Political Reservations, Access to Water and Welfare Outcomes: Evidence from Indian Villages[1]

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Abstract

In a developing economy with an ethnically diverse society, such as India's, household welfare and its distribution within the household unambiguously depend on how much time each member of the household spends on productive activity. In this paper we examine the welfare impact of reducing the time spent by members of households, particularly women, through political reservations in rural India. Using a unique data set we find that (i) Political reservations and the ability of women to participate in the process of governance contribute to household welfare by allowing women to participate in labor markets, essentially because provision of public goods and in particular water, increases the productivity of household labor time. (ii) The concomitant decline in household work and increase in labor market participation is a robust indicator of increased productivity of household labor time being translated into productive work. In particular women participate in self employment and on cultivation. The effect on household incomes caused by members engaged in self-employment activities and own-cultivation is higher compared to effects caused by participation in off-farm wage labor. (iii) Further, our results are robust to the inclusion of residential location, access to credit, and shocks.

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1. Introduction

Household welfare unambiguously depends on how much time each household member spends on productive activity. Further, distribution of utility within the household could depend on the allocation of time between productive and unproductive activities between members of the household. Time spent in accessing public services (henceforth PS) by rural households is a significant factor in determining household welfare. There is evidence to suggest that the time spent by members of rural households in accessing PS such as water is increasing over time. Intra household allocations of time have significant consequences for welfare of individual members. This is particularly so for women given their dual role within households as child caregivers, and fulfilling family responsibilities

Increased attention is being paid in the literature to understand the implications of the changing composition of time allocations by women. For example Leslie and Paolisso (1989) Glick and Sahn (1998) Glick (2002) show that conditioned on the dual role of women within families any discussion of policies that empower women will have to take into account the impact they will have on child welfare. There is evidence from several countries that women, in particular, spend a considerable proportion of their time in the household's common property activities such as fetching water, harvesting fodder, and collecting firewood. Such household work undertaken by children is common in rural areas of developing societies where basic household infrastructure and services are inadequately provided (Mitik and Decaluwe, 2009). The extant literature relating the links between provision of public services and intra-household allocation of time (e.g. Ilahi, 2000) shows that access to basic services affects intra-household time-allocation. Moreover, this is a better indicator of the health of the household in developing countries. Empirical evidence also suggests that increased time spent in accessing water will significantly alter women's work patterns and have adverse impacts on income-generating activities

In this paper we examine the welfare impact of reducing the time spent by members of the household -and women in particular- in fetching water. A South African survey in 2000 showed that girls on average spend two hours each day on fetching fuel and water while boys spend about 68 minutes for these tasks. According to a UNDP report, 70-80% rural women in India, on average, spend 47 minutes per day for water collection. In India a 2004-05 NSSO report (60th round) suggests that tube-wells/hand pump is the most prevalent source of drinking water in rural areas. 56 per cent of rural households report drinking water use from

tube wells whereas 13 per cent rely on 'pucca wells'. In developing nations such as India, Nigeria, and other African countries, girl children too have the responsibility of accessing PS such as water for the household. Anecdotal evidence suggests that in villages of Haryana, on average, a woman spends 138 minutes per day to fetch water. In rural Andhra Pradesh, the average time spent by female household members each day for fetching water ranges from 0.84 to 1.31 hours (Reddy, 1999). Governance can have a significant impact on the time spent in fetching water. Private availability of water is still marginal in countries such as India. Evidence also suggests that intra-village provision of public goods is influenced by parochial considerations. Munshi and Rosenzweig (2008), for example, have shown that households that are located in streets where the elected representatives reside have better access to PS such as water.

In India, high levels of social stratification and gender disparity, some of which seem to widen rather than narrow over time, provide the basis for policies mandating reservation of a certain share of political positions to females. The 73rd Amendment to the Indian Constitution, designed in 1992 and promulgated in 1993, mandated that one-third of all seats in all Panchayat councils and one-third of village-chief (pradhan) positions be reserved for women. The seats to be reserved are selected randomly in each election round. The devolution of power to local authorities, following 73rd and 74th Amendments, allowed elected political bodies to function as units of self-government, with gram Panchayats being the lowest tier of local government at the village-level. The President of gram Panchayat (pradhan) is responsible for the provision of key services such as drinking water, health, roads, education, and other administrative activities. This paper purports to examine whether this policy of reservation has reduced the time women spend in fetching water for their household.

