datt and Ravallion 1994; Jalan and Ravallion 2003). Given that the difference between INR 105.40 and the mean open market unskilled wage rate, INR 85.50 (Table 1) is only INR 19.90, the estimated consumption increase (INR 23- INR 30) is likely to be substantial. More importantly, this is statistically significant, which supports the evidence for the poverty reducing effect of continuous participation in NREGS.

From Columns (3)-(4) of Case B, we observe that if cumulative NREGS days of participation increase by 1 day, then their monthly food expenditure (i.e. food expenditure for the family as a whole) would increase by 0.7% to 1%. Both the increase in MPCE and

monthly food expenditure are statistically significant. However, based on our results in Columns (3)-(4) of Case C, we do not find any significant effect of NREGS days of participation on non-food expenditure, which may indicate that NREGS earnings have been mainly spent on food-consumption - given the high intensity of manual labour, not on non-food consumption. This is in line with the scheme's main objective of poverty alleviation.

Columns (3)-(4) of Case D point to a positive and significant effect of NREGS days of participation on monthly per-capita income adjusted after NREGS earnings. If cumulative days of NREGS participation increase by 1 day, then the household may realise 0.74% to 1 % increase in monthly per-capita income adjusted after monthly NREGS earning, other factors being equal. One might well ask how it is possible that monthly income increases following the NREGS participation even after we deducted NREGS earnings from the monthly income. Our field level experience and several anecdotes imply that out of NREGS income, people not only repaid their existing loan especially to local groceries, but they also sometimes invested a small part of this NREGS income in purchasing small livestock like cows, goats, pigs, chicks, ducks and tiny productive assets like a plough, paddy extraction machines, fishing nets, husking machines etc. Moreover, we found that women participants in NREGS deposited a part of their earned NREGS income in Self-Help-Group (SHG) revolving funds in the expectation of getting a small interest income from the SHG in near future. These field findings and anecdotes suggest that sustained participants of the NREGS programme may realise an increase in the monthly income not directly from NREGS but rather by indirectly investing NREGS earning in some tiny productive initiatives. [23]

[23] It is interesting to note from the graphs in Online Appendix 3 that NREGS participants (i.e. '1') and involuntary non-participants (i.e. '2') have different asset distribution but have almost the same landholding distribution. Here we form an asset index for household's productive assets (plough, paddy extraction machine, fishing net, husking machines, axe, spade/grubber etc.) using a Multiple Correspondence Analysis (MCA). Now we can see from the figure that the median value of the asset index for the NREGS participants is higher than that of observationally equivalent involuntary non-participants. In fact the CDF of NREGS participants lies below (almost all through the distribution)

The most striking and important results are observed in Columns (3)-(4) of Case E. In this case, if a household is a regular participant of NREGS and thereby, gets 1 day extra work in NREGS till current period (i.e. if *CD* increases by 1 day), then in the current period, the gross volume of monthly credit or credited transaction (mainly for daily food and non-food items for subsistence) that the household can get from the local grocery owner (or from non-poor neighbour) increases by 6.8% to 7.6% with statistical significance at 5 % level. The effect of cumulative days of NREGS participation on informal credit is substantial in the context of poor rural households and by far the largest - in terms of percentage terms - among the five outcome variables which we have reported in Table 4. The result implies that the credit-worthiness of the NREGS participating household increases with the increase of their previous accumulated days of participation, which appears a remarkable achievement of the programme. This is also consistent with the conceptual framework in Section 2.

During our field work we also conducted a few habitation and grocery level case studies. We found that if a member (or members) of a household was occasionally working in a stone crushing belt or illegal coal-digging unit or in any uncertain farm/non-farm level daily work in a nearby locality (which was one of the major alternative sources of livelihood in our survey region) with a most unstable stream of earnings, then a member of that household was denied the chance to provide daily grocery items on credit from the local grocery in the period when those families had no earnings. On the other hand, when the same members from those same households were working in the NREGS public work

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the CDF of involuntary participants for the asset index. On the other hand, almost coinciding land distributions imply that the two groups of households have similar values of land at different points. This is because the land holding changed very slowly over time and was insensitive to small income changes, while tiny productive assets could grow even in a smaller time interval with a small income transfer programme. It is noted that such assets can themselves generate some tiny incomes. This will explain how the monthly per-capita income, adjusted by subtractingr NREGS earnings, has also risen with the NREGS participation.

for a considerable period of months or in a sustained way in the last few years (indicating that he was a regular participant rather than a new joiner or quitter) then that same member of the same household was provided with grocery items in credit by the grocery owner with the expectation that this household would repay the credited amount when any member from that household started working in NREGS.[24]

Collating all the pieces of evidence - theoretical, quantitative and qualitative - we can conclude that a rise in cumulative previous participation in NREGS enhances the credit worthiness of the poor household. This is likely to have a long-term impact on poverty management. With the sustained participation in NREGS, households can signal themselves as at good borrower who has the capacity to repay the credit without providing any physical collateral. Essentially, cumulative days of NREGS participation (which is quite visible, as the works are only available in close vicinity), rather than the current period participation, serve as "collateral" in such a way that poor households can obtain small credit for adjusting temporal income shocks. This will relax their credit constraints, and hence budget constraint, to achieve higher levels of consumption and income, as have been found in Cases A, B, and D of Table 4. However, it should be noted that this effect of relaxing credit constraints may not be large enough to increase the poor households' non-food consumption, as the results in Case C of Table 4 suggest.

Further extending our analyses, we have estimated the effect of NREGS days of participation on the variability of consumption and income or on consumption and income smoothness. Table 5 reports the results of the effect of NREGS days of participation (*CD*) on the variability of consumption and income (measured in terms of standard deviation, based on *monthly per-capita consumption expenditure, monthly food and non-food*

[24] Such evidence-based case studies and field notes have been frequently featured in local newspapers in recent times. This type of anecdotal evidence actually motivated us to systematically gather information on the gross volume of monthly credit from the credit register of the household as well as the local grocery shop keeper.

expenditure, and *per-capita monthly income adjusted after NREGS earnings*). The results of OLS estimation show that with an increase in the cumulative days of participation, the variability of these variables decreases, with the coefficient estimate significant only for income. However, statistically significant and negative results are found in the last four columns of IV where *CD* is instrumented by (time-series means of) the attendance in regular village meetings and the village-level *CD minus* own *CD*. In the results with instrumental variable, with one day increase in the cumulative days of participation, the variability of per-capita consumption expenditure reduces by 4.46 standard deviation point, the variability of monthly food expenditure reduces by 1.12 standard deviation point, and the variability of monthly per-capita income adjusted after NREGS earnings reduces by 6.15 standard deviation point.[25] Here we can conclude that NREGS days of participation indeed reduce the variability of monthly per-capita consumption expenditure and monthly per-capita food expenditure, which is consistent with our conceptual framework. However, the coefficient estimate for *CD* is not significant for the standard deviation of per-capita monthly non-food. It can be concluded from Table 5 that cumulative NREGS participation tends to reduce overall consumption variability, especially food consumption, consistent with the role of NREGS participation in consumption smoothing.

