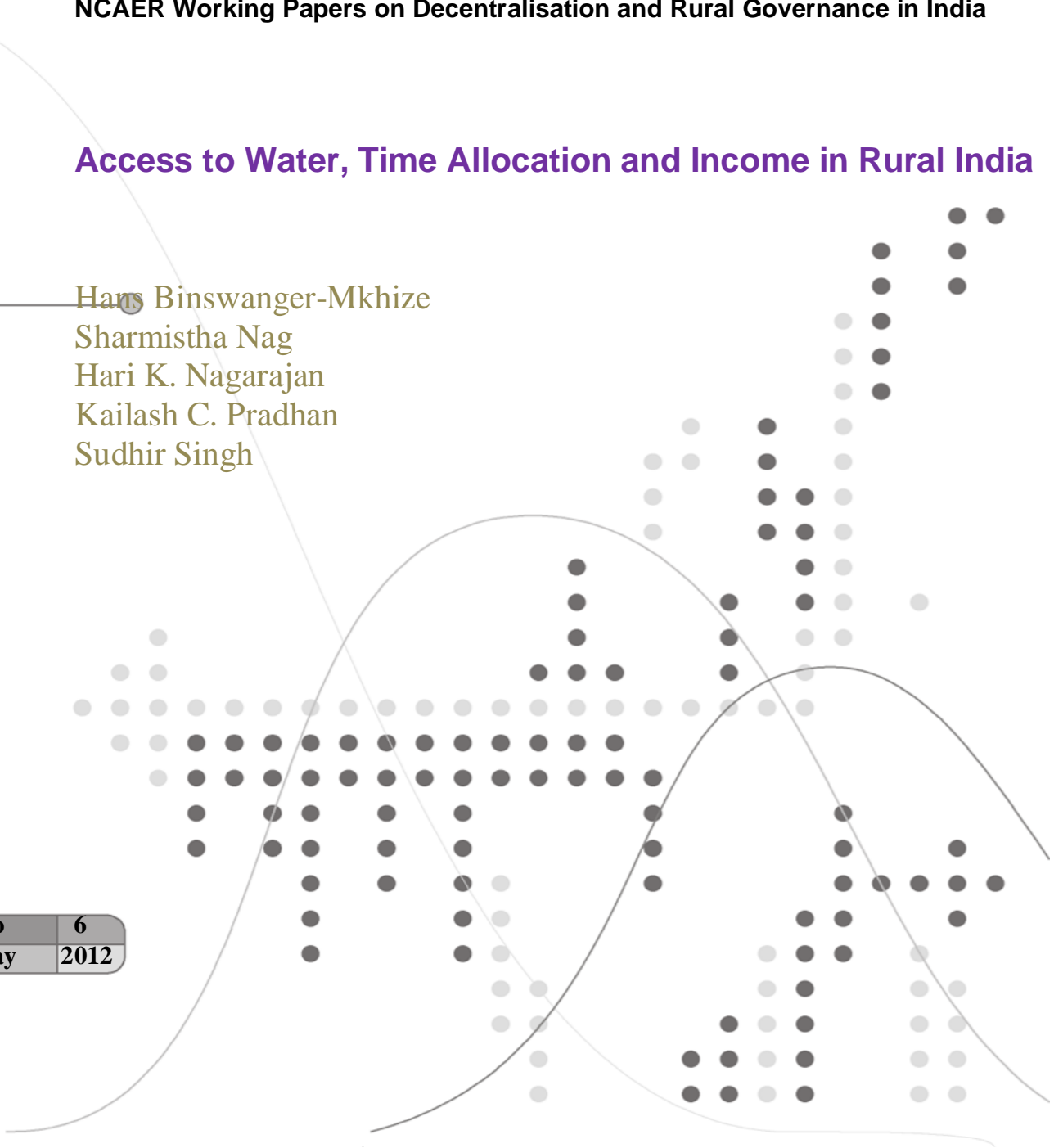


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Access to Water, Time Allocation and Income in Rural India

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Abstract

In this paper we show that investments to improve the supply and management of water reduce the time spent in fetching water by both men and women, which in turn will lead to a reallocation of the time saved to productive activities, and result in increased incomes. Using the national ARIS/REDS panel data of the NCAER we show that political reservations in the local government for vulnerable groups like scheduled castes and tribes, and women lead to greater local government investments in water supply and improved management. Political reservations are shown to increase the time spent by women in all productive activities, especially in self-employment in farm and non-farm activities. Increases in self-employment are shown to have the greatest impact among the productive activities on household incomes. We show that reservations also increase the wages that women receive in the rural non-farm labor market, which suggests that they reduce discrimination against women in labor markets.

Keywords: Drinking Water, Political reservations for women, Time in unproductive activity, IV estimation.

JEL Classification Codes: B21, C26, H41, H42, J22

[#] The findings, interpretations and conclusions expressed here are those of the authors and do not necessarily reflect the views of NCAER or its Governing Body.

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Access to Water, Time Allocation and Income in Rural India

1. Introduction

Our paper provides a consistent link between political reservations, public provision water by local governments, the resulting changes in intra-household time allocations, and household and individual income of men and women. Women typically have less time for productive work than men, due to differences time spent in household work and in accessing water supplies.¹

The literature linking various factors that inhibit the time available for productive work is diverse (Mitik and Decaluwe 2009, Ilahi 2000, Munshi and Rosenzweig 2008, Leslie and Paolisso 1989, Glick and Sahn 1998, Glick 2002). In the unitary models following Becker (1981), a household allocates the male and female members' time according to each member's productivity of household commodities (household work) and goods for the market. However, in the bargaining models (McElroy and Horney 1981, Lundberg and Pollak 1993, Mahoney 1995), it is the power relation and strategic interaction between the members of the households, mediated by market wages that determines intra-household time allocations. Widmalm (1998) has shown that if a woman's decision to work is conditional on the male's labor supply, then the number of hours worked by the female in the household will be fully divisible and will adjust based on the needs of the household (usually leading to a reduction in leisure). Gender differences in intra-household time allocation has also been attributed to the family's non-labor income, presence of young children, and the ratio of the mother's non-labor income to the family's non-labor income (Molina and Montuenga 2009). Alvarez and Miles (2003) suggest that male-female differences in time allocation could be more due to cultural and historical reasons as opposed to any observable gender specific attributes.

In the literature it has been argued that if the time needed for domestic labor could be reduced, then time would be available for income-generating activities (Ilahi and Grimard 2000, Morrison, Raju, and Sinha 2007, Ray 2007). This has led to calls for better tailoring infrastructure investments to women's needs to reduce the time needed for domestic chores. However, increasing domestic labor productivity may well increase the time spent on other

¹ Other factors may be higher number of days absent from work due to illness and impact of education on access to employment opportunities. Binswanger et al. (2012) show that women are absent for 14.87 percent of days due to illness; this number is 6.36 percent for men.

activities, such as domestic work and leisure, rather than increase the supply of time to produce market goods and services. Koolwal and Van de Waal (2011), using data from multiple countries (including India), do not find any significant effects on women's paid labor due to improved access to water. However, they do not investigate the time spent in self-employment, which we also consider in this paper. While the household welfare effects are found through the improved enrolment rates of children of households with improved access to water, they find that the impact on self-employment is ambiguous.

