

Female Labour Force Participation and Child Education in India: The Effect of the National Rural Employment Guarantee Scheme

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Abstract

We study the impact of India's National Rural Employment Guarantee Scheme (NREGS) on children's educational outcomes via women's labour force participation. Using data from the Young Lives Study and taking advantage of the spatial and temporal variation in the intensity of implementation of the NREGS, we find that greater participation of mothers in the program is associated with better educational outcomes of their children. Further, the estimated impact of mother's program participation is over and above any income effect induced by the scheme and is robust to concerns about endogeneity of labour force participation and differences in economic trends across districts. We provide evidence which suggests that the mechanism through which children's educational outcomes improve is empowerment of mothers resulting from better labour market opportunities for females.

Keywords: labour, education, gender, bargaining

JEL classification: I21, I38, J16

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1. Introduction

The World Development Report (2012), focusing on gender equality, finds that women in the poorer regions of the world continue to suffer from disadvantages in the economic sphere. Although, significant progress has been made in reducing gender disparities in health and educational outcomes, economic opportunities continue to be limited for women. The Report underlines the policy priorities of closing gender differences in access to economic opportunities and earnings as well as increasing women's voice within households as a means to reducing poverty in developing countries. In this paper we study the impact of one such policy initiative in India – the National Rural Employment Guarantee Scheme (NREGS) initiated in 2006. While the program's main objective is to alleviate rural poverty, it also has the potential to empower rural women through greater access to labour market opportunities.

From a gender perspective, there are two interesting features of this program. First, the wage rate provided in this program is uniform across gender, and second, it gives priority to female employment and targets at least one third of the beneficiaries to be women. Thus, NREGS not only has the potential to raise female labour force participation rates by bringing employment opportunities almost to their doorsteps, the equal wage rates provided in NREGS program can potentially reduce any gender disparity prevalent in the rural labour markets. We, therefore, hypothesize that the introduction of this program should lead to an increase in labour market opportunities for women, either on the extensive or intensive margin or both.

An increase in women's labour force participation can potentially impact individual and household behaviour on several fronts including marriage, fertility, and

intra-household distribution of resources. This paper analyzes the effect of the exogenous policy shock of the implementation of the NREGS on children's well being. Specifically, we explore whether an increase in participation of mothers in NREGS projects affects the educational outcomes of their children differently from that of fathers' participation in the program. If yes, we attempt to understand the mechanism through which this differential effect can be explained.

While an increase in either fathers' or mothers' labour supply could improve their children's outcomes purely due to an income effect, greater labour force participation of mothers could impact children's education through two additional channels. First, women (including mothers) are likely to have more alternative uses of their time than men – market work, household chores and leisure. If children's time in doing household chores substitutes for mother's time then an increase in NREGS participation of mothers may lead to a *decline* in educational attainment of her children.¹ Second, mother's say in household resource allocation decisions may rise due to her higher earned income. Research suggests that this is likely to have a *positive* effect on her children's schooling. If an increase in mother's earned income is likely to translate into greater weight being attached to her preferences in resource allocation decisions of the household and mothers prefer to invest more in their children's health and education (Blumberg 1988; Thomas

¹ If mother's and children's time on household chores are not substitutes and child care services in the market are either unavailable or unaffordable, then it is more likely that children are in school when mothers are at work. If children attend school more regularly due to mothers working, then this would be an additional channel through which children's educational outcomes might improve.

1990; Hoddinott and Haddad 1995; Quisumbing and Maluccio 2003) relative to fathers, then we should see an improvement in child outcomes. Therefore, an increase in mother's decision-making ability within the family can have a positive impact on her children's welfare (Thomas 1990; Thomas et al. 2002). To sum, the net impact of a change in mother's participation in the labour force on her children's schooling depends on which of these two effects dominates – the substitution effect or the effect of greater bargaining power, holding household income constant.²

There exists relatively little empirical research on the impact of parental labour supply on children's time allocation, particularly in a developing country context. Skoufias (1993) shows that an increase in female wages in rural India reduces the time in school significantly for girls only. Similar results were found by Grootaert and Patrinos (1999) in a cross-country study. However, Ilahi (1999) does not find any impact of female wages on children's time use in Peru.

In contrast to the sparse literature on time allocation effects, there is considerable empirical evidence suggesting that households' resource allocation decisions are made in a 'collective' (Chiappori, 1988) or bargaining framework (McElroy and Horney, 1981) where the final allocation usually depends on the bargaining power or weights attached to the preferences of the members of the household. The importance of labour income as a determinant of women's bargaining power within the household has been highlighted recently by Anderson and Eswaran (2010). Using data from Bangladesh, the authors

² We are abstracting from any long term effects of changes in fertility due to increased labour force participation of women since we are looking at these changes over 2 to 3 years only.

show that the effect of *earned* income on female autonomy is far greater than that of unearned income. Also, women who work on the household farm have no more autonomy than those who are housewives, while those who earn independent income have considerably greater autonomy. Luke and Munshi (2011) exploit data from tea plantations in South India where women are employed in permanent wage labor, to find that a relative increase in female income has a positive effect on their children's education. Qian (2008) shows that a change in agricultural pricing policy in post Mao China which increased female labour income increased educational attainment of all children. However, when the policy increased male labour income, educational attainment for girls decreased but had no effect on boys' educational attainment.

Using data from the Young Lives Study (YLS) in the state of Andhra Pradesh in India and taking advantage of the spatial and temporal variation in the intensity of implementation of the NREGS within districts, we find that greater participation of mothers in the program, relative to fathers, is indeed associated with more time spent in school of children within households. Results suggest that this effect on the educational outcome of children is over and above any income effect induced by the NREGS. Moreover, the impact is largely present for the poorer households and limited to the time spent in school by girls. Further, we find that the increase in time spent in schooling translates into better educational attainment of children as well. Greater participation of mothers in NREGS leads to higher grade attainment of children. These findings are robust to concerns about unobservable child level heterogeneity, endogeneity of adult labour force participation and differences in economic trends between districts.

In order to understand the mechanisms through which these effects occur, we exploit household level data on education expenditures and on household members' say in decision-making and control of income from various sources. The analysis of the household level education expenditure data show that an increase in women's share in total household work days on NREGS significantly increases the share of total education expenditures, including variable costs of schooling such as stationary, in discretionary annual household expenditures in poorer households. Moreover, cross-sectional data suggest that the probability that mothers have a say or control over utilization of earnings from different sources increases when they participate in the labor force. These results, together with the significant effects of greater share of mother's participation in NREGS on girls, suggests that women's preferences could be the primary drivers of the improvements in educational outcomes of her children when her program participation is higher. Hence our results can be explained within the framework of a bargaining model of household resource allocation.

The findings of our study not only inform us about the impact of female labour supply on intra-household outcomes but it also addresses a broader policy question of the effect of public programmes on improving household outcomes in developing countries. Specifically, our paper extends the current debate in India on the impact of NREGS on poverty (Ravi and Engler, 2009; Uppal, 2009) and finds evidence, albeit through the channel of women's program participation, that supports preliminary findings of positive benefits of NREGS on households.

The paper is organized as follows. Section 2 gives the background on the National Rural Employment Guarantee Scheme and motivates the study. Section 3 describes the

data and methodology used in this paper. Section 4 discusses the results and Section 5 concludes.

2. Background

The National Rural Employment Guarantee Act (2005) of India provides a legal guarantee for up to 100 days of annual employment at a predetermined wage rate to rural households willing to supply manual labour on local public works. The act was operationalised through the National Rural Employment Guarantee Scheme (NREGS) which began in 2006. Initially restricted to 200 “poorest” districts of India (February 2006), it was extended to 130 more districts in May 2007 and to all districts across the country by 1st April 2008.

We analyse data on individuals’ labour force participation from Young Lives Study (YLS) – a panel study from six districts of the state of Andhra Pradesh. To date, there have been three rounds of YLS surveys. We use data from rounds 2 (2007) and 3 (2009-10) of the YLS for reasons of comparability and exclude round 1 data (2002). The survey years coincide with the initial implementation of NREGS (four YLS districts in Phase 1), followed by nation-wide coverage by 2008 (one YLS district each in Phase 2 and 3).³

Using data on NREGS participation of individual household members and comparing 2007 and 2009-10, we find that the overall female labour force participation in

³ Anantapur, Cuddapah, Karimnagar and Mahbubnagar implemented the NREGS in 2006. Srikakulam and West Godavari were the two districts that came under NREGS in 2007 and 2008, respectively.

the age group of 16 to 60 years has increased substantially from 59 to 72 per cent while the same for males has fallen marginally (Figure 1). This rise in female labour force participation is largely driven by casual labour (public and private) as shown in Figure 2. However, unlike females, participation of males in the casual labour market has not increased in this period; rather, it has remained almost the same.⁴

On the intensive margin, the annual average number of days a household worked in NREGS has increased from around 11 days to 40 days (Figure 3). This rise is more prominent in the districts where NREGS was implemented after 2007. Moreover, participation of women in NREGS on the intensive margin has increased more substantially as compared to men.⁵

The data from the YLS establish that casual labour force participation as well as NREGS participation has increased substantially more for women than men between 2007 and 2009-10. However, it is not clear from these data whether these trends are attributable to NREGS implementation per se since the YLS does not have information which would enable us to calculate casual *private* labour force participation trends.

⁴ Disaggregating the labour force participation rates across asset quartiles of the households, we find that the rise in female participation in casual labour market is more prominent for poorer households (18 percentage points) relative to the upper most asset quartile (5 percentage points).

⁵ We also find that poorer households tended to work for more days in NREGS, particularly in 2009-10. Besides, the rise in female participation in terms of number of days worked in NREGS is also more noticeable in the poorer households.