[Table 5 to be inserted]

6. Conclusion

The main purpose of this paper is to shed new light on workfare programmes in developing countries. It looks at one such programme, the National Rural Employment Guarantee Scheme (NREGS) in India. It shows that sustained participation in such a programme over many years can serve as "collateral" for households' acquisition of informal credit. This

[25] This is consistent with Scandizzo et al. (2009b) showing the risk benefit of Maharashtra EGS.

credit can then lead to an improvement in households' economic security and poverty reduction. As a conceptual framework for our empirical studies, we have presented an infinitely repeated trilateral game among lenders, scheme participants, and local politicians to underscore how participation in NREGS matters for securing informal credit from the local shop owners or moneylenders. The primary effect is to allow participants to cope with temporary adverse income shocks and smooth out consumption.

We have then examined whether participating in NREGS work has any specific effect on the household level economic variables, such as, monthly per-capita overall consumption, monthly food and non-food consumption, gross monthly credit and monthly income of the participating households using three waves (2009, 2010, 2012) of household level panel data. This dataset is based on our primary surveys conducted in West Bengal. Specific attention was paid to the issues of self-selection bias and endogeneity by using different estimation strategies. The strategies used were: Fixed Effect, Fixed Effect-IV and Fixed Effect-IV with PSM. We have also investigated the effect of NREGS days of participation on the variability of household level consumption, income and hence the consumption smoothing impact of NREGS.

We have found that cumulative days of NREGS participation since inception of the programme have significantly increased the per-capita monthly consumption expenditure, monthly food expenditure and per-capita monthly income adjusted by subtracting own NREGS earnings. Moreover, the results imply that sustained participation in NREGS has improved the credit worthiness of the participating household. That is, the households with sustained programme participation over many years managed to access a greater volume of gross monthly credited transactions. Improvement in credit worthiness may indirectly relax the budget constraint of the participating households and hence reduce consumption poverty. These results support the theoretical arguments that even a poor household, characterised by

little collateralisable wealth, can signal to potential lenders that their sustained-long-continuous NREGS participation can ensure the possibility of repayment of a loan. This can help smooth out consumption and tackle consumption poverty. Eventually such participation can lift the credit constraint and increase consumption, particularly food consumption. The results have shown that cumulative days of participation in NREGS have significantly reduced the variability of consumption and income.

An interesting finding emerging from this study is that current period participation does not appear to be a significant predictor of higher consumption and income. Rather, it is the cumulative days of participation in NREGS that are the significant predictor of higher consumption and higher income and also lower variability of consumption and income. This suggests that NREGS can reduce poverty (defined in monetary terms, income and consumption) only when members in the poor households have participated in NREGS for a considerable number of days over the years, rather than participating NREGS only for a short period. This finding suggests that impact evaluations of NREGS or workfare programmes should span several, rather than just one or two, years.

In the absence of any pre-programme baseline, one of this study's main contributions is to suggest that NREGS needs to be looked at as being a continuous treatment rather than a binary treatment. To our knowledge, this is the first rigorous study to estimate the effect of NREGS on household economic welfare rigorously based on the household panel data covering three waves. In particular, we have addressed the issue of endogeneity by applying versions of Fixed Effects Model, e.g. with IV where PSM is used to make the samples comparable for participants and non-participant. Given the credible empirical estimation strategies adopted and rich balanced panel data set this study concludes that - at least in the surveyed region i.e. in Birbhum district of West Bengal - the NREGS has already established a significant positive effect on participants with longer participation on

consumption expenditure, income and credit worthiness especially when compared with similar involuntary non-participants in the same region.

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Table 1 Summery Statistics of important variable: Comparison between Participant and non-participant

Description of variable	*Participant (P)*		*In voluntary Non-participant (INP)*		*Std. Error of mean diff. of P & INP*	*Voluntary Non-Participant (VNP)*	
	Mean	*Std. Dev*	*Mean*	*Std. Dev*		*Mean*	*Std. Dev*
Per-capita household expenditure	663.25	361.54	738.27	491.85	(31.19)**	1274.93	1059.03
Per-capita monthly income	625.41	583.52	768.36	974.6	(60.25)**	1996.3	2191.61
Per-capita monthly income (after NREGS income)	559.67	584.52	768.36	974.6	(60.26)***	1996.3	2191.61
Per- capita Monthly food exp.	440.69	197.89	484.99	326.7	(20.22)**	605.87	340.18
Per-capita Monthly non-food exp.	57.45	112.25	75.23	96.74	(6.77)***	173.05	228.82
Gross Monthly Credit	517.6	1272.9	869.4	2292.0	(140.69)**	1903.9	4966.8
Annual Savings	3221.8	19203.36	2935.44	11203.2	(913.12)	40605.6	106719
Main occupation days	254.54	267.65	298.34	201.33	(14.74)**	372.98	258.17
Main occupation income	23696	38172.57	37162.9	62370.6	(3864.9)***	105372.7	140469
Subsidiary occupation days	74.96	94.90	58.63	86.38	(5.95)***	33.3	71.16
Subsidiary occupation income	5531.2	7653.61	5362.17	9264.7	(598.74)	4411	10896.96
Non-NREGS days of employment	322.9	201.37	355.58	199.03	(13.42)**	401.03	244.328
Income from Non-NREGS days of employment	28997	38826.97	42477	63409.5	(3929.5)***	110874.8	142060.9
NREGS days of employment	32.09	25.75	0	0	(-)	0	0
Income from NREGS days of employment	3516.2	3131.885	0	0	(-)	0	0
Wage rate in NREGS	105.40	24.52	108.04	25.27	(1.59)	98.25	26.12
Open market unskilled wage rate	85.50	22.55	87.37	24.19	(1.50)	88.96	58.44
Age of the head of the household	47.56	12.44	49.06	13.95	(0.91)	53.07	13.39
Landholding (in acre)	0.6679	1.15	0.6881	1.12	(0.076)	1.27	1.74
Value of live stock index (based on PCA)	0.0648	0.072	0.666	0.10	(0.006)	0.0596	0.077
% of male headed household	88	0.3175	89	0.313	(0.021)	85	0.360
% of female headed household	12	0.3175	11	0.313	(0.021)	15	0.360
% of household with illiterate head	46.5	0.499	37.8	0.485	(0.033)**	14.86	0.356
% of - with primary educated head	27.5	0.446	24	0.428	(0.029)	11.89	0.324
% of - with upper primary educated head	14	0.3481	18.2	0.386	(0.025)	16.73	0.373
% of - with Secondary educated head	7.5	0.264	9.9	0.3	(0.0196)	20.82	0.406
% of - with higher secondary educated head	1.7	0.1311	5.5	0.228	(0.014)***	8.18	0.274
% of - with 12+ educated head	2.5	0.1566	4.6	0.206	(0.0132)	27.52	0.447
% of General (Bramhin) household	2	0.1426	2.4	0.153	(0.010)	14.51	0.352
% of General Household (non-Bramhin)	37.8	0.4851	49.48	0.5	(0.033)***	62.45	0.485
% of OBC household	4.8	0.2140	10.31	0.304	(0.019)***	7.07	0.256
% of SC household	50.27	0.5	34.71	0.476	(0.0325)***	14.86	0.356
% of ST household	5	0.218	3.1	0.173	(0.0124)	1.11	0.105
% of Hindu household	81.2	0.39	78.7	0.41	(0.027)	82.5	0.380
% of Muslim Household	18.8	0.39	21.3	0.41	((0.027)	17.5	0.380
% of Political Household	18.58	-	19.24	-	-	8.92	-
% of Apolitical Household	81.42	-	80.76	-	-	91.08	-
No of observation in pooled data	915		291		-	269	