Political reservation in general, and for women in particular, affect expenditure allocations and outcomes through women's agency within households via to increased participation by women in the process of governance. If women prefer water investments, the latter should lead to improved provision of publicly provided water. A direct impact via agency is triggered by a reduction in the time spent in accessing water that will lead to increased productivity of household work and to options for more leisure or more productive work. We should, however, note that enhancing women's agency within the households need not be only related to changes in productivity of household time, but in addition may be the result of empowerment through political process: political empowerment allows women to enhance their status within households such that intra-household time allocations could be altered in favor of women.

The literature on the role of political agency in influencing economic outcomes is expanding rapidly: Duflo and Chattopadhyay, 2004, examine the impact of the random assignment to villages of the reservation of one third of the position of the Panchayat head, the Pradhan, to a women, which allows for the examination of the impact as if an experiment had been conducted. They use data from 265 Panchayats in West Bengal and Rajasthan to compare the type of public goods provided in reserved and unreserved Panchayats. The main result is as follows: "In West Bengal, women complain more often than men about drinking water and roads, and there are more investments in drinking water and roads in Gram Panchayats (GPs) reserved for women. In Rajasthan, women complain more often than men about drinking water but less often about roads, and there are more investments in water and less investment in roads in GPs reserved for women." (p. 1411). Beaman et al. (2006) extend the analysis in Chattopadhyay and Duflo (2004)

to 11 Indian states and investigate the impact of female leadership on the availability and quality of and the satisfaction with public goods. They use the all-India Millennial Survey data of the Public Affairs Center to develop a composite index of quality. The degree of satisfaction with services is approximated by household information on the reliability of service provision and the overall satisfaction with public goods provision. Consistent with Chattopadhyay and Duflo, they show that female-headed reserved GPs have more public goods, especially in the area of drinking water. The quality of these goods is at least as high as in non-reserved villages. Although female presidents in reserved GPs provide better services in terms of quality and quantity than their male counterparts, male and female villagers are still more dissatisfied with the service provision in female-headed GPs. This finding might be due to the traditionally vested bias against disadvantaged groups like women.

However there are differences among states: Ban and Rao (2008b) use information on the characteristics of elected officials and GP public good investment activities in Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. The results suggest that female- and male-headed GPs provide similar services in the areas of drinking-water supply, health, sanitation, roads, transport, and electricity. However, GPs reserved for female presidents pursue significantly more education activities than unreserved constituencies.¹

Gajwani and Zhang (2008) use panel data from 144 villages in Tamil Nadu that was also included in the previous study. While female presidents have lower knowledge of the GP processes and functioning, and have fewer contacts with higher level Panchayat officials than their male counterparts, they provide as many public goods as their male counterparts. However, with some exceptions they are not providing public goods according to their preferences.

Rajaraman and Gupta 2012 also challenge the findings on the importance of female reservations for the allocation of public expenditures using data from 776 Gram Panchayats (GPs) conducted in 2006 in 17 districts of Madhya Pradesh, Chhattisgarh, Rajasthan and Orissa. They analyze water expenditures for drinking water, for irrigation and for sanitation out of the SGRY funds received by the village. Of these the drinking water expenditures (but not irrigation and sanitation expenditures) are commonly considered the most likely preference for women. The Probit regressions analyze whether or not there is an expenditure on water in a village, using reservation of the position of the sarpanch, access to hand pumps, spatial dispersion of the

population and per capita availability of SGRY funds as explanatory variables. The probability of expenditure on water is higher where per capita funding is more ample, and where access to hand pumps is lower and, spatial dispersion is higher, suggesting that the probability of an outbreak of water-borne diseases may lead to higher probability of water expenditure. The dummy variable for reservations is not statistically significant. It is unfortunate that the expenditures for water also include the irrigation and sanitation expenditures, for which no data is provided or nor findings reported that they are preferred by women.

In Deininger et al (2012) it has been shown that political reservation influences several intra-household variables like time spent on self-employment, and household work. However, the household level welfare impact due to time reallocations caused by political reservations needs to be explored. It is argued in the literature (Schultz 1999) that change in the bargaining power of women within households is attributable to increasing investment in women's human capital in the form of improved nutrition, health, schooling and family planning. Political agency of women has, however, not been considered.

Other factors that can affect time allocation include family inheritance of the household, as well as inherited wealth of individual members, and especially of women (Browning and Gortz 2006), which define power structure and preference for leisure over work, and off-farm wages for women (Kimmel and Connelly 2006).

To bridge the gap in the existing literature we explore the link between political reservations, public provision of home goods such as access to water; intra-household time allocations, and household welfare. We consider both the impacts of individual empowerment of women via own inheritance of land, and their political empowerment via political reservations. More specifically, we test the following hypotheses:

- 1) Household work by women is a significant impediment to their participation in the labor market.
- 2) Lack of access to drinking water contributes significantly to low productivity of household work.

- 3) Improved governance, particularly through political reservations for women will provide an important channel for redressing this constraint.
- 4) Enhanced women's participation in productive work as a result of better water supply significantly increases household welfare.

The paper is structured as follows: Section 2 describes the water policy in India. Section 3 describes the background and data and explains the various measures taken to redress problems of providing access to water. Section 4 outlines the methodology and Section 5 discusses the results. Section 6 concludes with policy recommendations.

2. Water Policy in India

Water supply and sanitation were added to the national agenda during the First Five Year Plan period (1951–1956), and increasing investments have been made in subsequent plans. A national water supply and sanitation program was introduced in the social welfare sector in the year 1954. The primary responsibility for providing drinking water in the country traditionally rests with the state governments and more specifically, the local bodies in the urban areas. The Centre allocates funds and ensures that funds are also provided in state budgets. Progressively larger allocations have been made for water supply and sanitation in the various Five Year Plans. The nodal agencies for rural and urban water supply and sanitation was the Rajiv Gandhi National Drinking Water Mission under the Ministry of Rural Development and the Ministry of Urban Development and Poverty Alleviation, respectively. Various other ministries and departments, financial institutions, external support agencies, non-governmental organizations and the private sector also play a role. A new National Water Policy was adopted in 2002, according primacy to drinking water, as in the earlier policy. Some states such as Karnataka, Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu have already drafted state policies based on the new national policy.

2.1 Accelerated Rural Water Supply Program (ARWSP)

The Central Government introduced the Accelerated Rural Water Supply Program (ARWSP) already in 1972–73 to assist the states and the union territories with 100 percent grants-in-aid to implement the water schemes in villages. The primary objectives of ARWSP were (a) to cover the residual “not covered” (NC), “partially covered” (PC) and “quality affected” rural

habitations, (b) evolve an appropriate technology mix, (c) improve performance and cost-effectiveness of ongoing programs, (d) create awareness on the use of safe drinking water, and (e) take conservation measures for sustained supply of drinking water. However, with the introduction of the Minimum Needs Program (MNP) during the Fifth Five Year Plan (from 1974–75), ARWSP was merged into MNP. The separate water program was reintroduced in 1977–78 when the progress of supply of safe drinking water to the identified problem villages under MNP was not found satisfactory. Comprehensive guidelines for the implementation of ARWSP were, however, only introduced in the year 1986. The implementation was usually done through PHED or Rural Development Department/Panchayati Raj Department/Board, Corporation, or Authority. If the program was to be implemented through more than one department in a given state, one of the departments was required to be designated as the nodal department responsible for planning, coordination, implementation, supervision and monitoring, and reporting.