Using household level data from repeated cross-sections in the National Sample Survey (NSS) for the years 1999-2000, 2004-05, and 2009-10 we report, therefore, the trends in labour force participation rates in casual wage labour for public *and* private works in Andhra Pradesh pre and post NREGS implementation.⁶ From Figure 5 we see that there has been a drastic rise in labour force participation in public works, both for men and women in the 16-60 year age group since NREGS implementation over 2006-08.⁷ While participation somewhat declined between 1999-00 and 2004-05 it has risen sharply in 2009-10 from almost no participation in 2004-05.⁸ Private casual labour force participation, on the other hand, is more or less flat for both men and women although wage rates for casual private works have increased for both genders, possibly due to substitution of labour from private to public works (Imbert and Papp, 2011). These results are reported in the Appendix.

To summarize, our analyses indicate that the trends we observe in casual labour force participation of women in the YLS may have been driven primarily by public works or specifically, the NREGS.

⁶ Trends in mean real wage rates for *public* casual wage labour by gender for the age group of 16 to 60 years in Andhra Pradesh show that the male-female wage ratio has fallen from 1.5 in 1999-2000 to 1.3 in 2004-05 and to 1.1 in 2009-10.

⁷ We take into account casual labour both as the principal occupation as well as a subsidiary occupation in the seven days prior to the survey date.

⁸ These trends hold for the country as a whole, although the increases are smaller in magnitude: from 0.09 per cent in 1999-00 to 0.21 per cent in 2004-05 and then to 2.74 per cent in 2009-10. A similar trend is visible for men.

3. Data and Methodology

A. Data

In order to identify the effect of the NREGS on children's education via their mothers' participation in the labour force, we conduct our empirical analysis at the level of the child using the two comparable waves of the YLS surveys - 2007 and 2009-10. We restrict our sample to children in the age group of 5 to 14 years in 2007, the school going age group. In order to construct our data set we use the following exclusion rules: first, we include only children living in rural areas in both periods. This rules out children who may have migrated to urban areas, less than 1 per cent of our sample. Second, we exclude children for whom we cannot identify mothers in the sample (5 per cent of the original sample). Third, for econometric reasons explained below, we restrict our attention to children present in both rounds of the survey; we thus drop 2.9 per cent of the children present in 2007. Finally, we exclude children for whom there is some missing information on relevant covariates in either of the years. Our data set, after these exclusions, contains information on 3006 children for both years.

Table 1 describes the relevant summary statistics for 2007 and 2009-10. The time spent in school by children in the reference period (a typical day in the last week) has gone up from 5.8 hours in 2007 to almost 7 hours in 2009-10. This increase in time spent in school is largely reflective of more regular school attendance. Children in the survey, who reported attending school regularly, spent almost two hours more in school than those who reported going to school irregularly, on a typical day. We can, therefore, interpret greater time spent in school by a child as an indicator of greater number of days of school attendance. The rise in time spent in school was accompanied by a rise in the

highest grade completed during this period. Enrollment rates also rose by 8 percentage points, largely a result of most 5 year olds joining school by 2009-10.⁹

During the same period, the proportion of children with either parent working in NREGS almost doubled. This increase in participation on the extensive margin was accompanied by a rise in the number of parental days of work on NREGS projects as well. The proportion of children whose mothers were working in NREGS rose from 28 per cent to 61 per cent, a change larger than the corresponding change in proportion of children whose fathers were working in NREGS. Further, we find that the average number of days that the mothers worked on NREGS increased by almost five times, while the average number of days worked by fathers rose, but not as much. Thus the share of the mother in the total work days in NREGS rose by about 8 percentage points among children who had at least one parent working in NREGS. Further, the mean annual household income (in 2009 rupees) increased during this period, primarily due to a rise in non-agricultural income. It is also important to note that the household size has remained more or less unchanged during this period.

While preliminary evidence presented above suggests that mother's NREGS participation and number of days of work have gone up, it would be incorrect to draw a

⁹ There may be a variation in grade attainment depending on when the survey was conducted. In March of each year students get promoted to the next grade. While all children in the 2009-10 were interviewed by March 2010, children in 2007 were interviewed before and after March. This introduces the possibility that those interviewed before March report a lower grade than those interviewed after March. We take this into account in our analysis.

causal link between that and changes in children's time spent in school since decisions regarding labour supply of household members are endogenous. However, the introduction of the NREGS also leads to exogenous shifts in the demand for labour. Larger fund allocation to a mandal indicates that there may be relatively more work opportunities for households residing in that area. The last row in Table 1 suggests that the total fund allocation to NREGS did increase during the period of our study. Moreover, this increase was not uniform across mandals. Hence the change in demand for labour for NREGS projects varied both over time and across mandals in Andhra Pradesh.

B. Methodology

In this section, we specify our empirical model and discuss the estimation strategy we adopt to test our hypothesis.

To begin with, note that NREGS participation by household members can have two distinct effects on children's time spent in school (TSS).¹⁰ First, as household members work on NREGS, the total income of the household may rise. In so far as households consider the education of children to be a normal good, this income effect

¹⁰ The time spent in school is recorded as hours spent in school on a typical day in the previous week. The total time spent on education on a typical day consists of time spent in school and time spent on studying outside school (private tuition and at home). The average time spent on education outside the school in the sample is less than 20 per cent of the total time spent on education on a typical day.

may result in a rise in children's time spent in school.¹¹ Second, NREGS could have an additional direct impact on children's education due to greater labour force participation of mothers, but in two *opposite* directions: a negative substitution effect and a positive bargaining power effect. Thus, the net impact of a change in mother's participation in the labour force on her children's schooling is an empirical question. We posit that, controlling for income, a positive effect of the mother's share of the total number of days parents have worked on NREGS on children's educational outcomes would suggest that the latter effect dominates the negative substitution effect.

More formally, we estimate the following specification:

$$\begin{aligned}
TSS_{chvmdt} = & \alpha_0 + \alpha_t + \alpha_{chvmd} + \alpha_{hvm} + \alpha_{vmd} + \alpha_{md} + \alpha_d + \alpha_{dt} + \beta \mathbf{X}_{chvmdt} \\
& + \delta \mathbf{Z}_{hvm} + \varphi_1 INC_{hvm} + \varphi_2 MOTHER_NREGS_{chvmdt} \\
& + \rho Soc_audits_{md} * t + \varepsilon_{chvmdt} \quad (1)
\end{aligned}$$

where the subscript c refers to a child in household h in village v in mandal m in district d . t refers to time, which takes the value 0 for the year 2007 and 1 for the period 2009-10. \mathbf{X} denotes the vector of child specific time variant variables that could affect TSS. Older children are more likely to spend time working outside or looking after their siblings. We allow for this effect to be non-linear in age by including age and square of age in \mathbf{X} . \mathbf{Z} is a vector of household variables that may change over time, viz. household wealth represented by asset quartiles and land ownership. Since households' optimization

¹¹ Whether the income effect is significant or not is a function of the cost of schooling as well. If physical access to schooling is relatively easy and costs of schooling are subsidized (as in primary schooling), any effect of an increase in household income may be muted for the age group under study here.

process is also a function of the size of the household we include the number of household members in Z as well. Our analysis also controls for whether the household's reference week was a school holiday.¹² INC is total annual household income.

$MOTHER_NREGS$ is defined as the ratio of mother's days of NREGS work to the sum of mother's and father's days on NREGS. Thus, using the temporal variation in the number of days of NREGS work done by the mothers and fathers between 2007 and 2009-10 our empirical model aims to identify the effect of NREGS participation of mothers on TSS (ϕ_2).

While the variables included in Z and X are observable, there may be unobservables at the geographic level (district, mandal and village), household level and there may also exist child specific unobserved heterogeneity. If these unobservables are correlated with the regressors on the right hand-side and they also affect time spent in school, it would lead to the issue of endogeneity and thereby inconsistency of our estimates. Our specification, therefore, includes time invariant child characteristics viz. ability (α_{chvmd}), household characteristics viz. parental preferences for schooling (α_{hvmd}), mandal level characteristics (α_{md}), and village characteristics viz. culture (α_{vmd}).

A potential problem for our empirical exercise is the phased implementation of NREGS. Districts that had NREGS earlier (Phase 1) may be different from those that had NREGS later (Phase 2). Moreover, these districts may have different economic

¹² Our results also hold up when we restrict our sample to only those children for whom the previous week was not a school holiday.

growth trajectories as well as trends in educational attainment. To take into account these concerns, we allow for district specific intercepts α_d and introduce district specific time trends (α_{dt}). We also control for a secular time trend (α_t), that allows for increases in demand for and supply of schooling.

In addition to district specific trends, there could be trends that are driven by rising awareness of rights due to social audits. For example, social audits that make households aware of their rights may also lead to a demand for public schools. Hence NREGS participation and children's time in school could be driven by this rising awareness. To control for this, we allow the trend to depend on the number of social audits that have taken place in the mandal prior to the date of the survey ($Soc_audits_{md} * t$).

Given this specification, and using data on a balanced panel of children over the two time periods, we estimate a child fixed effects model. In doing so, we eliminate $\alpha_{chvmd}, \alpha_{hvm}, \alpha_{vmd}$ and α_{vd} as well as α_d . If we assume that the deviation of the observed variables from their mean values are not correlated with the deviation of the error term from its mean values, this estimation procedure would yield consistent estimators of φ_1 and φ_2 .