Studies examining the implications of reservations have found contradictory evidence. Rajaraman and Gupta (2008) find that reservations are largely ineffective because the elected women are poorly educated and hence easily manipulated by politically powerful elites such as their husbands or other family members. However, when relevant characteristics — education and political experience – are accounted for, results could be different. A number of studies (Paxton and Hughes (2007), Reingold (1992), Saint-Germain (1989), Thomas (1989)) find that female participation in legislative processes tend to support policies in favor of family welfare and women's rights through allocation of funds for the provision of local

public services and infrastructure more relevant to women such as drinking water supply (Chattopadhay and Duflo, 2004). Women's political participation raises educational and health investments, particularly access to pre-natal care (Knack and Sanyal, 2000). Reservations also tend to increase women's participation in gram sabha meetings (Besley et al., 2005). Nevertheless, even if female reservation targets policy implementation in favor of women, the impact of such policies could be outweighed by redirecting resources away from those sectors during the next (unreserved) term (Deininger et al., 2010).

Our paper provides a consistent link between political reservations, provision of public services, intra-household time allocations and household welfare. We posit that a significant retardant to labor market participation by women is household work. Much of household work is due to accessing public services like water and other common property related activities. The present paper has the singular objective of showing that effective provision of PS and, in particular, water can produce significant welfare effects at the household level. Effective provision of a PS that leads to time saving-reduction of household work- alters intra household dynamics in favor of women. Since household work is a barrier to women's participation in labor market and other income earning activities, empowering women to make choices leads to significant welfare gains for the household. Local governance and other empowering mechanisms such as political reservations could be effective tools for enhancing household welfare.

Chattopadhyay and Duflo (2004) and Deininger et al. (2010) show that a significant outcome of political reservations is the improved provision and access to water. The latter paper draws upon the findings of Leslie and Paolisso (1989), Glick and Sahn (1998) and Glick (2002) and shows that conditional on the role of women within households, improving intra-household time allocations in favor of women can have significant positive outcomes for household welfare. Our paper is conditioned on the proposition that reduced time spent in accessing public goods for household consumption will increase productivity of domestic labor time. Such an increase will have an impact on the ability of women to participate in other productive activities. Given that households consume both domestically produced and market produced goods if both domestic and market goods are normal and complements then any increase in the productivity of domestic labor time will increase the consumption of market goods and lead to an increase in the supply of labor towards productive activities.

The present paper tests and explores the following hypothesis

1) A significant retardant to labor market participation by women is household work and in particular work related to accessing public goods such as water.

2) Political reservations could alter the intra household dynamics such that women might be empowered to participate in productive work.

3) Women's participation in productive work significantly increases household welfare while a similar participation in unproductive household work lads to retardation in household welfare.

4) The impact on household welfare is larger if women participate in productive work compared to if there is an increase in labor market participation by males.

The paper is structured as follows: Section 2 provides the background and describes the various measures taken to redress problems of providing access to water. In section 3 we discuss the data and some preliminary findings related to governance and access to water. Section 4 outlines the methodology and, section 5 discusses the results. We provide policy recommendations and conclude in section 6.

2. Background

In India, the National Water Policy was implemented in April 2002. Some of its key features include prioritizing provision of drinking water, regulating ground water extraction, and monitoring water quality. In order to make the planning and management of water resources effective, it is imperative that the institutions under the water resources sector be better organized. The scheme considers provision of drinking water a primary component of project planning. The Accelerated Rural Water Program (ARWP) launched in 1972-73, by supplementing the efforts of state government's aims to mitigate drinking water paucity in rural areas. Sustainability of rural drinking water schemes was based upon increasing government's role in empowering gram Panchayats for management and sustainability of drinking water resources. The National Drinking Water Mission (NDWM renamed as renamed Rajiv Gandhi National Drinking Water Mission in 1991), an extension of the ARWP, was launched in 1986 to ensure adequate water supply through the inflow of scientific and technical inputs into the rural water supply sector. Subsequently in 1999 Government of India formed the Department of Drinking Water to improve water supply in rural areas. The National Rural Drinking Water Quality Monitoring and Surveillance Program (NRDWQMSP) was launched in February 2006 to facilitate monitoring all drinking water resources in the country, decentralizing water quality monitoring, and making village

institutions capable of maintaining drinking water resources. The NRDWQMSP aims to generate awareness about water quality issues and water-borne diseases among the rural people by imparting information, education, and communication (IEC) to the Panchayati Raj Institutions, women's groups, self-help groups, and NGOs.