2.2 National Rural Drinking Water Program (NRDWP)

The Tenth Plan, that was implemented during the period for which we have data (1999-2006), identifies the following unresolved issues in water supply: sustainability, availability and supply, poor quality, centralized versus decentralized approaches to water management, and financing of operation and maintenance (O&M) cost while ensuring equity with respect to gender, socially and economically weaker sections of the society, school children, socially vulnerable groups such as pregnant and lactating mothers, disabled senior citizens, etc. In order to address these issues, ARWSP and its guidelines have been revised (with effect from April 2009) and renamed these as the National Rural Drinking Water Program (NRDWP). The Government of India has been progressively increasing the annual financial outlay for the rural water supply sector over the years. Access to water was to be provided to 55,067 habitations without access to water, 331,000 slipped-back habitations, and 217,000 quality-affected habitations. Dealing with arsenic and fluoride contamination has also been given significance. NRDWP is also an attempt to adopt a strategy that will improve access to water for households. The focus of water security is on households instead of habitations.²

² The following norms are recommended for providing drinking water to rural population: (a) forty liters per capita per day (lpcd) of safe drinking water for human beings, (b) an additional quantity of 30 lpcd for cattle in the Desert Development Program

After the 73rd Amendment to the Constitution adopted in 1992, the responsibility for drinking water has been increasingly devolved to the Panchayati Raj Institutions (PRIs). The panchayats increasingly have been involved in the selection of the location of stand posts, spot sources, O&M, fixing of cess or water tariff, etc. In many states, rural drinking water schemes have been transferred to PRIs for O&M. To encourage this aspect and involve PRIs in O&M, the Government of India revised its guidelines for rural water supply scheme to provide for a 10 percent weight in the allocation of funds to states (these were implemented in 2009 and represent reforms that were effected at the end of our survey period). This weight is given to the rural population for managing their water supply schemes. Also, to reduce the tendency of state departments to operate schemes on their own and not transfer them to PRIs, the O&M component has been reduced from 15 percent to 10 percent. The states are also advised to set up corpus O&M funds at the PRI level, on which funds of 12th Finance Commission, user charges and tariffs, and O&M funds of Centre and the state can be imposed and used by the PRIs.

3. Data and Village and Household Characteristics

The data for this paper are based on the ARIS/REDS surveys of NCAER. These data provide us with a combination of community, household, and member level information based on a nationally representative sample of 241 villages from rural India across 17 states³ and collected over six rounds encompassing the period 1969 to 2006.⁴ There is detailed demographic information on households, participation in welfare schemes, governance, evaluation of governance by households and members of households, composite pattern of cultivation, infrastructure, and availability of public goods, etc. with community data. The data cover a period of considerable change in the rural economy of India, both in terms of structure as well as the policy regime. In addition it also allows tracing of the impact of changes in policy on the

areas, (c) one hand pump or stand post for every 250 persons, and (d) existence of the water source within the habitation or within 1.6 km in the plains and within 100 meters of elevation in the hilly areas.

³ The states include Tamil Nadu, Kerala, Karnataka, Maharashtra, Gujarat, Rajasthan, Punjab, Haryana, Himachal Pradesh, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Orissa, Chhattisgarh, Madhya Pradesh, and, Andhra Pradesh. The state reorganization that influenced Bihar, Madhya Pradesh and Uttar Pradesh, did not affect the selection of villages that have remained intact since 1969.

⁴ The first three rounds included Assam and Jammu and Kashmir. However, the 1982 round did not include Assam, while the 1999 round excluded Jammu and Kashmir (both rounds got affected by the law and order situation prevailing in these states at that time). The current round excludes both these states.

households and fixes these within a policy space. In this paper we use data from the 1999 and the 2006 rounds, because it is for this period that we have consistent data on panchayats, gram sabhas, expenditures, and the participation by households in village level decision making⁵. The 2006 round has surveyed 8,659 households out of which 5,885 represented the panel covering the 2006 and 1999 round.⁶

The data are in three parts, namely listing, community, and household schedule. In the rounds prior to 2006⁷ the listing data was confined to identifying households for the detailed survey. However, in the current (2006) round listing represents a census of the village and forms the basis for detailed information on incomes, occupations, voting, land holdings and network formation. The community data set contains information on the structure of governance in these villages, incidences of village wide shocks, composite pattern of cultivation, infrastructure, and availability of public goods, etc. The household survey provides detailed information on participation in governance, welfare programs, assessment of quality of welfare programs, information on networks, voting behavior, *jati*, apart from the usual details of cost of cultivation, household characteristics, etc.

The summary statistics from the two rounds of survey are presented in Table 1. About 30 percent of the villages are reserved for female Pradhans. Village expenditures on water increased from about Rs 56,000 to Rs 60,000 in 1999 Rupee. Average number of public water taps increased slightly to 3.44, but the number of drinking wells remained about constant. The number of public toilets in the villages saw a sharp increase from 0.39 to 0.67 on an average. The proportion of houses with electricity connection went up by 6 percent and had reached almost 50 percent.

Per capita consumption has increased by over 10 percent and the poverty head count has gone down by about 5 percent to 25 percent. Real wages have gone up for both farm and non-farm jobs. Those for non-farm jobs are close to 50 percent higher than for farm jobs. Real income from agricultural wages has decreased by around 700 rupees, perhaps on account of increasing agricultural mechanization and reduced farm sizes, while rural non-farm wage income has

⁵ For the purposes of estimating the impacts at the household level, we use the “panel” of households, which are those households that were surveyed in 1999 also.

⁶ The household sample has compensated for attrition through a random addition to the original sample since 1982. Ten households were randomly selected for listing in each of the survey rounds. Thus the sample remains representative.

⁷ The listing component of the survey was completed in 2006 while the household survey was administered between 2007 and 2008.

increased by 1200 rupees. Average household size has declined from 6.2 to 5.2 members, along with cultivated area that has reduced by about 0.6 acres. In line with national trends, years of schooling have increased by eight months, and in the younger cohort, girls now receive as much education as boys.