The main concern with our estimation strategy is that household income and parental labour supply decisions are likely to be determined simultaneously with investments in children's education. To address this simultaneity issue, we adopt a 2SLS estimation procedure using mandal (sub-district) level rainfall shocks in the month of May and June and variation in the demand for NREGS labour as instruments. We define a rainfall shock as the deviation of rainfall recorded in May and June for the mandal in

the year prior to the survey from the long term (20 year) average rainfall, for the same months, in that mandal.¹³ The demand for NREGS labour is captured by the total amount sanctioned for NREGS projects in the mandal in a financial year.¹⁴ In our preferred specification, therefore, we have two endogenous variables (INC, MOTHER_NREGS) and three instruments (rainfall shocks, NREGS sanctioned amount and the interaction of the two). We discuss the validity of our instruments next.

C. Validity of instruments

Agricultural production in India continues to be dependent upon rainfall. The choice of rainfall in May-June of the reference period as an instrument is, thus, driven by the nature of agricultural activity in the region of our study. Rice is the main crop cultivated in Andhra Pradesh. Using the YLS data we find that among rural households, the crop

¹³ The variable capturing rainfall shocks (RAIN) is constructed from the precipitation data available from the Center of Climatic Research at the University of Delaware. The data include monthly precipitation values at 0.5 degree intervals in latitude and longitude. To match this data at the mandal level, the nearest latitude-longitude to each mandal headquarter is taken. To construct the rainfall shock at the mandal level, the long term (1990-2008) average mandal level rainfall in the months of May and June are estimated. Standard deviation of rainfall for the same period is also calculated at the mandal level. Then rainfall shock is defined as the deviation of actual rainfall in the months of May and June in the last year from the long term average, divided by the standard deviation.

¹⁴ Data on the sanctioned funds at the mandal level is obtained from the Andhra Pradesh Government's website on NREGS (<http://nrega.ap.gov.in/>).

which the largest proportion of households cultivate (almost 36 per cent across rounds 2 and 3) is rice.¹⁵ The cultivation of rice is highly water-intensive. The crop is mainly cultivated in flooded, standing water fields. But prior to cultivation in the paddy fields, the rice seedlings are grown in nurseries. They are then manually transplanted into the flooded fields. It is therefore expected that rainfall in the pre-monsoon season will promote the development of rice seedlings enabling farmers to increase their cultivation of rice during the monsoon season. This in turn would create greater demand for labour for transplanting. Majority of the transplanting work is done by women because it is delicate work and is a highly labour-intensive activity (Mies, 1986; Foster and Rosenzweig, 1996). Our assumption, therefore, is that, *ceteris paribus*, demand for female labour for agricultural work will be higher if premonsoon rainfall is high.

The monsoon typically arrives in Andhra Pradesh in mid June. Hence the premonsoon rainfall falls mostly in the month of May and early June. Furthermore, schools are closed for summer vacations from the last week of April to mid June every year in Andhra Pradesh.¹⁶ Thus it is unlikely that rainfall in this period will have a direct effect on time spent in school or grade attainment either due to households' labour substitution decisions or supply-side factors such as teacher attendance.

¹⁵ Groundnuts is a distant second, with about 16% of rural households engaged in its cultivation.

¹⁶ See http://aputf.org/go_s/Rc.No.31,Dt.22.07.2011.pdf for an official circular of the Department of Education on the schedule of public schools in AP.

Our second instrument is the amount sanctioned for NREGS projects in a mandal in a financial year which begins in April and ends in March of the following year.¹⁷ Since the NREGA is envisaged as a demand-driven program, households are expected to apply for work to the village council and once a critical mass of demand is generated in a gram panchayat (a collection of 1 to 3 villages) in a mandal, a project has to be selected from the approved list of works and sanctioned by the district administration.¹⁸ Thus the main concern with the IV's validity is that current, household demand may determine the amount of sanctioned funds, partly or fully, at the mandal level.

Note that our instrument is defined at the level of the mandal - a collection of 11 to 39 gram panchayats (in the YLS sample) - and the sanctioning of projects is at the district and mandal level. Furthermore, although the NREGA envisages a demand driven programme, the reality is quite different according to several recent studies. Imbert and Papp (2012) report that “many people are unaware of their full set of rights under the programme”; “in practice, very few job card holders formally apply for work while the majority tend to wait passively for work to be provided.” Other research on Andhra Pradesh (Ravi and Engler, 2009; Afridi et al., 2012) also indicate that the programme is

¹⁷ Ideally, we would have liked to use lagged values of this variable. Unfortunately, since the reference period for the 2nd round of the YLS is 2006 and the NREGA was initiated in February, 2006, lagged data do not exist for both rounds of the YLS survey.

¹⁸ The Mandal Parishad Development Office (MPDO) is the main agency for administering each NREGA project and sanctioning all financial payments for projects undertaken in that mandal.

supply rather than demand driven.¹⁹ Hence, given the fact that the program is driven by the supply of projects at the district and mandal level and that our instrument is defined at the level of the mandal, it is unlikely that there are significant effects of current household demand on program intensity at the mandal level.

The concern that remains then is whether temporal changes in awareness of NREGA entitlements (including demanding work; Khera, 2011) is correlated with intensity of the NREGS and are accompanied with changes in the demand for public schooling (quality or quantity).²⁰ On the other hand, say there is no increase in awareness but the administration is learning how to implement NREGS, which improves between 2006-09 along with the quantum of sanctioned funds and this learning spills over to the provision of the public good of interest to us – education. In either case, our IV will not meet the exclusion restriction as it would have a direct effect on educational outcomes.

We address the latter concern first. In Andhra Pradesh, school participation is near universal.²¹ According to the Annual Survey of Education Report (ASER, 2006), the

¹⁹ In survey of 1500 households across 8 districts in AP, Afridi et al. (2012) find that only about 20 per cent of households applied for NREGA employment in 2010-11, 4 years after the inception of the program.

²⁰ The NREG Act allows for the conduct of regular “social” audits of project expenditures by stakeholders. In AP the state government has institutionalised social audits since 2006.

²¹ Enrolment of children in 6-10 years age group was almost 93 per cent in both round 2 and round 3 while enrolment in the 11-14 age group was almost 81 per cent in round 2 and 86 per cent in round 3 in our sample.

percentage of out of school rural children in the 6-14 age group was between 0 to 5 per cent in all the YLS districts except West Godavari where it was between 5 to 10 per cent in 2006. Learning levels were higher than the average for the country and have remained more or less steady during this period (ASER, 2006 and 2009). Thus any administrative “learning” with respect to public schooling would be minimal, if at all. Enrolments in private rural schools actually declined for 6-14 year olds by about 5 percentage points between 2006 and 2009 (ASER, 2006 and 2009). This suggests that any improvements in educational attainment that we find is unlikely to be driven by improvements in either public schools or an increase in private school presence. Second, while it is quite likely that administrative capacity and NREGA implementation improves over time, it is unlikely that this would be accompanied by administrative improvements in public schooling. The administrative machinery that has been created for the NREGA implementation at the grass root level and which helps expand capacity for the program is different and delinked from that required for public schooling. Third, there has been no change in local governments since 2006 in AP. State legislative elections returned the same political party back to power (Congress) in May, 2009, *after* our survey reference period. Hence, there are unlikely to have been any significant changes in political will for implementation of public programmes either.

To address the former concern, we first use data from the YLS to check whether political participation or participation in community led demand for certain public goods was correlated with the occurrence of social audits. The timing, frequency and conduct of social audits in a mandal is determined centrally by an independent body – the Society for Social Audit, Accountability and Transparency (SSAAT) – in Andhra Pradesh.

Hence, the number of audits conducted in a mandal should be exogenous to the village and household. We find an insignificant effect of the occurrence of social audits on awareness between the second and third round of the YLS surveys in a household fixed effects model (see Table A2 in the appendix). Nevertheless, as discussed in the empirical model above, we include a variable “number of social audits that took place in the mandal between the two survey rounds” in all our baseline regression analyses to control for any direct effect of ‘awareness’ improvements on children’s schooling. Our results are robust to the inclusion of this variable.

4. Results

A. Overall impact on children’s time in school

Table 2 shows the results for child’s time spent in school. Column 1 reports the results of an OLS-FE regression, accounting for unobservable heterogeneity in child characteristics and differences in trends across districts. We find that the coefficient of MOTHER_NREGS is insignificant. However, as pointed out above, this specification does not account for the possible endogeneity of labour force participation of parents and household income.

Instrumenting for the endogenous variables in column 2, we find that the coefficient on MOTHER_NREGS is positive and significant.²² Therefore, one percentage

²² The first stage results (Table A1 in the appendix) suggest that our instruments are good predictors of the endogenous variables (F statistics ranging from 52 to 86). The results suggest that an increase in the amount sanctioned for NREGS projects in a mandal increases the household income. The coefficient on rainfall shock is negative but

point increase in MOTHER_NREGS leads to a 0.058 hours a day increase in time spent in school. Over the school year of 200 days, this implies 11.6 more days of school. The result is even more pronounced if we take into account the change in mother's share of parental work in NREGS between the two survey rounds. To elaborate, between 2007 and 2009-10, mother's share of parental work in NREGS went up by 23 percentage points.²³ The estimated coefficient of 5.83, therefore, implies a 1.34 hours per day (5.83×0.23) increase in the time spent in school of the child over this period. For a typical school day lasting 6 hours, this effect is equivalent to attending school almost quarter a day more. If we extrapolate this impact over the academic year, we can view this effect as an almost 22.3 per cent increase in school attendance rate.²⁴

insignificant for annual household income possibly because agricultural income forms a very small proportion of total annual household income for our sample. Also, a good rain shock for the summer crop may well be followed by a bad rain shock during the winter crop, resulting in an insignificant effect of May-June rainfall on total annual agricultural income. The coefficient on rainfall shock is negative, as expected, while the interaction of the two instruments is positive and significant for share of mother's NREGS participation.

²³ This reflects 16 more days worked by the mother on NREGS and a tripling of her contribution to household income in 2009-10, if (as we explained in section 2) there is no crowding out from private labour.