Source: Our primary survey between 2009 and 2012

Table 2 Mean difference of the main variables by the binary classification ("*Political*") on whether a household member(s) took part in the last political campaign

Variables	Mean		Difference	Value of 't' statistics of t-test of average comparison
	"Political=1"	"Political=0"		
CD (Cumulative Days of NREGS Participation)	**139.54**	**99.99**	**39.54**	**(6.66)*****
D (Current period days of participation in NREGS)	**38.82**	**30.56**	**8.26**	**(3.80)****
Landholding in acre	0.79	0.64	0.149	1.539
mpce (Monthly per-capita consumption expenditure)	647.75	666.78	-19.028	0.619
pcmfe (per-capita monthly food expenditure)	441.96	440.40	1.55	0.0926
Pcmnfe (per-capita monthly non-food expenditure)	50.68	58.99	-8.30	0.8704
Gross volume annual credit	7487.306	5919.69	1567.613	1.207
mpi_nregp (monthly per-capita income adjusted after nregp income)	522.04	568.26	-46.21	0.93
No of non-nregp days of employment	321.55	323.20	-1.64	0.096
Total size of the sample (=915)	170	745		

Table 3 Effect of NREGS participation on household consumption expenditure, income and credit

	Case (A)				**Case (B)**				**Case (C)**			
	Log of real Monthly per-capita consumption exp.				**Log of real Monthly food exp.**				**Log of real Monthly non-food exp.**			
	(1) Fixed Effect	(2) Fixed Effect with IV	(3) Fixed Effect-IV with PSM (a)	(4) Fixed Effect-IV with PSM (b)	(1) Fixed Effect	(2) Fixed Effect with IV	(3) Fixed Effect-IV with PSM (a)	(4) Fixed Effect-IV with PSM (b)	(1) Fixed Effect	(2) Fixed Effect with IV	(3) Fixed Effect-IV with PSM (a)	(4) Fixed Effect-IV with PSM (b)
Instruments	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Sansad_meeting (Village Meeting Attendance)		✓	✓	✓		✓	✓	✓		✓	✓	✓
Village_avgCD (Village level CD)		✓	✓			✓	✓			✓	✓	
Political (Political Campaign)				✓				✓				✓
Selected Explanatory variable												
CD (Cumulative Days)	**0.001**	**0.0054**	**0.009**	**0.007**	**0.001**	**0.008**	**0.01**	**0.007**	**0.001**	**0.006**	**0.009**	**0.008**
	[0.000]**	**[0.003]***	**[0.004]****	**[0.0033]****	**[0.00034]***	**[0.003]****	**[0.004]****	**[0.0036]***	**[0.0016]***	**[0.006]**	**[0.007]**	**[0.0069]**
Land Holding	0.049	0.047	0.034	0.0371	0.033	0.031	0.022	0.0247	0.108	0.107	0.11	0.110
	[0.016]***	[0.017]***	[0.028]	[0.241]	[0.016]**	[0.021]	[0.030]	[0.0256]	[0.036]***	[0.037]***	[0.050]**	[0.0493]**
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1475	1475	1050	1050	1475	1475	1050	1050	1475	1475	1050	1050
R^2	0.114	0.061	0.883	0.382	0.099	0.526	0.998	0.4805	0.125	0.082	0.04	0.0061
F	7.275	5.933	3.257	4.24	6.211	3.951	2.63	3.47	8.048	7.516	5.687	5.86
Sargan test (p-value)	-	0.7623	0.8517	0.0095	-	0.7386	0.8165	0.0259	-	0.5568	0.7983	0.8911
No. of excluded instruments	-	2	2	2	-	2	2	2	-	2	2	2
Under identification test (p-value)	-	0.0024	0.0101	0.0101	-	0.0024	0.0101	0.0101	-	0.0024	0.0101	0.0101

Note: Standard errors in brackets* p<0.10, ** p<0.05, *** p<0.01. Volume of Gross credit in a month (in real terms)here refers to gross monthly amount of credit accumulated by household for procuring daily subsistence items (food & non-food like rice, wheat, cooking oil, spices, vegetables, soap, dress material, shoes etc. from local grocery) in a month.

Table 3 NREGS Days of Participation-Consumption class & land holding- an exploration

MPCE Class	Number of HH	Average D	Average CD	Average Land holding (in acre)
0 – 350	129	26.11	98.86	0.3626
350 – 700	745	22.19	82.87	0.6147
700 – 1050	357	19.26	72.69	0.8847
1050 – 1400	118	14.65	51.87	1.1268
1400 – 1750	53	8.37	33.16	1.4926
1750 – 2100	22	9.68	39.45	1.2899
2100 – 2450	13	6.76	25.07	1.7104
2450 – 2800	10	2	11.1	1.6390
2800 – 3150	9	2.11	16.77	2.9344
3150 – above	19	4.21	5.78	2.0250
Total	1475	19.91	74.49	0.7827
Total (if D>0)	915	32.09	107.34	0.6679

Source: Based on Field survey: 2009-2012.

Table 4 Effect of NREGS participation on household consumption expenditure, income and credit (cont.)

	Case (D)				**Case (E)**			
	Log of real Monthly per-capita income adjusted after NREGS earnings				**log of real value of Gross Volume of Monthly Credit**			
	(1) Fixed Effect	(2) Fixed Effect with IV	(3) Fixed Effect-IV with PSM	(4) Fixed Effect-IV with PSM	(1) Fixed Effect	(2) Fixed Effect with IV	(3) Fixed Effect-IV with PSM	(4) Fixed Effect-IV with PSM
Instruments	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Sansad_meeting (Village Meeting Attendance)		✓	✓	✓		✓	✓	✓
Village_avgCD (Village level CD)		✓	✓			✓	✓	
Political (Political Campaign)				✓				✓
Selected Explanatory variable								
CD (Cumulative Days)	**0.001**	**0.01**	**0.01**	**0.0074**	**0.003**	**0.034**	**0.068**	**0.076**
	[0.00046]	**[0.004]****	**[0.005]****	**[0.0041]***	**[0.002]***	**[0.020]***	**[0.031]****	**[0.0325]****
Land Holding	0.118	0.115	0.145	0.1483	-0.162	-0.17	-0.22	-0.227
	[0.021]**	[0.027]***	[0.035]***	[0.294]***	[0.128]	[0.139]	[0.219]	[0.231]
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1475	1475	1050	1050	1475	1475	1050	1050
R^2	0.179	0.338	0.547	0.1066	0.098	0.07	0.724	0.9424
F	12.269	7.801	5.94	8.10	6.121	5.226	2.491	2.27
Sargan test (p-value)	-	0.5119	0.4841	0.0493	-	0.252	0.5209	0.1667
No. of excluded instruments	-	2	2	2	-	2	2	2
Under identification test (p-value)	-	0.0024	0.0101	0.0101	-	0.0024	0.0101	0.0101

Note: Standard errors in brackets* p<0.10, ** p<0.05, *** p<0.01. Volume of Gross credit in a month (in real terms)here refers to gross monthly amount of credit accumulated by household for procuring daily subsistence items (food & non-food like rice, wheat, cooking oil, spices, vegetables, soap, dress material, shoes etc. from local grocery) in a month.