Table 1: Village and Household Characteristics

Variables	2006	1999
<i>Village characteristics</i>		
Women's reservation: current panchayat	0.31	0.27
Village expenses incurred on water	60454	56256
Average number of public taps in a village	3.44	3.10
Average number of drinking wells in a village	2.51	2.55
Average number of public toilets in a village	0.67	0.39
Proportion of households with secure water source	0.88	0.76
Proportion of houses with electricity connection	0.49	0.43
<i>Household characteristics</i>		
Per capita consumption (Rs)	6568.2	5857.37
Poverty (head count)	24.98	30.60
Household real agriculture wage income (Rs)	3257.5	3930.9
Household real non-agriculture wage income (Rs)	4937.94	3735.5
Farm wage (combined for males and females)	62.81	50.44
Non-farm wage (combined for males and females)	93.16	66.54
Household size	5.24	6.23
Years of schooling	5.11	4.46
Land owned	4.61	5.25
Time to collect water (minutes)	70.98	93.4
Days spent in household work	156.3	175.6
Number of days worked (permanent, casual, family labor)	161.05	126.38
Farm days worked	165.23	158.57
Off-farm days worked	227.27	196.54
Number of days worked (permanent, casual, family labor) by women	93.23	74.63
Farm days worked by women	102.86	93.73
Off-farm days worked by women	147.41	111.40
Approached pradhans to complain about water problems	0.60	0.48
Actions taken to solve water problems	0.29	0.25

The time spent by women for household work has declined significantly. Women spend on an average 156 minutes per day doing household work compared to 176 minutes during the

previous survey period. This decline is almost entirely accounted for by the decline in time for fetching water of over 22 minutes per day⁸. Women have been able to add nine farm labor days and 36 days of off-farm work, a very large growth in total days of gainful employment. Men have been able to add slightly fewer days to their gainful employment.

The ability to hold elected officials to account has improved. Sixty percent of households surveyed report that they have members who have approached elected representatives to complain about problems related to water, an increase of 12 percentage points. However, problem resolution has not greatly increased. Only 29 out of 60 percent report problem resolution while this was 25 out of 48% in the previous round.

4. Methodology

We use the ARIS/REDS data sets to examine the impact of political reservations on (i) time spent in collecting water, (ii) salaried employment, (iii) productive works like self-employment and own cultivation, (iv) participation in non-farm work, and (v) household welfare. We can treat political reservations of the position of village Pradhan for a woman as a random experiment. Reservation status of a village at any time t is orthogonal to all other variables and incidence of reservations at time t and time $t + 1$ are also orthogonal to each other. A time trend associated with any variable such as time allocation, a welfare indicator associated with technical change or, any exogenous income trend will affect all villages in the same way, irrespective of their reservation status. Hence such trends will not contaminate the effect of past reservations on current time allocations or welfare. We can, therefore, read off the impact of reservations on time allocation and welfare indicators directly from two way tables. By looking at the impact of past reservations for women – also a random event – we can also test the persistence of effects caused by political reservations. Since reservations will be in place for a limited time, their impact may or may not persist. If the impact persists, then the total long-term effects of the reservation system could exceed the direct impact in the current period (Beaman et al. 2009, Deininger et al. 2012 a, b).

⁸ Census of India 2011 suggests that the problems associated with access to drinking water are still quite significant. Twenty percent of all households travel upwards of half a kilometer (one way) to fetch water.

Political reservations have both direct and indirect impacts on time allocations. The indirect effect arises out of the ability to participate in the process of governance. If political participation improves then the provision of public goods for which members of households spend time in accessing, will improve. The direct effect is due to intra-household dynamics getting altered. If women are empowered politically, then this could lead to changing the composition of time allocations by various members of the household. To probe these indirect effects we use multiple regressions. Our empirical strategy will first examine the indirect effects via village governance. We next use the predicted outcomes due to such indirect effects in the estimation of household welfare. The total effect of reservations on the time spent in accessing water can be measured using the following simple OLS regression.

$$O_{ivt} = \beta_v + \beta_1 R_{vt} + \beta_2 R_{vt} * Z_k + \beta_3 R_{vt-1} + \beta_4 R_{vt-1} * Z_k + \beta_5 R_{vt-2} + \beta_6 R_{vt-2} * Z_k + \beta_7 DE_{t-1} + \beta_8 \Delta DE_{vd} + \beta_9 X_{ivt} + \varepsilon_{ivt} \quad (1)$$

Where, the subscripts i, v and t denote members of households, villages, and time periods respectively, and O_{ivt} is the outcome variable of interest. We examine the impact of political reservations on three outcomes related to water management, viz. time to collect water, existence of problems related to water in the village, and the ability to complain about water related problems to the elected representative. β_v denotes village fixed effects, R_{vt} is a dummy that takes the value 1 if a village v is politically reserved at time t , and 0 otherwise, R_{vt-1} and R_{vt-2} indicate lagged reservation dummies (allowing us to measure the persistence of reservation effects), Z_k is a dummy for female household members (Political reservations dummy is interacted with Z to examine whether women residing in reserved villages are able to participate in the process of governance related to water and whether time spent in fetching water in such villages is different for women compared to their male counterparts). DE_{t-1} is the district level expenditures on water in district d during the Panchayat period $t-1$, ΔDE_{vd} is the growth in district level water expenditure (over the three Panchayat periods), and X_{ivt} is the vector of various exogenous household level characteristics such as gender, age, marital status, caste, education, landlessness and household size. We also include district dummies in the above OLS regression to control the various district fixed effects. Since we use the predicted value of the

outcome variable, in order to control any upward bias in its estimate we control for both the level and growth in the district level expenditures associated with water. Both these variables are exogenous to political reservations at the level of Panchayats.

The relationship between welfare and time allocation is written as follows:

$$\ln y_{it} = \sum_{A=1}^4 \alpha_A \mathbf{T}_{Ait} + \delta_{mt} \mathbf{M}_{mit} + v_t + \varepsilon_{it} \quad (2)$$

Where, subscript i is the ith member of a household, t is the time period, T_A is a vector of explanatory variables such as the time allocations, that is, time spent on various activities such as household work, salaried employment, off-farm wage employment, and self-employment and own-cultivation such that $\sum_A T_A \leq 1$.

The variables in the vector \mathbf{T}_{Ait} could be potentially endogenous to household income. Hence we use a vector of instrumental variables to predict them. The prediction equation in the first stage is specified as follows:

$$T_{Ait} = \beta_l \mathbf{B}_{lit} + v_{it} \quad (3)$$

and \mathbf{B} is a vector of instruments to predict the time allocations, and include the following variables: political reservations (current and previous panchayat periods), reservations interacted with female members (current and previous panchayat periods), predicted time to collect water by females (obtained from equation 1 above), land inheritance by females, inherited household wealth by females, time spent in accessing water by females, predicted off-farm wages earned by females, and village shocks.