²⁴ We recognize that any additional time spent in school could be substituted by less time spent studying outside school leading to an insignificant effect of mother's NREGS work days on total time spent on education on a typical day. In an alternate specification,

In so far as NREGS income is a part of total income, any NREGS work by parents may lead to a rise in the time spent in schooling. In column 1 we find that the coefficient on total household income is insignificant. Once we account for the endogeneity of household income in column 2, we get a positive and significant income effect.

As pointed out, children's time spent in school and parental NREGS participation may covary because of increasing awareness, through social audits. While the OLS-FE results estimate this effect to be negative, the 2SLS-FE results find this effect to be insignificant. Recall that the variable, "number of NREGS social audits in the mandal between the two survey rounds \times time" allows for different trends in time spent in school depending on the number of audits that have taken place in the mandal before the survey. Our results point out, that if anything, the change in time spent in schooling is lesser in mandals with more social audits.

The coefficient on time is positive and significant in columns 1 and 2. In both cases, the point estimates are large representing the effect of increasing age of the child over time. While the child's age drops out as it is collinear with time, we find that there is a non-linear effect of age. The square of age turns out to be negative in columns 1 and 2. The greater the age, the lower the increase in time spent in school. This reflects the higher opportunity cost of time in school for older children.

B. Heterogeneity of impact on children's time in school

therefore, we consider the total time spent on education (including time spent studying outside the school) as the dependent variable. Our results are unchanged.

The reported average effect of NREGS participation by mothers may hide large heterogeneity of impact across households belonging to different socio-economic groups. To address this issue we run our regressions by two indicators of household wealth - asset ownership and land ownership. We construct sub-samples of children who belong to households with asset ownership, in 2007, less than the median and more than the median asset ownership index (note that the median, which is the sum of the first two asset quartiles, is based on the pooled sample of 2007 and 2009-10). In addition, we classify households into those whose land ownership was less than the median land ownership and more than the median land ownership (based on 2007 distribution of land in the sample).

The results in Table 3 suggest that the effect of MOTHER_NREGS is significant for the households which had lower than median asset ownership in 2007. The marginal coefficient on MOTHER_NREGS is significant only in column 1. There is no significant impact of MOTHER_NREGS in households with higher than median asset ownership. This indicates that the overall result, that we observed in the last section, is driven by the sub-sample of children who belonged to poorer households in 2007. For these children, mother's work in NREGS contributed even more to the total income of the household than in the entire sample.

The results are, however, different in columns 5 and 6 where households are classified on the basis of land owned in 2007. The coefficient on share of mother's days in parental NREGS work days is significant for households above and below median land (1.04 acres) ownership in 2007. Note, however, the significant income effect in column 5.

Next, we look at whether the effect of mother's days of NREGS work differs by the characteristics of the child in Table 4. In columns 1 and 2 we disaggregate the overall analysis by the gender of the child. The coefficient on share of mothers' days of NREGS work suggests a positive impact only on female children.²⁵

Columns 3 and 4 further disaggregate the effect of NREGS work by parents by the age of the child. We divide the sample of children into two groups: those who were in the age group 5-10 years in 2007 and those who were 11-14 years old. The days worked by the mother in NREGS is positive and significant for the younger and older age cohort.

C. Impact on children's grade progression

In the previous sections, we have shown that mothers' work on NREGS projects positively affects children's time spent in school. In this section, we delve into whether an increase in attendance rate in school has translated into higher grade attainment of a

²⁵ Our results are in keeping with the findings of existing research on the impact of parental resources on children's outcomes. Previous literature suggests that the impact of mother's influence on household decision-making may differ by the gender of the child (Thomas 1990; Murthi et al. 1995) but the literature is not conclusive on whether it exacerbates or reduces gender differences. For instance, Thomas (1990) finds that in Brazil women's education has a significantly stronger effect on girls' health while educated fathers prefer to invest more in boys. In Java (Thomas et al. 2002) and Cote d'Ivoire (Haddad and Hoddinott 1994), on the other hand, women with greater earned income allocate more resources to sons' health.

child. To find the determinants of GRADE, we consider a slight modification of the empirical model presented above. We estimate the following specification:

$$\begin{aligned}
GRADE_{chvmdt} = & \alpha'_0 + \alpha'_t + \alpha'_{chvmd} + \alpha'_{hvmd} + \alpha'_{md} + \alpha'_{vmd} + \alpha'_d + \alpha'_{dt} \\
& + \beta' X_{chvmdt} + \delta' Z_{hvmdt} + \varphi'_1 INC_{hvmdt} \\
& + \varphi'_2 MOTHER_NREGS_{chvmdt} + \rho' SOCIAL_AUDITS_{md} * t \\
& + \varepsilon'_{chvmdt} \quad (2)
\end{aligned}$$

The dependent variable is grade attainment of a child divided by ideal grade completed for age (subscripts follow the same convention as in equation 1). We define ideal grade completed for age by assuming that at the age of 6, a child should have completed class one. Thereafter, the ideal grade completed increases by one for every incremental year.

We report results of OLS-FE and 2SLS-FE in Table 5.²⁶ For the overall sample, we find that while MOTHER_NREGS is positive and insignificant in OLS-FE specification in column 1 and for 2SLS-FE in column 2. When we stratify the sample by households' asset ownership in 2007, we find that MOTHER_NREGS is positive and significant for households with less than median asset ownership (columns 3 and 4). We find no significant effects by land ownership. However, we find significant positive effects for female children. The coefficient of 0.297 reflects a 13.5 percent increase in GRADE (as compared to Round 2) when take into account the change in MOTHER_NREGS (0.19 in 2007 and 0.41 in 2009-10). These results substantiate what we have also observed for time spent in school - that the effect of days of NREGS work by mother is more visible in the lower economic strata and for girls.

²⁶ We use the same instruments as in our main specification for TSS.

To sum, our results for grade attainment suggest that the days of work by the mother on NREGS, *ceteris paribus*, has lead to better educational outcomes for her children.²⁷

D. Discussion of results

Our results establish that, holding the total number of days of NREGS work by parents constant, an increase in mother's share in NREGS work days have a significant positive impact on her children's educational outcomes. There are two likely explanations for the results we observe. The first possibility is that mothers who increase their workforce participation may leave their children at school in the absence of day care or other family support. This would be an unintended consequence of NREGS participation. There are

²⁷ There are certain caveats to interpreting the effect of NREGS work days on children's grade progression. First, the highest grade completed is right censored for the sub-sample of children who are still enrolled in school. This is not the case, however, for children who have completed schooling (17 year olds in 2009-10) or have dropped out by the time of the survey interview. Second, the effect of parental labour market activities may not be reflected completely in grade attainment for those households which are interviewed before April (March is the last month of an academic year) since the highest grade attained by children in these households would be right censored. Finally, the highest grade completed is a stock variable that may be determined not just by current NREGS participation of parents but also program participation between 2007 and 2009-10. Our assumption of a monotonically increasing relationship between program participation in 2007 and 2009-10 may not be valid.

several reasons why we think this is unlikely. First, if the above explanation were correct, then the impact should have been on both boys and girls, probably larger for the former and children in the younger age-group. The time allocation hypothesis indicates that there should be a negative or zero effect of mother's labour force participation on children's educational outcomes, particularly girls. While we do find that there is an insignificant effect of mother's program participation on boys, both young and older children and girls tend to benefit. The latter effect suggests that women's preference could be coming into play. Second, to test for the possibility that schools substitute for day care for working mothers, we control for the demographic composition of the household. Under this hypothesis, the effect of mothers working on children's time in school should be insignificant if there are older siblings or grandparents in the household to take care of the younger ones. But the interpretation of our results are unchanged when we control for demographic composition of the household or stratify the sample by presence of household members in the 60+ age group. (See Table A3 in the appendix for details).

A second possible explanation is the mandatory provision of child care facilities on NREGS work sites. Mothers who have higher participation in NREGS may also have better access to child care facilities. This would free up the time of older siblings, particularly girls, who could then attend school more regularly. However, in our sample 1 per cent of households report using on-site child care facilities in 2007 while more than 80 per cent of households report absence of child care facilities at the last work-site in 2009-10. Furthermore, we find that our results are driven by mothers in the 26-32 age group (in 2007, as opposed to 25 or below, 33-39 and 40+ age groups), who are less

likely to have very young children. We, therefore, do not consider this explanation as being likely.

This leads us to our preferred explanation - that the effects we are seeing are due the increased bargaining power of mothers in household decision-making. If this is the case, we should see a positive effect of mother's labour force participation on other outcomes besides those related to time allocation. We, therefore, use household level data on education expenditures to test our hypothesis. Results are reported in Table 6. Our specification is now run at the household level (since these data are not available at the individual child level) with additional controls for number of children in 5-17 age group and the gender composition of this group in the household. Our main coefficient of interest is the share of NREGS days of women in the household. The dependent variable is the share of annual household expenditure on non-food consumption – clothing, education, health and others – on education. While we do find an increase in share of schooling expenses related to more regular attendance (i.e. books and stationary, columns 3 and 4) for the overall sample and poorer households, there is a significant effect of share of women's participation in NREGS on the overall education expenditure share in asset quartile 1 (column 2). We do not find any significant impact for other components of education expenditure (columns 5 to 8).