Table 5 Effect of NREGS participation on Variability of consumption and Income -OLS and IV

Covariates as Mean value	OLS estimation after collapsing the data				IV estimation after collapsing the data [*2]			
	SD of monthly per-capita consumption exp.	**SD of Monthly food exp.**	**SD of Monthly non-food exp.**	**SD of Monthly per-capita income adjusted after NREGS earnings**	**SD of monthly per-capita consumption exp.**	**SD of Monthlyper-capitafood exp.**	**SD of Monthly per-capita non-food exp.**	**SD of mpi adjusted after NREGS earnings**
(mean) CD	**-0.318**	**-0.147**	**-0.031**	**-0.916**	**-4.460**	**-1.116**	**-0.032**	**-6.150**
	[0.199]	**[0.115]**	**[0.050]**	**[0.393]****	**[1.371]*****	**[0.401]*****	**[0.565]**	**[2.288]*****
(mean) landholding	47.580	23.509	6.138	118.864	43.625	5.102	23.619	113.866
	[24.513]* [1]	[11.845]**	[7.104]	[70.738]*	[20.858]**	[6.098]	[8.603]***	[34.824]***
(mean) Non-nregp days	0.212	0.114	0.038	0.559	0.130	0.016	0.116	0.455
	[0.140]	[0.062]*	[0.042]	[0.243]**	[0.150]	[0.044]	[0.062]*	[0.251]*
Observations	500	500	500	500	500	500	500	500
R^2	0.248	0.148	0.201	0.277	0.081	0.146	0.146	0.124
F	3.063	3.012	4.130	4.384	5.370	4.438	3.684	7.016
Sargan test (p-value)	-	-	-	-	0.5495	0.7740	0.7267	0.2733
Under identification test (p-value)	-	-	-	-	0.0000	0.0000	0.0000	0.0000

Note: 1. Standard errors in brackets, * p<0.10, ** p<0.05, *** p<0.01.; 2. .Instruments are "village_meeting" and "village_CD".

Appendix 1 Definition and illustration of the variables used in the analysis

Variable	Definition/Illustration
Dependent Variable	
lnmpce	Log of real value of Per-capita monthly consumption expenditure. This includes food and non-food both
lnpmfe	Log of Per-capita monthly food expenditure in real terms.
lnpmnfe	Log of Per-capita monthly non-food expenditure in real terms.
lngmc	Log of Gross monthly credit in real terms. Here 'gmc' refers to gross average monthly amount of credit accumulated by households for daily subsistence items (food & non-food). We have accumulated different credit amount of the household on daily subsistence till the time of survey during the last one year and then divided it by 12 to derive the monthly equivalent.
Lnsavings	Log of annual savings in real terms
sd_mpce	Standard Deviation of Per-capita monthly consumption expenditure in real terms. This includes food and non-food both. This is used to capture the variability of consumption expenditure.
sd_pmfe	Standard deviation of Per-capita monthly food expenditure in real terms.
sd_pmnfe	Standard deviation of Per-capita monthly non-food expenditure in real terms.
sd_gac	Standard deviation of Gross annual credit in real terms
sd_savings	Standard deviation of annual savings.
lnmpi_nregs	Log of Monthly per-capita income adjusted after NREGS earnings in real terms
Explanatory variables	
CD	Cumulative days of participation
Agehead	Age of head of household
Agesqr	Square of Age of head of household
edu_head_hh=1	Education of the head of household= Illiterate (i.e. can't read or write)
edu_head_hh=2	Education of the head of household= Upper Primary level (i.e. up to class-VIII)
edu_head_hh=3	Education of the head of household= Secondary level (i.e. up to class-X)
edu_head_hh=4	Education of the head of household= Higher Secondary level (i.e. up class-XII)
edu_head_hh=5	Education of the head of household= Higher Secondary level (i.e. up class-XII)
edu_head_hh=6	Education of the head of household= Above Higher secondary (i.e. above class-XII)
Hhsize	Household size i.e. number member of household
Hindu	If the religion of household is Hindu
Muslim	If the religion of household is Muslim
Sexhead	Sex of the head of the household. It is a dummy variable with 1(male) & 0 (female)
socilgroup=General(B)	If the caste of the household is general Brahmin (i.e. highest caste)
socilgroup=General(NB)	If the caste of the household is general Non-Brahmin
socilgroup=OBC	If the caste of the household is Other Backward Caste
socilgroup=SC	If the caste of the household is Schedule Caste

Socilgroup=ST	If the caste of the household is Schedule Tribe
landholding	Land holding of the household in acre
non_nregp_days	Non NREGS days of employment in a year that a household got
Unemployed_ph	Per-head Days of unemployment in a year
Relwage	Ratio of NREGS wage to open market wage faced by each household
wave=1	1st round of survey i.e. the year 2009
wave=2	2nd round of survey i.e. the year 2010
wave=3	3rd round of survey i.e. the year 2012
Sansad_meeting (IV1)	1st Instrumental Variable i.e. whether households regularly attend village council meeting
Village_avgCD (IV-2)	2nd Instrumental variable i.e. village-level average value of Cumulative days of NREGS. To get the value, we summed up all household's CD within that village excluding the 'i'th household under consideration, and then we divide that sum by the number of NREGS participants within that village minus 1.
Political(IV-3)	3rd Instrumental variable: 'Political' is a dummy variable and when Political=1 implies member/s from the household took part in the election campaign/s in favour of at least any one political party which fought in that election. We treat household with political==1 as Political household

Appendix 2 Effect of Cumulative days of NREGS participation - Fixed Effects-IV Estimates after Propensity Score Matching (a)