We assume that (i) $E(Z'X) \neq 0$ (i.e. all instruments are relevant to the vector \mathbf{T}_{Ait} , and \mathbf{B}_{lit} affect \mathbf{T}_{Ait}) and (ii) $E(Z'\varepsilon) = 0$ (i.e. the instruments used are valid and uncorrelated with ε). We compute the partial R^2 (Shea 1997) of relevance of the instruments (also called the test for excluded instruments). If the value of R^2 is high and standard error is low then the instruments are sufficiently relevant to explain the endogenous regressor. This test performs under the null hypothesis, i.e. the instruments lack sufficient relevance to explain the endogenous regressor. If

the null hypothesis is rejected then there are no redundant instruments that have been included. We have also used the Anderson canonical correlation likelihood ratio test under the null hypothesis that equations are under identified (we expect the null to be rejected in our specification)⁹. If our specification is identified then we wish to test whether the identification is strong or weak using the Cragg–Donald’s F-statistic under the null of weak identification¹⁰. The Sargan test¹¹ has been used for over identification. Results from the various tests suggest that (1) no redundant instruments have been used, (2) the equations are not under-identified, (3) there are no weak instruments, and (4) the over-identification test is rejected. The second stage equation is specified as follows:

$$\ln y_{it} = \gamma_1 \hat{\mathbf{T}}_{Ait} + \delta_{mt} \mathbf{M}_{mit} + v_t + \varepsilon_{it} \quad (4)$$

where $\hat{\mathbf{T}}_{Ait}$ is the vector of predicted time allocations obtained from the first-stage estimation of equation (3), vector of household characteristics \mathbf{M}_{mit} of household m in which member i lives include: age, education, marital status, caste and household size. Vector v_t denote village fixed effects and ε_{it} is the random error.

5. Results

Table 2 illustrates the socio–economic divergence by income classes in accessing water by rural households. Economically weaker sections, in general, have poorer access in terms of average time spent per day in fetching water, spending on average 78 minutes per day while it is only 47 minutes per day for the affluent households. In the poor households, men spend a similar amount of time fetching water like women, but in the more affluent households, women spend more than twice as much time as the men.

Table 2: Access to Water by Income Class

⁹ The under-identification test is a Maximum Likelihood test of whether the equation is identified, i.e. the excluded instruments are “relevant”, i.e. correlated with the endogenous regressors. The test of the rank of the matrix: under the null hypothesis that the equation is under-identified. A rejection of the null indicates that the matrix is full column rank, i.e. the model is identified.

¹⁰ Cragg–Donald’s F-statistic tests whether the equation is weakly identified, i.e. if the F-statistic is greater than 10 then, the instruments are not weak.

¹¹ The Sargan is a test of over-identifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e. uncorrelated with the error term.

Poverty status	Average time spent (minutes)		
	Whole sample	Male	Female
Ultra poor	78	76	85
Poor	72	70	77
Non-poor	61	40	58
Affluent	47	22	49

Note: Ultra poor: <8000; poor: 8000–50000; non-poor: 50000–200000; affluent: >200000 (income in rupees (annual))

It has been suggested (Kochar et al., 2007) that if societies are segregated, then provision of public goods can also reflect such segregation. Along these lines Munshi and Rosenzweig (2008) argue that parochial considerations could drive the provision of public goods and services. Therefore, can location explain variations in outcomes germane to the access of water? In Indian villages, choice of residence is not really endogenous to households, but residential location is historically determined by factors related to occupation and *Jati* (the sub-caste to which an individual belongs). Following Munshi and Rosenzweig (2008), streets where certain *Jatis* reside could be discriminated in favor of or against in terms of locating a public good such as water. Therefore, street location of residence should explain much of the variance in access. Table 3 shows that the share of the variance in access to water as explained by location is significant¹². For example, streets explain 16 percent of the variation in the number of trips made by members of the households to fetch water and 10 percent of the variance in time spent in fetching water. However, when the number of trips or the time spent increases, up to 96 percent of the variance is explained by location. These results suggest that the distribution of water resources within villages is significantly discriminatory.

Table 3: The Proportion of Variation in Variables Reflecting Access to Water Explained by the Street of Residence

Variables	Number of daily trips	Time spent in fetching water	Time spent in fetching water (>60 minutes)	Number of trips (10–15)	Number of trips (>15)
R Square	0.16	0.10	0.47	0.65	0.96

Can effective governance produce favorable outcomes related to water? With improved governance, members of households are able to participate in the decision making process

¹² We regress the time spend (number of trips made) on location dummies.

related to budgeting and allocations germane to the provision of public goods and services. The ARIS/REDS surveys show that political reservation empowers women and enables them to participate effectively, for example, in gram sabha meetings. Villages are chosen at random for female reservations, so we can directly observe the causal impact of reservations on participation from the descriptive data. The quality of such participation is better in villages that are reserved to either caste or women. The incidence of women protesting and raising questions during gram sabha meetings is higher in reserved villages. The decline in the magnitude of participants in gram sabha meetings who were passively observing the proceedings is significant. It has come down from 38 percent to 12 percent. From Table 4, we also note 21 percent of the female respondents who participated in the gram sabha meetings in villages that had reservations at least once during the past 15 years, reported being able to protest against the current form of governance. This is up from 12 percent in villages that never had reservations.

Table 4: Political Participation and Willingness to Contribute towards Local Development

Gram Sabha meetings		Reserved (SC/ST/Women)				Reserved (Women only)			
		Male		Female		Male		Female	
		R	U	R	U	R	U	R	U
Number of meetings attended		6.18	5.73	7.01	6.89	5.52	6.25	7.76	3.26
<i>Nature of participation</i>									
Presented issues		0.23	0.21	0.24	0.16	0.18	0.22	0.27	0.22
Raised questions		0.15	0.14	0.18	0.13	0.14	0.16	0.17	0.12
	Discussed	0.15	0.14	0.23	0.20	0.12	0.18	0.25	0.16
	Protested	0.20	0.19	0.24	0.17	0.18	0.23	0.21	0.12
	Observed only	0.32	0.31	0.15	0.34	0.36	0.21	0.12	0.38
<i>Households willingness to contribute for</i>									
Health		0.15	0.19	0.23	0.20	0.14	0.19	0.25	0.20
Education		0.18	0.12	0.17	0.18	0.15	0.19	0.22	0.21
Roads and transport		0.20	0.19	0.22	0.21	0.18	0.20	0.26	0.18
Drinking water		0.31	0.29	0.32	0.25	0.29	0.27	0.33	0.24
Electrification		0.23	0.17	0.22	0.23	0.21	0.20	0.25	0.22

R – Reserved; U – Unreserved

If women participate in the process of governance, will they then be willing to contribute to village development? The survey asked both male and female respondents of households about their willingness to contribute to local developmental efforts. Each respondent was asked whether he/she will be willing to contribute Rs 100 per month towards the development of any specific issue, water, roads, health, electricity, sanitation, law and order, and education being the choices. We find that both men and women are willing to contribute towards all public goods but that in all cases women are slightly more willing to contribute than men. Among amenities, willingness to contribute towards improved provision of water is the highest for both men and women (Table 4). When reservations are broader, i.e. for either Scheduled Castes or Scheduled Tribes, both men and women are more willing to contribute to most of the services. When the reservations are specifically for women, the willingness of men to contribute is lower (except for water), while that of the women is generally higher. We note that 33 percent of all women respondents are willing to contribute towards the development of water resources in villages that are reserved for women, while the percentage for men is 29, up by two percent from when the village is unreserved.