Further, we analyse whether increased participation in the labour market led to improvements in women's decision-making abilities within households using data from

the second round of the Young Lives survey.²⁸ Our dependent variable is the binary response to the following questions:

- a. “Is the caregiver responsible for making the key decisions about any of the plots?”
(Land)
- b. “Does the caregiver control the use of the earnings from the sale of goods or rent from any of these plots?” (Earnings from land)
- c. “Is the caregiver responsible for making the key decisions about any of these work for wages activities?” (Wage activities)
- d. “Is the caregiver responsible for controlling the earnings from any of these from work for wages activities?” (Earnings from wage activities)

The sample is restricted to caregivers who are mothers in age group 16-60 years.²⁹ Our main variable of interest is whether the woman works. Results for a 2SLS specification with district fixed effects are reported in Table 7. The positive and significant coefficient on ‘working’ across all outcomes, except column 3, suggests that greater participation of mothers in the labour market does increase the say and control these women have on important decisions being made within the household. In a rural setting earnings from land and from wages are likely to be the two most important

²⁸ These data were not collected for households in round 3 of the YLS. Our analysis, therefore, is cross-sectional. We also have very little variation in women’s NREGS participation in round 2.

²⁹ The labour force participation rate among fathers in our sample is 98.4 per cent, almost universal.

sources of income for households.³⁰ This result, therefore, bolsters our claim that an increase in work opportunities for women is likely to have a positive effect on their decision-making abilities within the household. The positive impact of mother's NREGS work on girls' time in school and our analysis here indicates that our findings cannot be explained within a unitary framework of the household.

5. Conclusion

The role of increasing women's bargaining power within households as a means of reducing poverty has been emphasized in discussions on development policy. In this paper, we look at one such policy initiative in India - the National Rural Employment Guarantee Scheme. While the scheme has been conceived primarily to provide households a guaranteed income through employment on public projects, it is sensitive to issues of gender discrimination in the labour market. Given that private casual wages for women are often less than those of men, the scheme stipulates equal wage rates across gender. It also gives priority to female employment and targets at least one third of the beneficiaries to be women. Thus the scheme aims to increase and improve rural women's labour market opportunities.

In this paper we contend that, *ceteris paribus*, an increase in participation of a mother on NREGS projects could affect her household's outcomes such that they reflect her preferences better. Using panel data collected by the Young Lives Study in a large southern state of India (Andhra Pradesh) and taking advantage of intra district variation

³⁰ We find no impact of work status of mothers on their participation in decisions related to earnings from livestock and self-employment activities of the household.

in rainfall shock and the funds sanctioned for NREGS , we find that greater participation of women in NREGS works has a positive effect on her children's time in school. Moreover we find that this effect is largely on children in the poorest wealth group and for girls in the household. Our findings of the positive effect of mothers' program participation on children's time spent in school carries implications for their educational attainment as well. Our results suggest that grade attainment of children, particularly the poorer households and girls improves due to mothers' NREGS participation, implying that more time in school translates into better educational attainment.

We find evidence that suggests that the positive impact of mothers' increased program participation could be due to her improved position in household decision-making. Our assertion is supported by recent qualitative evidence on the empowering effects of NREGS on rural women (Pankaj and Tankha, 2010; Khera and Nayak, 2009) accompanied by more rigorous findings of increased labour force participation of rural women due to this public program (Azam, 2012). Thus, our study not only informs us about the impact of female labour supply on intra-household outcomes but also extends the current debate in India on the effects of one of its most ambitious poverty alleviation program.

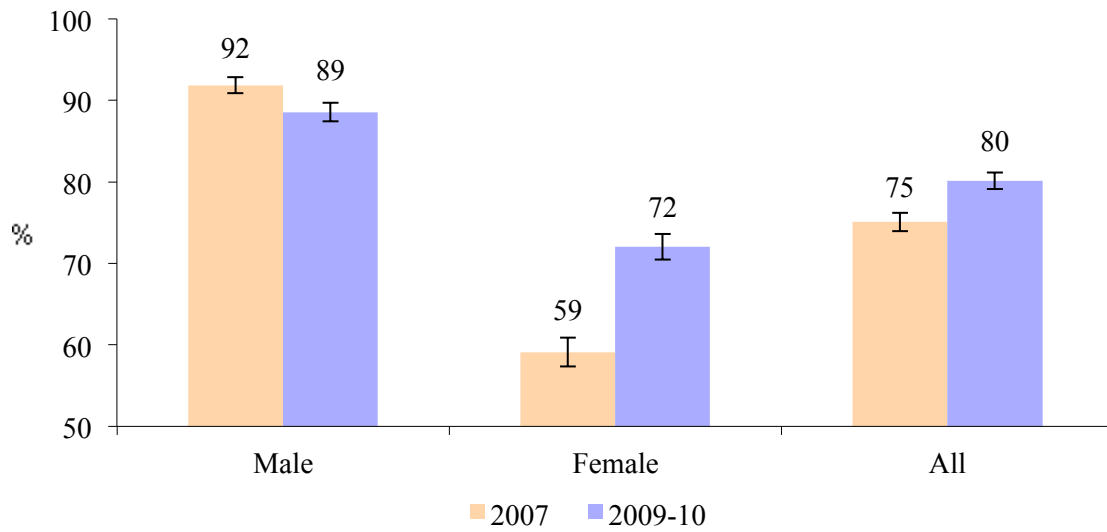
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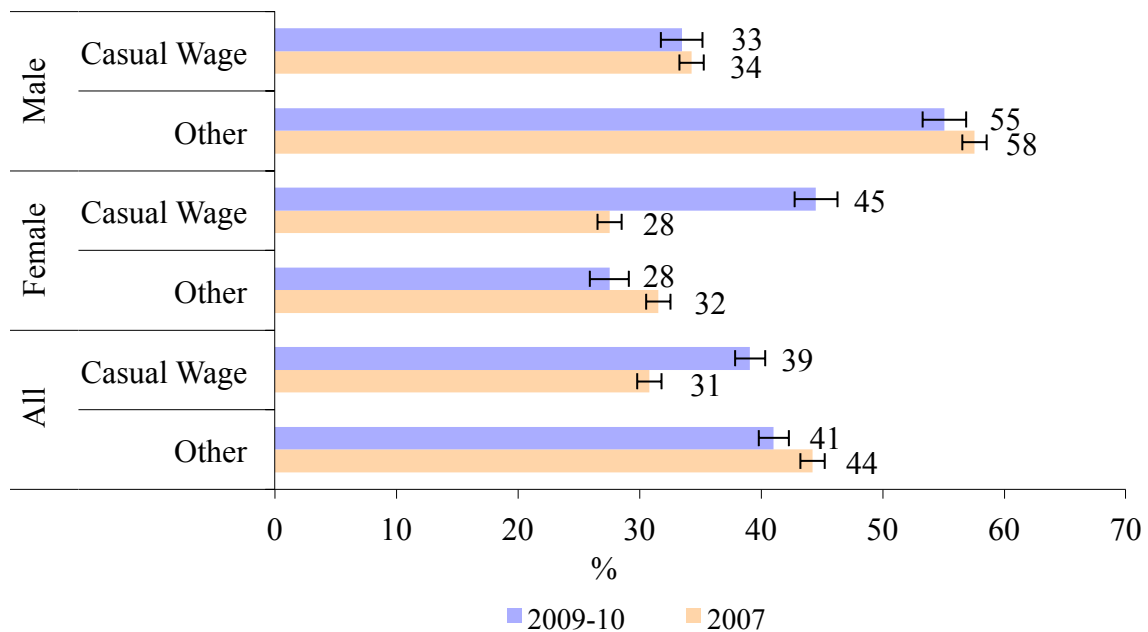
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Figure 1: Labour Force Participaton by Gender



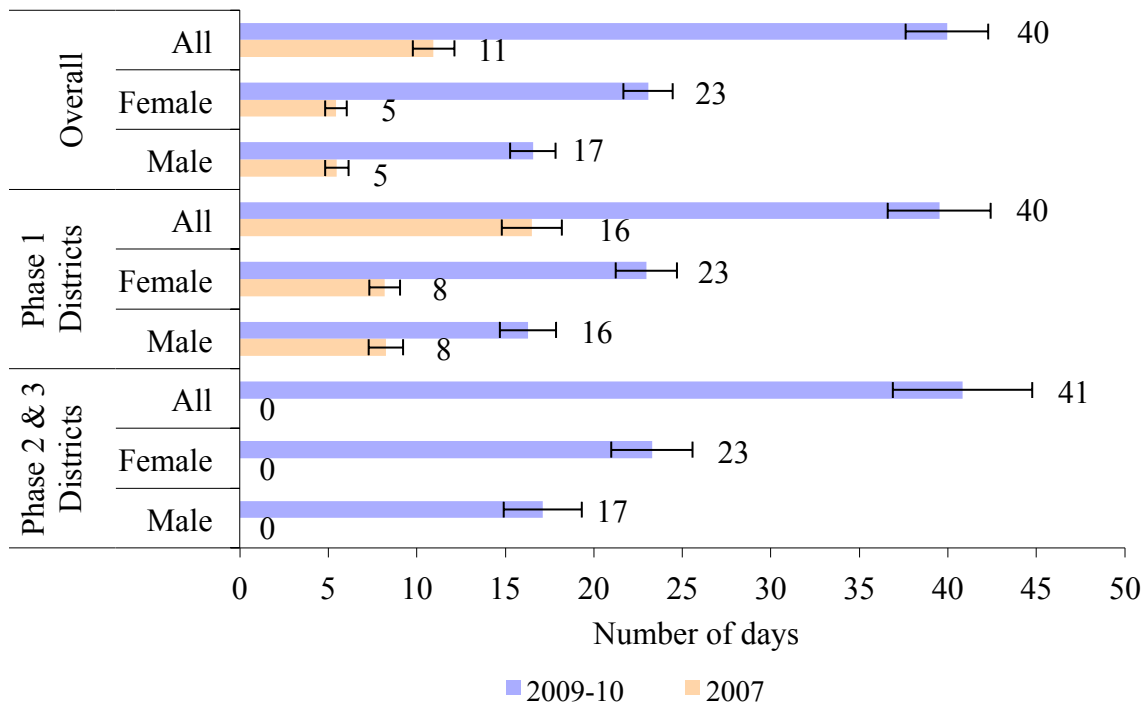
Notes: Individuals belonging to the working age of 16-60 years are included. Sample size is 5832 in 2007 and 6021 in 2009-10. 95% confidence intervals are superimposed.
Source: Young Lives data.