	lnrealmpce	lnpcmfe	lnpcmnfe	lnrealmpi_nregp	lngac	lnrealsavings
Cumulative days of NREGS participation	0.009	0.010	0.009	0.010	0.068	0.018
	[0.004]**	[0.004]**	[0.007]	[0.005]**	[0.031]**	[0.023]
Age of Head of HH	-0.026	-0.033	-0.043	-0.034	-0.006	0.271
	[0.022]	[0.023]	[0.039]	[0.027]	[0.169]	[0.129]**
Agesqr	0.000	0.000	0.001	0.000	-0.000	-0.002
	[0.000]	[0.000]	[0.000]	[0.000]	[0.002]	[0.001]**
edu_head_hh== 2.0000	-0.011	-0.042	0.002	-0.014	0.302	0.280
	[0.060]	[0.064]	[0.106]	[0.074]	[0.463]	[0.354]
edu_head_hh== 3.0000	-0.007	-0.046	-0.028	-0.009	0.704	0.002
	[0.096]	[0.103]	[0.171]	[0.119]	[0.745]	[0.569]
edu_head_hh== 4.0000	0.031	0.050	0.183	0.054	0.159	1.637
	[0.134]	[0.144]	[0.239]	[0.166]	[1.042]	[0.797]**
edu_head_hh== 5.0000	-0.046	0.033	-0.312	-0.011	0.992	-0.369
	[0.231]	[0.248]	[0.411]	[0.285]	[1.788]	[1.367]
edu_head_hh== 6.0000	0.372	0.035	0.004	0.350	0.808	-0.647
	[0.285]	[0.306]	[0.507]	[0.352]	[2.208]	[1.688]
HH size	-0.136	-0.132	-0.186	-0.156	-0.089	-0.236
	[0.028]***	[0.030]***	[0.049]***	[0.034]***	[0.214]	[0.164]
sexhead== 1.0000	-0.008	0.010	0.282	0.005	-0.225	0.815
	[0.134]	[0.143]	[0.238]	[0.165]	[1.036]	[0.792]
Land Holding	0.034	0.022	0.110	0.145	-0.220	0.563
	[0.028]	[0.030]	[0.050]**	[0.035]***	[0.219]	[0.167]***
Livestock_Index_PCA	0.418	0.319	0.266	0.573	3.763	2.799
	[0.355]	[0.381]	[0.632]	[0.438]	[2.751]	[2.103]
Total_Non-NREGP_days_last 1 yr.	0.000	0.000	0.000	0.001	0.001	0.001
	[0.000]*	[0.000]**	[0.000]*	[0.000]***	[0.001]	[0.001]*
days of unemployment per-head	-0.000	-0.001	-0.000	-0.001	-0.000	0.002
	[0.000]**	[0.000]**	[0.000]	[0.000]**	[0.002]	[0.001]
ratio of NREGS wage to open mkt wage	-0.109	-0.159	0.103	-0.128	0.409	-0.407
	[0.089]	[0.096]*	[0.159]	[0.110]	[0.692]	[0.529]
wave== 2.0000	-0.374	-0.375	-0.515	-0.462	-2.161	-1.008
	[0.146]**	[0.156]**	[0.259]**	[0.180]**	[1.128]*	[0.863]
wave== 3.0000	-0.548	-0.611	-0.313	-0.822	-6.186	-1.931
	[0.288]*	[0.309]**	[0.512]	[0.356]**	[2.232]***	[1.706]
Observations	1050	1050	1050	1050	1050	1050
R^2	0.883	1.069	0.040	0.547	0.724	0.051
F	3.257	2.630	5.687	5.940	2.491	3.455
Sargan Test (Chi. Sq. P-Value)	0.8517	0.8165	0.7983	0.4841	0.5209	0.7597
Under Identification Test (Chi. Sq. P-Value)	0.0101	0.0101	0.0101	0.0101	0.0101	0.0101
Number of Group	350.000	350.000	350.000	350.000	350.000	350.000
Sargan test 'j' Statistics	0.035	0.054	0.065	0.490	0.412	0.094
Number of Instruments	18	18	18	18	18	18
Number of excluded Instruments	2	2	2	2	2	2

Standard errors in brackets, * p<0.10, ** p<0.05, *** p<0.01

Appendix 3 Correlation Matrix of Instruments, CD and Dependent Variables

		Sansad_meeting (Village Meeting Attendance)	*Village_avg CD (Village level CD)*	*Political (Political Campaign)*	*CD (Cummulative Days of Participation)*	*Lnmpce (Consumption Expenditure)*	*Lnpmfe (Food Expenditure)*	*Lnpmfe (Non-food Expenditure)*	*Lngac (Credit)*	*lnmpi_nregs (Income)*
Sansad_meeting	*(Village Meeting Attendance)*	1.000								
Village_avgCD	*(Village level CD)*	0.104	1.000							
Political	*(Political Campaign)*	0.011	0.071	1.000						
CD	*(Cummulative Days of Participation)*	***0.167***	***0.514***	***0.195***	1.000					
Lnmpce	*(Consumption Expenditure)*	-0.074	-0.131	-0.058	-0.249	1.000				
Lnpmfe	*(Food Expenditure)*	-0.021	-0.123	-0.031	-0.167	0.808	1.000			
Lnpmfe	*(Non-food Expenditure)*	-0.083	-0.127	-0.025	-0.241	0.642	0.455	1.000		
Lngac	*(Credit)*	0.118	0.017	0.018	-0.012	-0.035	-0.050	-0.096	1.000	
lnmpi_nregs	*(Income)*	-0.106	-0.206	-0.081	-0.372	0.693	0.556	0.532	-0.079	1.000

Appendix 4 1st Stage regression results of (1) FE-IV, (2) FE-IV-PSM(a) and (3) FE-IV-PSM(b)

	(1) FE-IV	**(2) FE-IV-PSM(a)**	**(3) FE-IV-PSM(b)**
	Cumulative days of NREGS Participation (CD)	Cumulative days of NREGS Participation (CD)	Cumulative days of NREGS Participation (CD)
Age of Head of HH	3.92	3.08	3.043
	[1.241]***	[1.596]**	[1.596]*
agesqr	-0.035	-0.026	-0.026
	[0.0116]**	[0.015]*	[0.016]*
edu_head_hh== 2.0000	-0.0526	2.255	1.914
	[4.617]	[5.045]	[5.021]
edu_head_hh== 3.0000	-0.1215	5.285	5.446
	[6.84]	[7.946]	[7.955]
edu_head_hh== 4.0000	1.573	1.125	0.764
	[8.889]	[11.304]	[11.295]
edu_head_hh== 5.0000	8.554	0.973	0.201
	[13.01]	[19.35]	[19.363]
edu_head_hh== 6.0000	-13.78	2.54	1.359
	[14.06]	[23.95]	[23.986]
HH size	4.545	4.166	4.178
	[1.41]***	[1.87]**	[1.872]**
sexhead== 1.0000	8.905	-1.06	-0.535
	[8.812]	[11.22]	[11.236]
Land Holding	0.400	1.006	0.899
	[1.756]	[2.341]	[2.342]
Livestock_Index_PCA	-15.703	-43.70	-42.111
	[23.72]	[26.73]	[26.702]
Total_Non-NREGP_days_last 1 yr.	0.002	0.0006	-0.0002
	[0.008]	[0.010]	[0.0105]
days of unemployment per-head	0.0207	0.018	0.017
	[0.014]	[0.017]	[0.018]
ratio of NREGS wage to open mkt wage	-2.017	-4.207	-3.874
	[5.75]	[7.384]	[7.377]
wave== 2.0000	28.94	34.859	33.597
	[4.319]***	[5.076]***	[5.286]*
wave== 3.0000	58.627	72.528	71.016
	[4.235]***	[5.061]***	[5.361]*
Z1(1st Instrumental Variable)	9.126	9.741	9.781
Sansad_meeting (IV1)	[2.84]***	[3.407]***	[3.407]***
Z2 (2nd Instrumental Variable)	1.246	0.9200	
Village_avgCD	[0.678]**	[0.547]*	
Z3 (3rd Instrumental Variable)			4.105
Political)			[2.428]*
Observations	1475	1050	1050
Overall R^2	0.36	0.39	0.4296
sigma_u	50.90	45.91	57.59
sigma_e	40.89	41.62	41.62
rho	0.607	0.548	0.657
F	26.30	28.54	28.54
Value of 'F' statistics for test of excluded instrument	6	4.53	4.54
P-value of F test of excluded instrument	0.0026	0.0111	0.0110
AP Chi-sq value for Under Identification	12.22	9.30	9.32
P-value for AP Chi-sq test	0.0022	0.0095	0.0095