Table 5 illustrates the dichotomy between households' preferred pattern of expenditures and the actual expenditures. As part of 73rd amendment, expenditures incurred must be based on a village plan which will take into account the preferences of households. We find that there is a significant difference between the expected shares of expenditures for water and the actual share, indicating both difficulties in disbursement of allocated resources as well as a mismatch between allocations and preferences. This undoubtedly leads to inefficiencies in resource use. This is not surprising, since in India the fund flow follows a silo structure where much of the decisions regarding allocations (both magnitudes and the choice of public goods and programs) as well as contracting and disbursements are made outside the village at higher levels of the bureaucracy related to Panchayati Raj. Table 5 illustrates two outcomes. First, the dichotomy is persistent across Panchayat types (i.e. whether the Panchayat is currently reserved or, has never been reserved or has been reserved at least once in the past 15 years). The differences in allocations for water between Panchayats currently reserved and those reserved at least once (ever reserved) are small. Second, and consistent with Deininger et al. (2011), we also find that political reservations have a legacy effect: if there are improved government allocations during the period

in which reservations were in place then, even after the reservations lapsed, such improved allocations remain in force. The allocations in villages that have been reserved at least once are the highest (22%). Since these villages are not reserved now and the allocations remain high it is evidence of supporting legacy (long run) effects of reservations.

Table 5: Expected versus Actual Expenditure Shares for Water by Reservation Status (for women)

Status of reservation	Expected expenditure shares		Actual expenditure shares	
	Mean	Std dev	Mean	Std dev
Reserved in current period	0.32	0.18	0.20	0.12
Ever reserved	0.34	0.15	0.22	0.10
No reservations	0.25	0.14	0.16	0.08

The survey also finds that both women and men prefer increased commitment of monetary resources to improving water relative to all other public services and goods. Each respondent was asked separately: “The government will give Rs 100,000 (approximately \$ 2000) towards the development of one public good but only if the majority vote in favor. If you had the tie breaking vote which public good will you choose?” The findings in Table 6 shows that in currently reserved Panchayats 33 percent of female and 32 percent of male respondents reported that they would cast their tie breaking vote in favor of water, while for all other public goods combined these percentages are only 67 and 68, respectively. These percentages are only slightly different in villages that were reserved at least once. However, there is a significant difference between Panchayats that have never been reserved and those that have been reserved at least once or are currently reserved.

Table 6: Tie Breaking Vote on Water and Other Public Goods

Status of reservation	Male/female	Drinking water		Other public goods	
		Mean	Std dev	Mean	Std dev
Currently reserved	Male	0.32	0.46	0.68	0.46
	Female	0.33	0.47	0.67	0.47
At least once reserved	Male	0.30	0.46	0.70	0.46
	Female	0.32	0.47	0.68	0.47
Not reserved	Male	0.24	0.43	0.76	0.43
	Female	0.23	0.43	0.77	0.43

The findings reported in Table 7 show that both current as well as past reservations reduce the time of both females and males in fetching water, although the effects are not statistically significant for females in currently reserved Panchayats and for males in earlier reserved Panchayats. In currently reserved Panchayats women have been able to increase their time in own crops, own livestock, other productive work, and non-arm self-employment activities, while males were able to increase their time allocated to own livestock, non-farm employment, non-farm self-employment and other productive works. Both genders reduced their agricultural wage labor slightly. For past reservations the reallocations are not the same for both genders, however.

Table 7: Impact of Current and Past Reservations on Current Time Allocations

Items of work	Female respondents			Male respondents		
	Currently reserved			Currently reserved		
	No	Yes		No	Yes	
<i>Number of days spent</i>						
Housework	61.05	60.61		15.10	14.82	*
Fetching water	48.11	45.47	**	21.52	20.37	
Other productive work	19.31	20.67	***	49.49	52.14	***
Agricultural wage labor	4.582	4.189	**	9.640	9.155	**
Non-agricultural wage labor	0.780	0.694		10.26	12.091	***
Own crops	4.032	4.336	**	12.37	12.09	
Own livestock	8.672	9.796	***	8.959	9.897	***
Self-employment	0.761	1.213	***	7.350	7.578	
Number of observations	29,212	13,105		29,301	13,665	
Items of work	Female respondents			Male respondents		
	Reserved in past			Reserved in past		
	No	Yes		No	Yes	
<i>Number of days spent</i>						
Housework	61.43	60.32	***	15.10	14.91	
Fetching water	51.18	51.02	*	22.51	21.64	
Other Productive work	20.10	19.29	***	49.81	50.96	**
Agric. wage labor	4.805	4.056	***	9.761	9.160	**
Non-agricultural wage labor	0.532	1.013	***	10.37	11.40	***
Own crops	4.442	3.755	***	12.76	11.71	***
Own livestock	9.053	8.981		9.001	9.560	***
Self employment	0.752	1.075	***	6.666	8.318	***
No. of observations	22,844	19,473		23,285	19,681	

Do political reservations lead to improved quality of governance and empower women? The regression results shown in Table 8 suggest that political reservations reduce the time spent by women in fetching water, and they do so more convincingly than the two-way Table 7. Any type of reservation will have this impact, but the impact is larger if the reservation is for women than for a scheduled caste or scheduled tribe. The regression results also suggest a significant degree of persistence of these effects of political reservations. We also find that both the initial level of public expenditures on water, as well as its growth over time, reduces the time women spend fetching water.

In reserved Panchayats the magnitude of problems associated with water faced by women is more than in unreserved Panchayats. However, the interaction terms with females suggest that when the reservations are specifically for women, water problems are reduced. However, all forms of reservations increase the complaints raised about water. Clearly, reservations improve governance in general and especially the political agency of women.

Table 8: OLS Specification of Time Spent in Collecting Water, Problems Related to Water Access, Complaints to Elected Representatives and Non-Agricultural Wage Rates

Variables	Ln (Time to collect water)	Problems ^a	Complaints raised ^b	Ln (Non-agricultural female wage rate)
Reserved (γ)	-0.179*** (0.017)	0.329*** (0.028)	0.395*** (0.020)	0.232*** (0.072)
Reserved*female (λ)	-0.398*** (0.020)	-0.141*** (0.024)	0.323*** (0.023)	0.240** (0.103)
ReservedLag1 (γ_1)	-0.228*** (0.017)	0.138*** (0.020)	0.229*** (0.019)	0.107*** (0.026)
ReservedLag1*female (λ_1)	-0.361*** (0.022)	-0.0239 (0.026)	0.100*** (0.025)	0.066*** (0.015)
Growth in water exp [†]	-0.0209*** (0.001)	-0.0123*** (0.001)	0.011*** (0.001)	
Initial district water exp ^{††}	-0.0475*** (0.008)	0.0106*** (0.001)	0.0151*** (0.001)	
Constant	2.607*** (0.021)	1.544*** (0.031)	1.749*** (0.031)	13.20*** (0.106)
$\gamma + \lambda = 0$	336.71***	83.29***	13.15***	24.98***
$\gamma_1 + \lambda_1 = 0$	60.65***	31.82***	43.51***	21.65***
F-test	172.02***	250.80***	199.27***	81.28***
Observations	44718	44718	44718	44718

Notes:

*, **, and *** denote significances at 10%, 5% and 1% levels respectively. District fixed effects, household and individual characteristics (age, sex, education, marital status, caste, and household size) included in the regression.

[†] Logged growth in the District-level water expenditure between 2002–03 and 2005–06.

^{††} Log of water expenditures in the initial (1999) Panchayat period. *a*, *b* are binary variables.