Figure 2: Labour Force Participation by Work Type and Gender



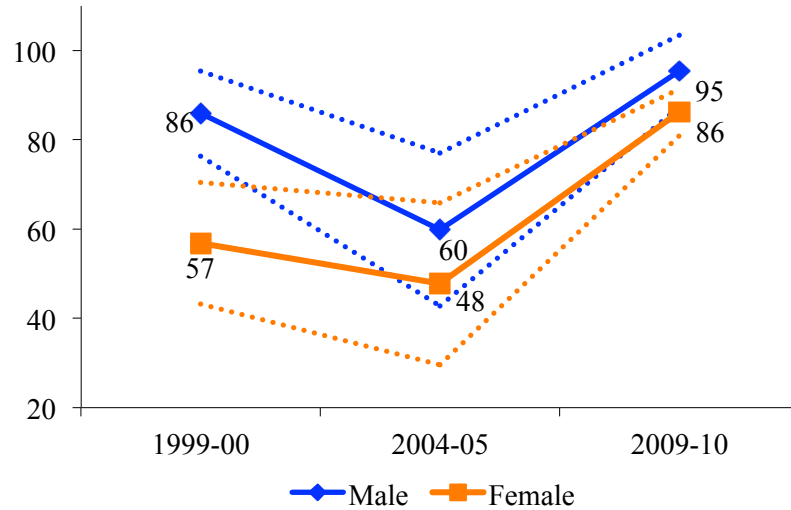
Notes: Same as in Figure 1.
Source: Young Lives data.

Figure 3: Number of Days Worked in NREGS (Household Level)



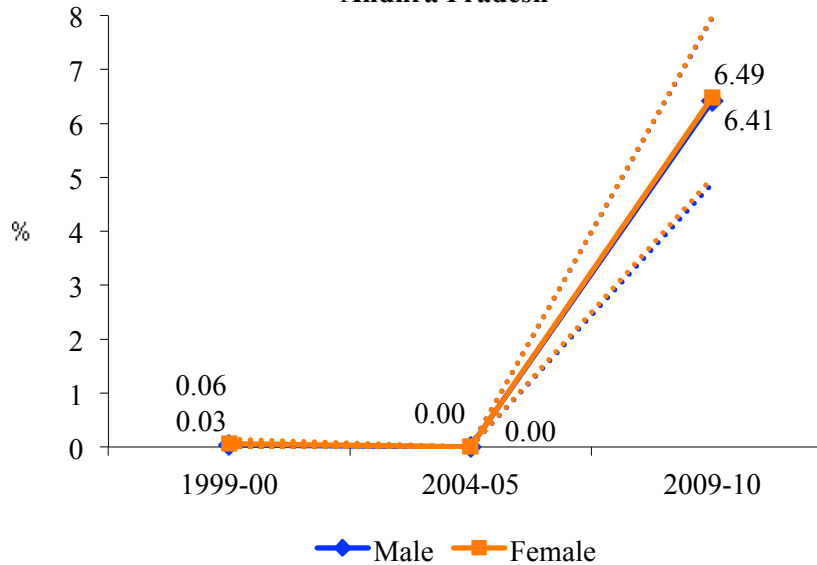
Notes: The figures are at the household level. The sample consists of 2122 households in 2007 and 2114 households in 2009-10. NREGS was implemented in the Phase 1 districts in 2006 and in the rest of the districts in 2007 and 2008. 95% confidence intervals are superimposed.
Source: Young Lives data.

Figure 4: Daily Wage Rate for Public Casual Labour in Andhra Pradesh



Notes: The wage rates are calculated for the working population in the age group of 16-60 years. The wage rates are deflated using CPI-AL and are expressed in 2009-10 rupees. 95% confidence intervals are shown by dotted lines. The confidence intervals are wide in 1999-00 and 2004-05 because of small number of observations for public casual labour in these two rounds. Source: National Sample Survey data from 55th round (1999-00), 61st round (2004-05) and 66th round (2009-10).

Figure 5: Participation in Public Casual Labour in Andhra Pradesh



Notes: The labour force participation figures are calculated considering both the usual principal and subsidiary activity status of the individuals. Working population belonging to the age group of 16-60 years is considered. 95% confidence intervals are shown by dotted lines. Source: National Sample Survey data from 55th round (1999-00), 61st round (2004-05) and 66th round (2009-10).

Table 1: Summary statistics

Variable	2007			2009-10		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
<i>Child characteristics</i>						
Sex (Male=1, Female=2)	3006	1.52	0.50	3006	1.52	0.50
Age (yrs.)	3006	8.27	3.00	3006	11.27	3.00
Enrolment	3006	0.79	0.41	3006	0.87	0.33
Time spent in school (hours)	3006	5.79	2.18	3006	6.95	2.59
Highest grade completed	1963	3.89	2.32	1963	6.28	2.57
Parents participated in NREGS	3006	0.33	0.47	3006	0.66	0.47
Total number of days parents worked in NREGS	3006	9.27	21.53	3006	36.06	48.05
<i>Mother's characteristics</i>						
Mother's age (yrs.)	3006	30.33	5.46	3006	33.29	5.43
Mother's education (highest grade completed)	2998	1.92	3.32	2998	1.92	3.32
Whether mother is working	3002	0.62	0.49	2999	0.84	0.37
Whether mother has worked in NREGS	3006	0.28	0.45	3006	0.61	0.49
Number of days mother worked in NREGS	3006	4.63	11.23	3006	20.78	28.47
Mother's share in total parental NREGS days	3006	0.18	0.32	3006	0.41	0.37
Mother's share in total parental NREGS days conditional on parents participated in NREGS	1000	0.54	0.33	1981	0.61	0.28
<i>Father's characteristics</i>						
Father's age (yrs.)	3006	36.25	6.33	3006	39.19	6.23
Father's education (highest grade completed)	3004	3.98	4.54	3004	3.98	4.54
Whether father is working	2999	0.99	0.11	2999	0.98	0.15
Whether father has worked in NREGS	3006	0.25	0.43	3006	0.49	0.50
Number of days father worked in NREGS	3006	4.64	11.87	3006	15.28	24.97
Father's share in total parental NREGS days	3006	0.15	0.29	3006	0.25	0.29
Father's share in total parental NREGS days conditional on parents participated in NREGS	1000	0.46	0.33	1981	0.39	0.28
<i>Household characteristics</i>						
Annual non-agricultural income (Rs.)	3006	28643	30122	3006	42041	46963
Annual agricultural income (Rs.)	3006	4272	22215	3006	8428	39870
Household size	3006	5.77	2.12	3006	5.76	2.19
Land owned (acre)	3006	2.14	3.27	3006	3.50	40.27
Total number of days household worked in NREGS	3006	11.18	26.72	3006	42.98	56.51
Whether date of interview was after March	3006	0.36	0.48	3006	0.00	0.00
Whether date of interview was during school summer vacation	3006	0.08	0.28	3006	0.00	0.00
<i>Community (Mandal) characteristics</i>						
Rainfall shock in May-June	3006	0.50	0.48	3006	-0.61	0.51
Total NREGS amount sanctioned (Rs. in lakhs)	3006	72.46	83.02	3006	201.91	191.73

Source: Young Lives Study

Table 2: Effect of mother's share in parental workdays on NREGS on child's time spent in school

Variable	OLS-FE	2SLS-FE
	(1)	(2)
Annual household income in thousands	0.001 (0.001)	0.033*** (0.013)
Mother's share in parental work on NREGS	-0.048 (0.111)	5.823*** (1.921)
Square of age	-0.040*** (0.003)	-0.039*** (0.004)
Household size	-0.046 (0.032)	-0.147* (0.084)
Asset Quartile 2	0.025 (0.111)	-0.168 (0.180)
Asset Quartile 3	-0.187 (0.124)	-0.069 (0.194)
Asset Quartile 4	-0.170 (0.163)	-0.050 (0.260)
Land owned	0.002*** (0.001)	0.000 (0.001)
Number of social audits * Time	-0.278** (0.135)	0.063 (0.230)
Date of interview during summer vacation	-0.416** (0.199)	-0.421 (0.287)
Time	3.133*** (0.214)	1.528** (0.605)
Constant	9.243*** (0.308)	
District Level Trends	Yes	Yes
Child Fixed Effects	Yes	Yes
Observations	6,012	6,012
Number of Children	3,006	3,006
R-squared	0.271	

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%;
*** significant at 1%.