Standard errors in brackets, * p<0.10, ** p<0.05, *** p<0.01

Online Appendix 1 Annual outlay of NREGS and household (HH) level coverage: National Picture

Year	HH covered (In Millions)	Average days worked by a HH	Annual outlay in billion $
2006-07	21	43.1	2.5 (0.31% GDP)
2007-08	33.9	42.38	2.6 (0.33% GDP)
2008-09	45.11	47.95	6.6 (0.79% GDP)
2009-10	52.53	53.98	8.68 (1.22% GDP)
2010-11	54.95	46.79	8.91 (1.29% GDP)
2011-12	50.64	43.20	8.45 (1.17% GDP)
2012-13	49.89	46.14	6.6 (0.72% GDP)
2013-14	47.48	45.62	6.25 (0.697% GDP)

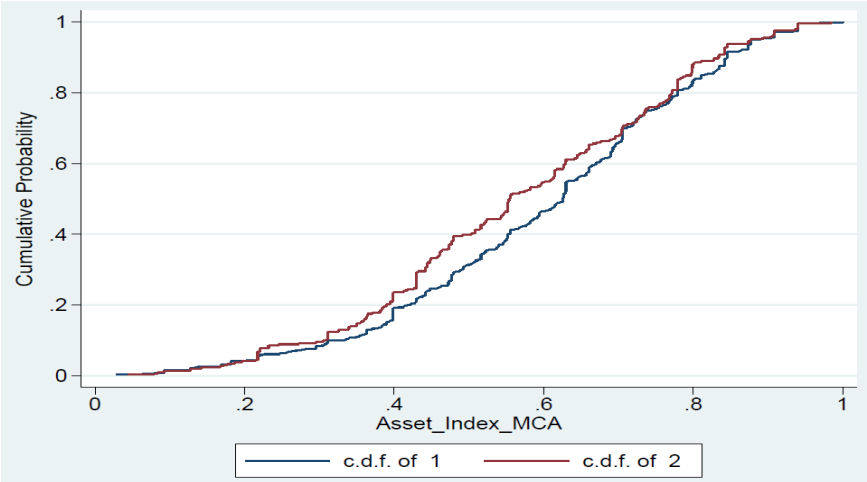
Source: www.nrega.nic.in (section NREGA Statistics National Overview) (Accessed 18th April 2014)

Online Appendix 2 Average values of household level economic variables in real terms

Year	Type of household (figure in bracket is the no. of household)	Per-capita household expenditure		Per-capita monthly income		Per- capita Monthly food exp.		Per-capita Monthly non-food exp.	
2009	Participant (n=304) Involuntary non-participants (n=91)	613 685.93	(52.88)	582.8 700.83	(82.61)	401.65 471.96	(44.77)	46.83 65.73	(9.57)*
	Voluntary Non-participant (n=105)	1402.86		2172.09		651.42		229.97	
2010	Participant (n=312) Involuntary non-participants (n=84)	653.63 735.79	(59.54)	662.39 922.29	(141.06)*	439.81 469.03	(36.26)	54.70 72.58	(14.19)
	Voluntary Non-participant (n=91)	1212.01		2029.09		557.54		124.44	
2012	Participant (n=299) Involuntary non-participants (n=116)	724.36 781.12	(50.33)	630.15 709.87	(89.82)	481.32 506.77	(25.98)	71.10 84.60	(10.65)
	Voluntary Non-participant (n=73)	1169.34		1702.61		600.61		151.76	
pooled data	Participant (n=915) Involuntary non-participants (n=291)	663.25 738.27	(31.18)*	625.41 768.36	(60.25)*	440.69 484.99	(20.2)**	57.45 75.23	(6.77)**
	Voluntary Non-participant (n=269)	1274.93		1996.31		605.87		173.05	

Source: Our primary survey between 2009 and 2012.
Note: here participant + Involuntary non-participant + Voluntary non-participant= total households surveyed in each round. Here 'n' shows the number of households.
Values in the bracket shows Standard Error of 't' test of whether difference in mean values of said variable for 'Participant' and 'Involuntary non-participants' are statistically significant. '*'p<0.05 **p<0.01

Online Appendix 3 Cumulative Density function of tiny productive assets and landholding of NREGS participants and involuntary non-participants



Note: '1' refers to NREGS participants and '2' refers to involuntary non-participants.

Online Appendix 4 Effect of Cumulative days of NREGS participation - Fixed Effects Estimates (with log of Objective variables)

	lnrealmpce	lnpcmfe	lnpcmnfe	lnrealmpi_nregp	lngmc	lnrealsavings
Cumulative Days of NREGS participation	0.001	0.000	0.001	0.000	0.003	0.004
	[0.000]**	[0.000]*	[0.001]*	[0.000]	[0.002]*	[0.003]
Age of Head of HH	0.001	0.012	0.008	0.019	0.159	0.138
	[0.011]	[0.011]	[0.026]	[0.015]	[0.091]*	[0.098]
Agesqr	0.000	-0.000	0.000	-0.000	-0.001	-0.001
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
edu_head_hh== 2.0000	0.020	-0.015	0.035	0.033	0.441	0.163
	[0.042]	[0.042]	[0.094]	[0.056]	[0.335]	[0.360]
edu_head_hh== 3.0000	0.053	0.033	0.040	0.106	1.243	0.895
	[0.062]	[0.062]	[0.141]	[0.084]	[0.499]**	[0.537]*
edu_head_hh== 4.0000	-0.056	0.004	0.179	0.074	0.357	1.137
	[0.081]	[0.081]	[0.183]	[0.109]	[0.648]	[0.697]
edu_head_hh== 5.0000	0.027	0.013	0.061	0.127	0.721	-0.405
	[0.119]	[0.119]	[0.268]	[0.159]	[0.951]	[1.023]
edu_head_hh== 6.0000	0.331	-0.023	0.572	0.332	0.331	-0.234
	[0.128]***	[0.128]	[0.289]**	[0.172]*	[1.025]	[1.103]
HH size	-0.112	-0.101	-0.144	-0.126	0.253	-0.090
	[0.013]***	[0.013]***	[0.029]***	[0.017]***	[0.104]**	[0.111]
sexhead== 1.0000	0.102	0.060	0.403	0.052	0.192	0.534
	[0.080]	[0.080]	[0.181]**	[0.108]	[0.643]	[0.691]
Land Holding	0.049	0.033	0.108	0.118	-0.162	0.610
	[0.016]***	[0.016]**	[0.036]***	[0.021]***	[0.128]	[0.138]***
Livestock_Index_PCA	0.194	-0.031	0.102	0.359	1.599	1.085
	[0.216]	[0.216]	[0.487]	[0.290]	[1.729]	[1.860]
Total_Non-NREGP_days_last 1 yr.	0.000	0.000	0.000	0.001	0.001	0.001
	[0.000]***	[0.000]***	[0.000]**	[0.000]***	[0.001]*	[0.001]*
days of unemployment per-head	-0.000	-0.000	-0.000	-0.000	0.001	0.001
	[0.000]*	[0.000]**	[0.000]	[0.000]	[0.001]	[0.001]
ratio of NREGS wage to open mkt wage	-0.121	-0.140	0.234	-0.151	-0.229	-0.768
	[0.052]**	[0.052]***	[0.118]**	[0.070]**	[0.420]	[0.452]*
wave== 2.0000	-0.098	-0.079	-0.283	-0.103	0.047	-0.466
	[0.040]**	[0.040]**	[0.090]***	[0.054]*	[0.320]	[0.345]
wave== 3.0000	-0.005	0.012	0.190	-0.143	-1.459	-0.837
	[0.042]	[0.042]	[0.095]**	[0.056]**	[0.336]***	[0.361]**
Observations	1475	1475	1475	1475	1475	1475
R^2	0.114	0.099	0.125	0.179	0.098	0.059
sigma_u	0.415	0.308	0.831	0.577	2.576	2.610
sigma_e	0.373	0.374	0.842	0.500	2.988	3.214
rho	0.553	0.404	0.494	0.570	0.426	0.397
F	7.275	6.211	8.048	12.269	6.121	3.564