The literature identified three channels through which reservations could affect long-term outcomes beyond the immediately reserved period. First, they might prompt those who previously had not participated in political process to change their behavior permanently. Evidence for persistent effects via greater participation along these lines is available from rural West Bengal (Beaman et al. 2010), South India (Besley et al. 2005) as well as urban Mumbai (Bhavnani 2009). This is plausible as previously ignorant voters might require time to learn about how to access and use information most effectively to hold leaders accountable. Second, reservations may trigger a process of learning and revision of prejudices as in cases where exposure to female leaders led to revision of stereotypes regarding women’s leadership qualities

(Beaman et al. 2009). A third option less documented in the literature is that, if it increases voice or shifts the composition of public goods in a direction that benefits certain groups, reservation may lead to increased contributions to public goods.

Empowerment of women through political agency could also lead to better bargaining power in the labor markets and/or to lower discrimination. Both would lead to increases in their wage rates. We find that off-farm wage rates for women in Panchayats currently reserved is 24 percent more than in Panchayats where there is no such reservation. However, this difference is much smaller for women in previously reserved Panchayats.

We have already seen that women in these villages have reduced their time for fetching water and increased their time in productive work that could increase household welfare. How much of this is caused by empowerment via reservation versus other forms of empowerment is shown in Table 9¹³.

Table 9: Household Work and Labor Participation (First Stage Results)

Variables	Ln (Household labor days)	Ln (Other labor days)	Ln (Self-Employment and own cult days)	Ln (Non-agricultural labor days)
Reserved	-0.405***	-0.238***	0.302**	0.223***
	(0.114)	(0.0499)	(0.0500)	(0.0736)
Reserved*female	-0.773***	-0.204***	0.153**	-0.175
	(0.066)	(0.0725)	(0.0726)	(0.107)
ReservedLag1	-0.161***	-0.181***	0.222***	-0.1979***
	(0.033)	(0.0449)	(0.0450)	(0.0463)
ReservedLag1*female	-0.541***	-0.131***	0.0527**	-0.1494**
	(0.149)	(0.0450)	(0.0251)	(0.0359)
Predicted time to collect water*female	0.207***	-0.0497***	-0.833***	-0.0808***
	(0.0229)	(0.0062)	(0.0262)	(0.0133)
Predicted non-agricultural wage*female	-0.154***	0.0730***	0.298***	0.151***
	(0.0172)	(0.00751)	(0.00752)	(0.0111)
Inherited land by women	-0.1419***	-0.0591*	0.382***	-0.552***

¹³ The impact of political reservations as well as other forms of empowerment on total labor days worked is shown in Appendix II.

	(0.030)	(0.0349)	(0.0350)	(0.0515)
Inherited wealth*female	-0.189***	-0.0721***	0.0740***	0.0535**
	(0.016)	(0.0207)	(0.0207)	(0.0247)
Village shocks	0.0734***	-0.0397***	-0.0609***	-0.101***
	(0.0191)	(0.00835)	(0.00837)	(0.0123)
Constant	-5.469***	-14.79***	2.654***	-12.85***
	(0.121)	(0.0530)	(0.0531)	(0.0781)
Test for excluded instruments Anderson Canonical LM test Cragg–Donald Wald F-test	1073.33***	67.65***	603.57*** 102.43*** 21.54***	331.77***
Observations	44718	44718	44718	44718

Notes:

Standard errors in parentheses

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

Political reservations lead to reductions in household work for both genders but more so for women. This can be attributed to improved productivity of household work for all members due to reduction in the time spent in accessing water. This enhances the ability of all members in general and women members in particular to participate in activities outside their household. For women, every hour of fetching water increases the time in household work by 0.2 hours, which means that there is a concomitant decrease in the hours of other housework. Therefore, getting better water supply frees up time for all the three other productive activities, with most of the gains going into self-employment activities.

An increase in the non-farm wage also reduces women's time in household work with an elasticity of 0.15 and increases other labor employment by only 7.3 percent while non-agricultural employment goes up by 15.1 percent and self-employment by 29.8 percent compared to males.

A woman's own land inheritance sharply reduces non-farm labor days and to a lesser extent the days in household work, while at the same time increasing time in self-employment activities. Inheritance of wealth by the family as a whole reduces household work and leads to a

reallocation of the hours to non-farm and farm work. Inheritance provides avenues for households in general and women in particular to find ways of saving on household labor time. Hiring of household help is one such mechanism. Our data shows that there is a small but significant correlation between wealth, inheritance and hiring of household help in the form of servants. While we find a significant correlation between land inheritance by women and hired laborers for household work, the magnitudes are small¹⁴.

If participation in labor markets is still discriminatory then an important avenue for employment for women is their own lands or self-employment. Elsewhere (Deininger et al. 2011) have shown that access to land and micro credit are important determinants of reducing the barriers to participation in labor markets and wage gaps among genders. In combination, these results have important implications for policy related to land reforms and micro credit. Hence these results contribute to the larger discussion on wage discrimination in labor markets.

We know that improved governance and participation in the political process by women affects the provision of drinking water which could significantly influence intra-household time allocations. From the first stage results if the predicted time to collect water goes up by 1 percent then household work increases at the rate of 20.7 percent, other labor days decline at the rate of 4.9 percent, number of days engaged in self-employment and own cultivation declines at the rate of 88 percent and non-agricultural labor days decline by 15.4 percent. Given the elasticities with respect to time allocations reported in the second stage results (Table 10), a 20.7 percent increase in household labor days due to increase in time spent in fetching water by women will lead to 19.68 percent decline in real incomes for women (other things remaining constant). Political agency also affects the off-farm wage rates for women. If off-farm wage rates go up by 1 percent

¹⁴ Correlation between inherited land, wealth and hiring of servants/permanent laborers

Wealth (Rs)	Correlations between servants hired and wealth
<60K	0.0206
60K–100K	0.0220
100K–500K	0.0298*
>500K	0.2557***
Land inheritance by women	0.162***

the decline in the time spent in household work for women is 15.4 percent¹⁵. The impact of increase in off-farm wage rates on real income for women is 16.14 percent.

The second stage results are reported in Table 10. The Sargan test shows that over identification is rejected. The Hausmann–Wu and Durbin–Wu–Hausmann tests show that we are dealing with endogenous regressors and that such endogeneity has been corrected by the inclusion of well specified instruments.

All types of gainful labor increase employment incomes significantly with elasticities 0.37, 0.29 and 0.26 for self employment, non-farm employment and other employment respectively. We know from the first stage regressions that time fetching water has the largest impact on labor allocated to self employment activities with an elasticity of 0.83, and from the second stage regression that the elasticity of income with respect to self employment time is 0.37, and the product of these elasticities is approximately 0.31. Therefore a decrease in hours fetching water by 10 percent will lead to an increase of self employment income by 3 percent. However, returns from off-farm employment or other labor are not far behind, their elasticities are 0.29 and 0.26, respectively. Household work marginally reduces real incomes and has an elasticity of 0.03. Relative to men, the estimated elasticities of gainful employment time of women with respect to time fetching water are 0.83 for farm and non-farm self employment, 0.08 for nonagricultural labor, and 0.05 for other labor, indicating that overwhelming reallocation of time is in favor of self-employment activities. An increase in the non-farm wage also reduces women's time in household work relative to men with an elasticity of -0.15. It increases time allocated to self employment, nonagricultural employment and other employment with elasticities of 0.3, 0.15 and 0.07. Surprisingly the impact on self employment is larger than for wage employment even in the case of a wage increase.