Table 3: Decomposition of effect on time spent in school by asset quartiles and land ownership (2SLS-FE)

Variable	Asset Ownership		Land Ownership	
	Asset ≤ Median	Asset > Median	Land ≤ Median	Land > Median
	(1)	(2)	(5)	(6)
Annual household income in thousands	0.012 (0.015)	0.017 (0.011)	0.022* (0.012)	0.003 (0.015)
Mother's share in parental work on NREGS	2.975*** (1.098)	-0.701 (2.231)	2.939* (1.540)	4.915*** (1.850)
Square of age	-0.051*** (0.004)	-0.025*** (0.005)	-0.035*** (0.005)	-0.049*** (0.005)
Household size	-0.070 (0.083)	-0.087 (0.072)	-0.159* (0.089)	0.030 (0.083)
Asset Quartile 2	0.028 (0.140)	-1.224 (0.975)	-0.080 (0.193)	-0.051 (0.228)
Asset Quartile 3	0.130 (0.217)	-1.741** (0.855)	-0.128 (0.214)	-0.095 (0.228)
Asset Quartile 4	0.247 (0.303)	-1.877** (0.867)	-0.099 (0.298)	0.003 (0.315)
Land owned	-0.061 (0.056)	0.001 (0.001)	0.050 (0.078)	0.003** (0.001)
Number of social audits * Time	-0.333 (0.226)	0.038 (0.299)	0.148 (0.245)	-0.457 (0.279)
Date of interview during summer vacation	-0.210 (0.258)	-0.756* (0.431)	-0.526 (0.353)	-0.097 (0.346)
Time	3.246*** (0.465)	1.611* (0.830)	1.775*** (0.596)	3.217*** (0.607)
District Level Trends	Yes	Yes	Yes	Yes
Child Fixed Effects	Yes	Yes	Yes	Yes
Observations	3,864	2,148	3,172	2,840
Number of Children	1,932	1,074	1,586	1,420

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Decomposition of effects on time spent in school by gender and age group (2SLS-FE)

Variable	Gender		Age-group	
	Male	Female	5-10 years	11-14 years
	(1)	(2)	(3)	(4)
Annual household income in thousands	0.021 (0.013)	0.044* (0.023)	0.036*** (0.014)	0.036 (0.033)
Mother's share in parental work on NREGS	2.880 (2.196)	8.823** (3.534)	4.730** (2.099)	9.268* (4.776)
Square of age	-0.035*** (0.004)	-0.042*** (0.007)	-0.043*** (0.008)	-0.046 (0.029)
Household size	-0.032 (0.111)	-0.328* (0.169)	-0.099 (0.095)	-0.281 (0.239)
Asset Quartile 2	-0.140 (0.175)	-0.368 (0.357)	-0.054 (0.189)	-0.444 (0.467)
Asset Quartile 3	-0.217 (0.202)	0.140 (0.388)	0.150 (0.216)	-0.711 (0.498)
Asset Quartile 4	0.018 (0.302)	-0.231 (0.440)	-0.118 (0.284)	0.170 (0.643)
Land owned	-0.089** (0.039)	0.000 (0.002)	-0.082* (0.043)	0.001 (0.002)
Number of social audits * Time	0.144 (0.278)	-0.109 (0.384)	0.005 (0.262)	0.296 (0.494)
Date of interview during summer vacation	-0.463 (0.284)	-0.267 (0.549)	-0.905*** (0.317)	1.248 (0.935)
Time	2.042*** (0.631)	0.922 (1.134)	1.797*** (0.630)	1.464 (2.626)
District Level Trends	Yes	Yes	Yes	Yes
Child Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,910	3,102	4,166	1,846
Number of Children	1,455	1,551	2,083	923

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Effect of mother's share in parental workdays in NREGS on child's grade progression

Variable	Overall		Heterogeneity (2SLS-FE)			
	OLS-FE	2SLS-FE	Asset ≤ Median	Asset > Median	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)
Annual household income in thousands	0.000 (0.000)	-0.001 (0.001)	-0.003 (0.002)	0.001 (0.001)	-0.002 (0.003)	0.0002 (0.001)
Mother's share in parental work on NREGS	0.023 (0.015)	0.074 (0.165)	0.257* (0.132)	0.134 (0.203)	-0.340 (0.372)	0.469* (0.278)
Household size	-0.006 (0.006)	0.002 (0.009)	0.011 (0.017)	-0.002 (0.014)	-0.010 (0.024)	-0.008 (0.015)
Asset Quartile 2	-0.027* (0.015)	-0.029* (0.016)	-0.008 (0.019)	-0.000 (0.058)	-0.023 (0.026)	-0.053* (0.028)
Asset Quartile 3)	-0.038** (0.016)	-0.043** (0.017)	0.030 (0.030)	0.035 (0.052)	-0.007 (0.031)	-0.057** (0.029)
Asset Quartile 4	-0.034 (0.022)	-0.027 (0.023)	0.058 (0.044)	0.013 (0.056)	-0.029 (0.046)	-0.031 (0.033)
Land owned	-0.000*** (0.000)	0.000 (0.000)	-0.003 (0.006)	-0.000 (0.000)	0.006 (0.006)	0.000 (0.000)
Number of social audits * Time	-0.001 (0.019)	-0.011 (0.021)	-0.030 (0.031)	0.042 (0.040)	-0.015 (0.032)	-0.013 (0.037)
Date of interview after March	-0.007 (0.014)	-0.022 (0.020)	-0.027 (0.023)	0.006 (0.033)	-0.014 (0.038)	-0.038 (0.030)
Time	0.053** (0.023)	0.066 (0.045)	0.052 (0.048)	0.008 (0.067)	0.116* (0.067)	-0.008 (0.082)
Constant	0.808*** (0.034)					
District Level Trends	Yes	Yes	Yes	Yes	Yes	Yes
Child Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,926	3,926	2,494	1,432	1,820	2,106
Number of Children	1,963	1,963	1,247	716	910	1,053
R-squared	0.027					

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Effect of women's share in household workdays on NREGS on educational expenditure (2SLS-FE)

	Total Expenditure		Books and Stationery		Fees		Others (uniform, tuition and transport)	
	Overall	Asset Quartile 1	Overall	Asset Quartile 1	Overall	Asset Quartile 1	Overall	Asset Quartile 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Annual household income in thousands	-0.001 (0.001)	-0.001 (0.001)	0.001** (0.000)	0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.000 (0.000)	-0.002* (0.001)
Share of female members in total days household worked in NREGS	0.017 (0.129)	0.233* (0.123)	0.129* (0.067)	0.079* (0.046)	-0.185 (0.118)	0.096 (0.062)	0.073 (0.072)	0.057 (0.081)
Average age of children in school going age	0.003 (0.003)	0.004 (0.004)	0.000 (0.002)	0.001 (0.002)	0.002 (0.002)	-0.000 (0.002)	0.002 (0.002)	0.004 (0.003)
Number of boys in school going age	0.050*** (0.009)	0.036** (0.014)	0.008* (0.005)	0.015*** (0.006)	0.022*** (0.007)	0.012 (0.008)	0.020*** (0.005)	0.010 (0.008)
Number of girls in school going age	0.026*** (0.007)	0.016 (0.011)	0.005 (0.004)	0.003 (0.005)	0.015** (0.006)	0.009* (0.005)	0.006 (0.004)	0.003 (0.006)
Household size	-0.006 (0.004)	-0.006 (0.007)	-0.005* (0.003)	-0.004 (0.003)	0.001 (0.004)	-0.006 (0.004)	-0.002 (0.002)	0.005 (0.005)
Asset quartile 2	-0.005 (0.009)	0.014 (0.015)	-0.008 (0.005)	-0.006 (0.007)	-0.001 (0.008)	-0.001 (0.007)	0.004 (0.005)	0.019** (0.010)
Asset quartile 3	0.001 (0.010)	0.014 (0.017)	-0.010* (0.006)	-0.016** (0.007)	0.016* (0.009)	0.015* (0.008)	-0.003 (0.006)	0.015 (0.011)
Asset quartile 4	0.010 (0.014)	0.045 (0.036)	-0.010 (0.008)	-0.014 (0.015)	0.009 (0.012)	0.011 (0.020)	0.013 (0.008)	0.048** (0.024)
Land owned	-0.000*** (0.000)	-0.001 (0.001)	-0.000* (0.000)	0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.001)
Number of social audits * Time	-0.022 (0.017)	-0.028 (0.021)	0.020** (0.008)	-0.004 (0.008)	-0.047*** (0.014)	-0.015 (0.011)	0.004 (0.010)	-0.009 (0.013)
Time	0.074** (0.037)	0.032 (0.037)	-0.019 (0.017)	0.021 (0.015)	0.091*** (0.031)	-0.004 (0.018)	0.001 (0.021)	0.017 (0.024)
District Level Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,852	1,530	3,878	1,546	3,862	1,534	3,856	1,532
Number of households	1,926	765	1,939	773	1,931	767	1,928	766

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Effect of work status of mothers on their decision-making within household (2SLS-FE)

Variable	Land	Earnings from Land	Wage Activities	Earnings from Wage Activities
	(1)	(2)	(3)	(4)
Annual household income (INC)	0.011 (0.007)	0.009 (0.008)	0.037* (0.019)	0.024 (0.015)
Mother is working	1.162*** (0.435)	1.562*** (0.496)	0.915 (0.824)	1.096* (0.653)
Mother's age	-0.008 (0.023)	-0.034 (0.026)	0.026 (0.040)	0.019 (0.034)
Mother's age squared	0.000 (0.000)	0.000 (0.000)	-0.000 (0.001)	-0.000 (0.000)
Mother's highest grade passed	-0.002 (0.007)	0.001 (0.008)	-0.025 (0.019)	-0.011 (0.015)
Household size	-0.052** (0.026)	-0.041 (0.031)	-0.102** (0.052)	-0.081** (0.041)
Asset quartile 2	0.043 (0.055)	0.087 (0.060)	-0.110 (0.101)	-0.034 (0.081)
Asset quartile 3	0.030 (0.075)	0.128 (0.087)	-0.252 (0.168)	-0.103 (0.132)
Asset quartile 4	-0.217 (0.240)	-0.088 (0.282)	-1.633* (0.884)	-1.008 (0.715)
Household's land ownership	-0.013 (0.010)	-0.009 (0.011)	-0.049 (0.034)	-0.041 (0.025)
Muslim	0.333** (0.140)	0.300* (0.174)	0.475 (0.436)	0.529 (0.325)
Christian	0.174 (0.158)	0.027 (0.161)	0.155 (0.220)	-0.088 (0.157)
SC	-0.083 (0.065)	-0.112 (0.071)	0.260 (0.202)	0.212 (0.150)
ST	-0.078 (0.106)	-0.181 (0.121)	0.369 (0.233)	0.233 (0.180)
Backward caste	0.014 (0.061)	0.047 (0.066)	0.399 (0.255)	0.335* (0.188)
Mixed caste	-0.255 (0.250)	-0.276 (0.349)	0.619 (0.429)	0.357 (0.313)
Constant	-0.248 (0.309)	-0.075 (0.354)	-0.607 (0.573)	-0.478 (0.490)
District fixed effects	Yes	Yes	Yes	Yes
Observations	1,881	1,908	1,498	1,472

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. The same set of instruments (Rainfall shock in May-June, Total fund sanctioned in NREGS, and their interaction) is used for annual household income and working.