Standard errors in brackets
* p<0.10, ** p<0.05, *** p<0.01

Online Appendix 5 Effect of Cumulative days of NREGS participation - Fixed Effects-IV Estimates

	lnrealmpce	lnpcmfe	lnpcmnfe	lnrealmpi_nregp	lngmc	lnrealsavings
Cumulative days of NREGS participation	0.005	0.008	0.006	0.010	0.034	0.015
	[0.003]*	[0.003]**	[0.006]	[0.004]**	[0.020]*	[0.023]
Age of Head of HH	-0.015	-0.018	-0.009	-0.018	0.038	0.094
	[0.017]	[0.020]	[0.035]	[0.026]	[0.132]	[0.132]
agesqr	0.000	0.000	0.000	0.000	-0.000	-0.001
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
edu_head_hh== 2.0000	0.027	-0.003	0.042	0.048	0.490	0.180
	[0.046]	[0.054]	[0.096]	[0.071]	[0.363]	[0.363]
edu_head_hh== 3.0000	0.057	0.041	0.045	0.116	1.277	0.907
	[0.068]	[0.081]	[0.143]	[0.106]	[0.539]**	[0.538]*
edu_head_hh== 4.0000	-0.056	0.005	0.179	0.075	0.362	1.138
	[0.088]	[0.105]	[0.185]	[0.137]	[0.700]	[0.698]
edu_head_hh== 5.0000	-0.005	-0.048	0.024	0.049	0.468	-0.497
	[0.131]	[0.156]	[0.276]	[0.205]	[1.042]	[1.040]
edu_head_hh== 6.0000	0.401	0.108	0.651	0.499	0.871	-0.039
	[0.147]***	[0.175]	[0.311]**	[0.230]**	[1.174]	[1.171]
HH size	-0.131	-0.137	-0.166	-0.172	0.106	-0.143
	[0.019]***	[0.023]***	[0.041]***	[0.030]***	[0.154]	[0.154]
sexhead== 1.0000	0.058	-0.023	0.352	-0.055	-0.155	0.408
	[0.093]	[0.110]	[0.195]*	[0.145]	[0.737]	[0.736]
Land Holding	0.047	0.031	0.107	0.115	-0.170	0.607
	[0.017]***	[0.021]	[0.037]***	[0.027]***	[0.139]	[0.138]***
Livestock_Index_PCA	0.235	0.046	0.149	0.457	1.917	1.200
	[0.236]	[0.281]	[0.498]	[0.369]	[1.880]	[1.877]
Total_Non-NREGP_days_last 1 yr.	0.000	0.000	0.000	0.001	0.001	0.001
	[0.000]**	[0.000]**	[0.000]**	[0.000]***	[0.001]	[0.001]*
days of unemployment per-head	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	[0.000]*	[0.000]***	[0.000]	[0.000]	[0.001]	[0.001]
ratio of NREGS wage to open mkt wage	-0.116	-0.130	0.240	-0.138	-0.187	-0.753
	[0.057]**	[0.068]*	[0.120]**	[0.089]	[0.454]	[0.453]*
wave== 2.0000	-0.210	-0.288	-0.409	-0.369	-0.817	-0.778
	[0.090]**	[0.107]***	[0.189]**	[0.140]***	[0.714]	[0.712]
wave== 3.0000	-0.237	-0.421	-0.072	-0.696	-3.253	-1.485
	[0.169]	[0.201]**	[0.357]	[0.264]***	[1.346]**	[1.343]
Observations	1475	1475	1475	1475	1475	1475
R^2	0.061	0.526	0.082	0.338	0.070	0.040
F	5.933	3.951	7.516	7.801	5.226	3.398
Sargan Test (Chi. Sq. P-value)	0.7623	0.7386	0.5568	0.5119	0.2520	0.9763
Under Identification Test (Chi-sq. P-Value)	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024
Number of Group	498	498	498	498	498	498
Sargan Test 'j' Statistics	0.091	0.111	0.345	0430	0.312	0.001
Number of Instruments	18	18	18	18	18	18
Number of Excluded Instruments	2	2	2	2	2	2

Standard errors in brackets; * p<0.10, ** p<0.05, *** p<0.01

Online Appendix 6 Effect of cumulative days of NREGS participation on variability of consumption/income - OLS Estimates after Collapsing