To conclude this section we see that improvements in water supply have a very significant effect on women's incomes, primarily via their self employment activities in agriculture and the nonfarm sector.

¹⁵ The lower elasticity of household work with respect to off-farm wage rates compared to the elasticity with respect to time spent in fetching water is indicative of labor market imperfections.

Table 10: The Impact of Participation in Gainful Employment on Income (Second Stage)

Variables	Ln (Real income – member level)
Ln (other labor days)	0.260*** (0.031)
Ln (self-employment and own cultivation)	0.371*** (0.006)
Ln (non-agricultural wage labor)	0.292*** (0.017)
Ln (household work)	-0.0284*** (0.004)
Constant	14.03*** (0.894)
Sargan Test	32.514***
Wu–Hausman F test	329.47***
Durbin–Wu–Hausman chi-sq test	1086.54***
Observations	44718

Note: Standard errors in parentheses

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

6. Conclusions

We find that both men and women care about the provision of drinking water, both are most willing to contribute financially to improve water services, and both save time fetching water if it improves. In terms of governance, both genders show a decline over time in passive participation in Gram Sabha meetings.

The time spent in fetching water by women represents nearly 22 percent of their working days and represents a significant relatively unproductive component of their work time. Policies leading to improved provision of water to households will clearly enhance welfare. There is significant variation in the time spent in fetching water by women owing to sharp variations across villages and neighborhoods in the provision of this public service. In this paper we show that improved governance, in particular, brought about by reservations of Panchayat head's position to women, leads to greater provision of drinking water, improved problem solving, and greater willingness to contribute to the costs of water.

Political reservations in favor of women reduce the time spent by both women and men in fetching water. The time is reallocated in favor of productive activities, in the case of women primarily to farm and non-farm self-employment activities. We predicted the reallocation of time to different types of gainful activities and used it later to estimate the likely income impact of improved water provision. Increase in all types of gainful labor increase employment incomes significantly with elasticities of around 0.3. Because the impact of better water on farm and off farm self employment is particularly large we find a final income elasticity of time saved in fetching water of about 0.3, while it is much smaller for the other types of labor. Therefore a decrease in hours fetching water by 10 percent will lead to an increase of self employment income by 3 percent. Improvements in water supply (apart from the positive impact on health of men and women), have a very significant effect on women's incomes.

Finally, we find that political reservations, and the associated empowerment of households belonging to vulnerable castes, and especially of women, also tend to increase women's non-farm wage rates, suggesting that it reduces discrimination in the labor market.

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Robustness Check

As a robustness check, we also use difference-in-difference specification that applies to our estimation strategy to households in the reserved villages who could be affected by reservation policies over three Panchayat periods. This allows us to test whether coefficient estimates in the OLS specification mistakenly pick up time trends in examining access to water facilities. Considering female household members as the treatment group and male members as the control group, we capture possible differences between the two groups in currently reserved and ever reserved villages. In the following specification,

$$Y_{ivt} = \beta_v + \beta_1 R_{vt} + \beta_2 Z_{vt} + \beta_3 R_{vt} * Z_k + \beta_4 \mathbf{X}_{ivt} + \pi_{ivt}, \tag{A1}$$

$\beta_3 = [E(Y | Z = 1, R = 1) - E(Y | Z = 0, R = 1)] - [E(Y | Z = 1, R = 0) - E(Y | Z = 0, R = 0)]$ is the difference-in-difference estimate where $R = 1$ implies currently reserved (ever reserved) villages. We find from Tables A1 and A2 that access to water improves, although marginally, conditions for women living in villages currently reserved vis-à-vis previously unreserved and villages reserved at least once vis-à-vis never reserved.

Table A1: Difference-in-Difference (Currently Reserved and Previously Unreserved Panchayats)

Model	Time to collect water
Female	0.484*** (0.040)
Reserved	-0.406*** (0.036)
Female*Reserved	-2.129*** (0.049)
R square	0.20

Note: *, **, *** denote significances at 10%, 5%, and 1% levels, respectively. Village fixed effects, household and individual characteristics such as age, education, marital status, caste, and household size are included in the regression.

Table A2: Difference-in-Difference (Panchayats Reserved at Least Once and Those Never Reserved)

Model	Time to collect water
Female	1.667***
	(0.076)
Reserved	-0.449***
	(0.061)
Female*Reserved	-2.900***
	(0.080)
R square	0.21

Note: *, **, *** denote significances at 10%, 5%, and 1% levels, respectively. Village fixed effects, household and individual characteristics such as age, education, marital status, caste, and household size are included in the regression.

Political Reservations and Impact on Labor Market Participation

The first stage results in Table 9 suggest that political reservations empower women to bargain better in the labor market and alter the intra-household time allocations in their favor. In Appendix II we present results of the impact of political reservations on total number of days worked (Table A3). The predicted values of inherited wealth (Table A4), time to fetch water, and non-agricultural wage rates from Table 8 are used to estimate participation in productive work. We find that the number of days spent in productive work by women in reserved villages is 59 percent more than those by women in villages that are not reserved. Any increase in the time to fetch water will reduce productive work by 12.9 percent. The results are consistent with what we find in the first stage outcomes presented in Table 9.

Table A3: Political Reservations for women and Labor Participation

Variables	Ln (All labor days ¹⁶)
Reserved	0.341*** (0.102)
Reserved*female	0.590*** (0.152)
ReservedLag1	0.551*** (0.0948)
ReservedLag1*female	0.0293 (0.142)
Predicted time to collect water*female	-0.129*** (0.00331)
Predicted non-agric. wage*female	0.883*** (0.0146)
Inherited land by women	0.719*** (0.0740)
Inherited wealth*female	0.0993*** (0.0224)
Village Shocks	-0.0547*** (0.0188)
Constant	-6.075*** (0.104)
Observations	44718

Notes: Standard errors in parentheses

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

¹⁶ All labor days = (Self-employed and own cultivation days + Non-agricultural labor days + Other labor days)

Table A4: Inherited Wealth

Variables	Ln (Wealth)
Ln (Variance of education 99)	0.0344*** (0.00419)
Ln (Age 99)	0.381*** (0.0422)
Ln (Household size 99)	0.716*** (0.0262)
Ln (Inherited wealth 99)	0.0936*** (0.00254)
Departed father 99	-0.373*** (0.0869)
Departed brother 99	-0.0951 (0.0591)
Departed sister 99	-0.517*** (0.102)
Constant	8.377*** (0.164)
F-stat	401.59***

Note: Standard errors in parentheses

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

ⁱ Women leaders tend to more knowledgeable and wealthier women. Importantly, however, political experience enhances the performance of women leaders more than it does for men, in villages which are less dominated by upper castes, and in states that have relatively mature panchayat systems.