Appendix

Figure A1: Participation in Private Casual Labour in Andhra Pradesh

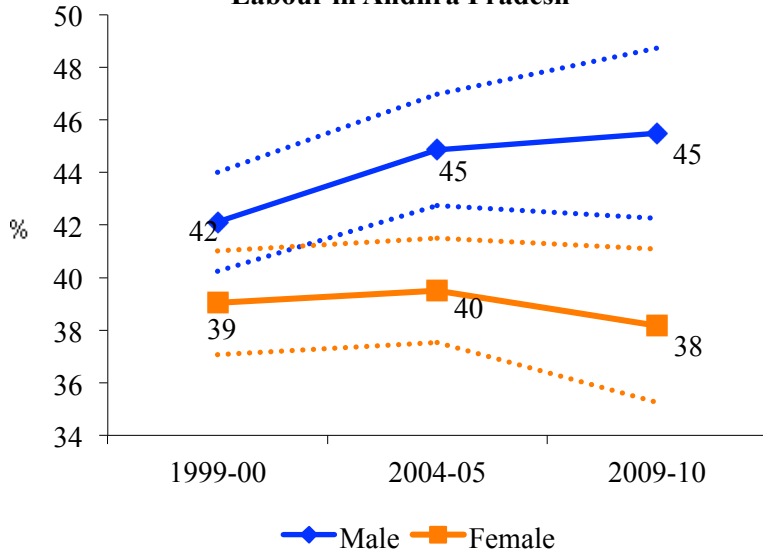
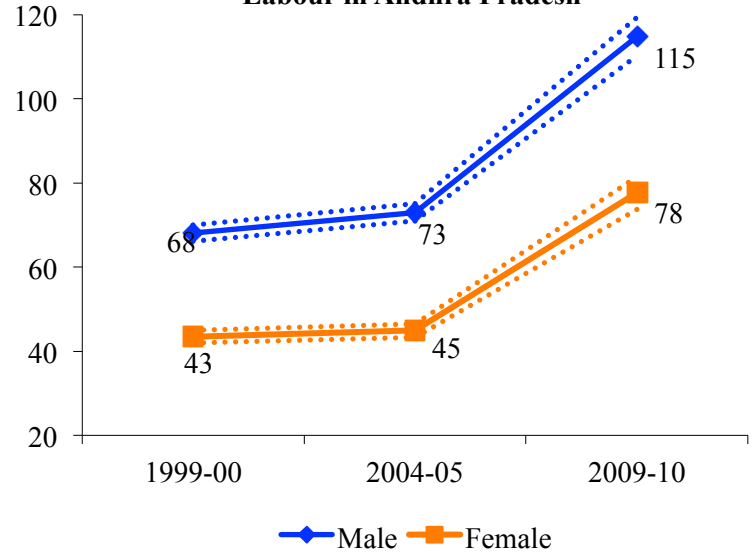


Figure A2: Wage Rate for Private Casual Labour in Andhra Pradesh



Notes: The wage rates are calculated for the working population in the age group of 16-60 years. The wage rates are expressed in 2009-10 prices. 95% confidence intervals are shown by dotted lines.

Source: National Sample Survey data from 55th round (1999-00), 61st round (2004-05) and 66th round (2009-10).

Table A1: First stage regressions (for overall results)

Variable	Time Spent in School	
	Annual household income in thousands	Mother's share in total days parents worked in NREGS
	(1)	(2)
Rainfall shock in May-June	-10.734 (6.649)	-0.210*** (0.053)
Total amount sanctioned	0.024** (0.010)	-0.0001 (0.000)
RAIN * Total amount sanctioned	-0.025* (0.014)	0.0002*** (0.000)
Square of age	-0.045 (0.055)	-0.0001 (0.000)
Household size	4.856*** (1.504)	-0.009 (0.006)
Asset Quartile 2	-1.973 (1.504)	0.040** (0.019)
Asset Quartile 3	-3.863 (2.603)	0.004 (0.021)
Asset Quartile 4	6.799** (3.122)	-0.051* (0.027)
Land owned	0.072*** (0.005)	-0.0001*** (0.000)
Number of social audits * time	6.764* (3.878)	-0.101*** (0.034)
Date of interview during summer vacation	2.206 (3.758)	-0.004 (0.026)
Time	-12.464 (9.363)	-0.027 (0.086)
Constant	13.879 (10.446)	0.327*** (0.055)
District Level Trends	Yes	Yes
Child Fixed Effects	Yes	Yes
Observations	6,012	6,012
Number of Children	3,006	3,006
R-squared	0.137	0.291
F-Stat	51.84	86.37

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. F-stat for joint significance of the three instruments is 14.40 (p-value 0.0001) for column 1, and 11.05 (p-value 0.0001) for column 2.

Table A2: Effect of social audits on households' awareness

	Taken action on a community problem	Participated in awareness campaign	Participated in protest march / demonstration	Voted in local elections	Index 1 [#]	Index 2 ^{##}
	(1)	(2)	(3)	(4)	(5)	(6)
Number of social audits * Time	0.039 (0.032)	-0.046 (0.028)	-0.070*** (0.022)	0.002 (0.008)	-0.191 (0.127)	-0.191 (0.127)
Average age of the household	0.002 (0.002)	-0.002 (0.002)	0.001 (0.001)	0.001 (0.001)	0.002 (0.009)	0.002 (0.009)
Household size	0.001 (0.007)	0.009 (0.006)	0.000 (0.004)	0.001 (0.002)	0.019 (0.024)	0.019 (0.024)
Land owned	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Asset Quartile 2	0.034 (0.022)	0.010 (0.022)	-0.009 (0.015)	-0.003 (0.009)	0.056 (0.090)	0.057 (0.090)
Asset Quartile	0.031 (0.024)	0.038 (0.024)	-0.002 (0.016)	-0.002 (0.009)	0.114 (0.097)	0.114 (0.097)
Asset Quartile 4	0.050 (0.032)	0.047 (0.032)	-0.006 (0.022)	-0.005 (0.012)	0.153 (0.132)	0.154 (0.132)
Time	-0.086** (0.037)	-0.077** (0.037)	0.074*** (0.025)	0.005 (0.011)	-0.103 (0.151)	-0.105 (0.151)
Constant	0.033 (0.056)	0.076 (0.049)	0.015 (0.033)	0.974*** (0.021)	-0.351* (0.211)	-0.349* (0.211)
District Level Trends	Yes	Yes	Yes	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,229	4,230	4,231	4,234	4,226	4,226
Number of Households	2,123	2,123	2,123	2,123	2,123	2,123
R-squared	0.046	0.056	0.038	0.022	0.057	0.058

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Index 1 is obtained by principal component analysis (PCA) of the dependent variables in column 1, 2, 3 and 4.

Index 2 is obtained similarly by PCA of the dependent variables in column 1, 2, and 3 (excluding 4).

Table A3: Effect of mother's share in total days parents worked in NREGS on child's time spent in school (2SLS-FE)

	Full sample	# of members of age 60 or more in 2007 = 0	# of members of age 60 or more in 2007 >0
	(1)	(2)	(3)
Annual household income in thousands	0.033*** (0.012)	0.026** (0.011)	0.056 (0.110)
Mother's share in total days parental days in NREGS	5.693*** (1.845)	5.429*** (1.952)	5.418 (9.456)
Square of age	-0.040*** (0.004)	-0.039*** (0.004)	-0.036** (0.016)
Household size		-0.130 (0.092)	-0.166 (0.370)
<i>Number of 0-4 years old females in household</i>	-0.158 (0.232)		
<i>Number of 0-4 years old males in household</i>	0.249 (0.232)		
<i>Number of 5-9 years old females in household</i>	0.046 (0.163)		
<i>Number of 5-9 years old males in household</i>	-0.087 (0.211)		
<i>Number of 10-15 years old females in household</i>	-0.221 (0.177)		
<i>Number of 10-15 years old males in household</i>	-0.159 (0.201)		
<i>Number of females above 15 years of age in household</i>	-0.212 (0.172)		
<i>Number of males above 15 years of age in household</i>	-0.198 (0.165)		
Asset Quartile 2	-0.168 (0.179)	-0.198 (0.199)	-0.145 (0.701)
Asset Quartile 3	-0.076 (0.189)	-0.094 (0.211)	0.036 (0.487)
Asset Quartile 4	-0.058 (0.254)	0.132 (0.286)	-0.891 (1.322)
Land owned	0.000 (0.001)	0.001 (0.001)	-0.172 (0.286)
Number of social audits * Time	0.035 (0.218)	0.286 (0.281)	-0.778 (1.223)
Date of interview during summer vacation	-0.433 (0.284)	-0.604** (0.301)	0.858 (1.666)
Time	1.716*** (0.571)	1.334** (0.665)	1.917 (2.744)
District Level Trends	Yes	Yes	Yes
Child Fixed Effects	Yes	Yes	Yes
Observations	6,012	4,662	1,350
Number of Children	3,006	2,331	675

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Controls for households' demographic composition in italics.