	sd_realmpc	sd_pcmfe	sd_pcmnfe	sd_gmc	sd_realmpi
(mean) CD	-0.318	-0.147	-0.031	-37.034	-0.916
	[0.199]	[0.115]	[0.050]	[11.606]***	[0.393]**
(mean) agehead	0.716	0.432	2.702	873.862	20.626
	[8.678]	[3.885]	[2.026]	[375.686]**	[11.666]*
(mean) agesqr	0.014	0.012	-0.021	-9.527	-0.184
	[0.084]	[0.038]	[0.018]	[3.920]**	[0.117]
(mean) Head_Education2	-2.267	49.096	5.280	438.054	21.931
	[40.359]	[29.721]*	[9.569]	[1937.436]	[58.572]
(mean) Head_Education3	49.186	19.808	26.449	6392.191	26.772
	[57.616]	[28.324]	[29.030]	[4006.026]	[99.905]
(mean) Head_Education4	57.949	-1.971	13.852	-978.795	254.625
	[70.034]	[33.982]	[20.701]	[4887.967]	[166.484]
(mean) Head_Education5	212.483	70.752	53.744	7195.172	813.010
	[132.636]	[59.622]	[42.508]	[8136.384]	[366.487]**
(mean) Head_Education6	344.840	90.370	82.660	19156.134	579.404
	[121.175]***	[43.624]**	[23.630]***	[8085.586]**	[214.018]***
(mean) hhsize	-21.947	-11.308	-5.200	108.874	-24.960
	[7.862]***	[4.410]**	[2.443]**	[594.083]	[18.134]
(mean) Hindu	-22.780	-6.736	6.155	-1531.086	127.771
	[62.528]	[28.754]	[12.113]	[3287.242]	[99.082]
(mean) Caste2	-186.718	-12.419	-107.187	-2665.087	-12.404
	[126.321]	[52.416]	[52.634]**	[11034.099]	[163.835]
(mean) Caste3	-223.265	-89.877	-119.837	-4003.870	-219.763
	[136.943]	[51.166]*	[54.089]**	[11387.749]	[201.049]
(mean) Caste4	-175.520	-4.906	-121.125	-4345.555	-84.521
	[123.094]	[50.647]	[51.083]**	[10903.966]	[155.183]
(mean) Caste5	-207.128	6.802	-133.512	-5334.068	-12.456
	[131.439]	[54.484]	[52.351]**	[10419.562]	[222.621]
(mean) male	-4.657	-36.954	7.554	462.567	-86.703
	[48.452]	[23.476]	[15.323]	[2122.080]	[81.503]
(mean) landholding	47.580	23.509	6.138	3916.224	118.864
	[24.513]*	[11.845]**	[7.104]	[2574.623]	[70.738]*
(mean) livestock_index_pca	4.759	-118.021	38.905	-4.20e+04	-513.326
	[340.866]	[133.354]	[93.879]	[27338.880]	[746.040]
(mean) nonnregp_days	0.212	0.114	0.038	10.630	0.559
	[0.140]	[0.062]*	[0.042]	[6.592]	[0.243]**
(mean) unemployed_ph	-0.781	-0.300	-0.170	10.141	-0.568
	[0.251]***	[0.154]*	[0.077]**	[13.431]	[0.392]
(mean) relwage	-172.956	7.815	-21.324	-1523.775	-21.019
	[86.357]**	[36.656]	[18.775]	[4745.054]	[146.239]
(mean) W2	-2068.925	-727.220	-351.432	13357.349	-1680.732
	[763.242]***	[508.069]	[214.215]	[31117.811]	[930.798]*
(mean) W3	-1410.497	-543.353	-379.573	34761.219	-2054.375
	[567.616]**	[410.260]	[341.359]	[24233.781]	[1390.456]
Observations	500	500	500	500	500
R^2	0.248	0.148	0.201	0.170	0.277
F	3.063	3.012	4.130	3.453	4.384

Standard errors in brackets; * p<0.10, ** p<0.05, *** p<0.01

Online Appendix 7 Effect of cumulative days of NREGS participation on variability of consumption/income - IV Estimates after Collapsing

	sd_realmpce	sd_pcmfe	sd_pcmnfe	sd_gmc	sd_realmpi_nregp
(mean) CD	-4.460	-1.116	-0.032	-129.401	-6.150
	[1.371]***	[0.401]***	[0.565]	[75.084]*	[2.288]***
(mean) agehead	21.261	8.086	-0.138	1332.036	46.587
	[11.998]*	[3.508]**	[4.949]	[657.273]**	[20.031]**
(mean) agesqr	-0.203	-0.078	0.018	-14.376	-0.458
	[0.120]*	[0.035]**	[0.049]	[6.564]**	[0.200]**
(mean) Head_Education2	-37.979	-4.079	50.087	-358.345	-23.196
	[64.426]	[18.836]	[26.574]*	[3529.437]	[107.565]
(mean) Head_Education3	-62.312	-2.770	22.904	3905.724	-114.120
	[81.110]	[23.714]	[33.456]	[4443.418]	[135.419]
(mean) Head_Education4	-137.088	-37.258	3.444	-5328.221	8.170
	[105.742]	[30.916]	[43.616]	[5792.828]	[176.545]
(mean) Head_Education5	-31.171	-10.107	77.516	1761.562	505.122
	[147.690]	[43.180]	[60.919]	[8090.870]	[246.581]**
(mean) Head_Education6	78.134	12.768	97.774	13208.451	242.386
	[124.183]	[36.307]	[51.223]*	[6803.063]*	[207.333]
(mean) hhsize	-19.877	-4.658	-11.366	155.030	-22.344
	[12.903]	[3.772]	[5.322]**	[706.870]	[21.543]
(mean) Hindu	-14.093	8.431	-6.977	-1337.357	138.748
	[58.795]	[17.190]	[24.251]	[3220.934]	[98.163]
(mean) Caste2	-171.566	-103.216	-12.839	-2327.193	6.742
	[93.662]*	[27.384]***	[38.633]	[5131.052]	[156.376]
(mean) Caste3	-226.261	-120.622	-89.794	-4070.675	-223.549
	[111.456]**	[32.586]***	[45.973]*	[6105.830]	[186.084]
(mean) Caste4	-36.071	-84.582	-8.778	-1235.788	91.689
	[106.932]	[31.264]***	[44.107]	[5857.997]	[178.531]
(mean) Caste5	-39.460	-89.574	2.147	-1594.984	199.414
	[140.061]	[40.950]**	[57.772]	[7672.919]	[233.843]
(mean) male	60.198	24.550	-38.754	1908.874	-4.750
	[67.218]	[19.652]	[27.726]	[3682.361]	[112.225]
(mean) landholding	43.625	5.102	23.619	3828.024	113.866
	[20.858]**	[6.098]	[8.603]***	[1142.654]***	[34.824]***
(mean) livestock_index_pca	331.384	124.499	-127.088	-3.47e+04	-100.594
	[339.903]	[99.377]	[140.202]	[18620.795]*	[567.495]
(mean) nonnregp_days	0.130	0.016	0.116	8.800	0.455
	[0.150]	[0.044]	[0.062]*	[8.236]	[0.251]*
(mean) unemployed_ph	-0.106	0.007	-0.319	25.196	0.285
	[0.391]	[0.114]	[0.161]**	[21.424]	[0.653]
(mean) relwage	-54.089	9.826	4.515	1127.036	129.185
	[126.343]	[36.939]	[52.114]	[6921.399]	[210.939]
(mean) W2	-1077.106	-91.521	-754.753	35475.419	-427.442
	[635.823]*	[185.895]	[262.262]***	[34832.052]	[1061.556]
(mean) W3	-491.461	-138.735	-568.866	55256.173	-893.057
	[634.826]	[185.604]	[261.851]**	[34777.442]	[1059.892]
Observations	500	500	500	500	500
R^2	0.081	0.057	0.146	0.126	0.124
F	5.370	4.438	3.684	4.160	7.016
Sargan Test (Chi-Sq. P value)	0.5495	0.7740	0.7267	0.0202	0.2733
Under Identification test (Chi-Sq. P Value)	0.000	0.000	0.000	0.000	0.000
Sargan Test 'j' Statistics	0.358	0.082	0.122	5.394	1.200
Number of Instruments	24	24	24	24	24
Number of Excluded Instruments	2	2	2	2	2

Standard errors in brackets
* p<0.10, ** p<0.05, *** p<0.01