Following the 73rd Amendment to the Indian Constitution (1993) the Government of India is formally committed to decentralize service delivery in rural areas. The 73rd Amendment transforms local governments from an appendix to state governments into independent entities, the rights and obligations of which are now more clearly defined. Decentralization of rural governance in India has led to constitution of democratically elected local bodies at the district, intermediate and village level called "Zilla" (District), "Block" and "Gram" (Village) Panchayats, respectively. The fact that, in most states, one third of Panchayats were randomly subject to reservations (quotas) for either women or lower castes provides the basis for a number of empirical studies. Such studies assess the impact of such reservations on the type of PS chosen by local decision-makers and, on political participation by previously disadvantaged groups (Chattopadhyay and Duflo, 2004)).

Decentralization aims at reducing the gap between supply and demand in the provision of local PS, both in volume and in terms of consumer preferences, leading to better project selection and asset maintenance. Decentralization tends to increase the number of levels and locales where decision making actually occurs. It aims to institutionalize community-based participatory approach in the provision of key public goods such as drinking water by integrating previously disadvantaged groups into policymaking. Supply of clean drinking water and assisting local communities to maintain drinking water sources in safe conditions have been priorities of the government. For ensuring sustainability, the government incorporated three basic principles in the implementation of rural drinking water supply scheme: first, empowering villagers for their full participation in a project through decision making roles in the choice of schemes and management; second, empowering gram Panchayats for sustainable management of drinking water resources – planning, implementation, operation and maintenance of drinking water assets by Panchayati Raj Institutions; third, partial capital cost sharing by communities in the form of cash, kind, or labor or all three combined.

The 73rd Amendment to the Constitution that came into effect on April 20 1993, noting the low participation of women in politics, proposed that not less than one-third of the total

number of seats to be filled by direct election in every Panchayats shall be reserved for women and such seats may be allotted by rotation to different constituencies in a Panchayat (The Constitution Act, 1992). It was a landmark step towards empowering rural women. The proponents of the policy of women reservation in Panchayats suggest that such affirmative action, through integrating women's issues in the mainstream decision making process, could bring about social, political, and economic upliftment of women and also provide them with a constitutional platform to seek redressal of gender-specific problems (Lal 1998). In a decentralized political set up, it is important for women to participate in the local decision making at the Panchayat level in order to achieve significant gains for themselves. A 2008 study by the Panchayati Raj Ministry reveals that a significant proportion of women perceive empowerment through legislation that ensures their participation in the Panchayati Raj Institutions. It is hoped that through collective voicing of opinion and participation in the local development process, reservation would go a long way to genuinely empower women.

3. Data and Discussion

The summary statistics from the two survey rounds are presented in table 1. Some of the findings are worth elaborating. The density of public taps in these villages has gone up. This is in line with increases in the magnitude of village level expenditures on water which has gone up by 10%. However the density of wells for providing drinking water has declined marginally. At the household level, we find that the time spent in fetching water on an average has declined. This has been accompanied by a decline in the time spent doing household work. Participation in labor markets and other productive work has increased. The quality of governance has improved. 60% of households surveyed say that they have members who have approached elected representatives to complain about problems related to water. However, problem resolution has not greatly increased (29% out of 60% report problem resolution while this was 25% out of 40% in the previous round) report effective problem resolution.

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Can we infer anything about household welfare given the time members of the household spend in accessing public goods? There is considerable debate about the inability of the poor

to access PS, and, in particular, regarding the less than optimal provision of PS to the poor. As a consequence the time spent in accessing PS by the poor is significantly higher. It has been argued that allocation of time in this manner by members of the poorer households further exacerbates their poverty since they are unable to engage in productive activities. Table 2 illustrates the welfare decay as time spent in fetching water increases. Gini for households where members spend increasing amounts of time is much greater than the sample average.

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It has been suggested in the literature (e.g. 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 variation in outcomes germane to the access of water? In India the villages form an insuring unit and are formed in such a way that they are usually homogenous with respect to the composition (in terms of Jatis). If there is discrimination based on Jatis then, streets where certain Jatis reside could be discriminated in favor of or against in terms of locating a public good such as water. Therefore streets should explain much of the variance in access. The results are revealing. The share of the variance in access as explained by location goes up when we look at higher number of trips. For example streets explain 16% of the variations in the number of trips made by members of the households to fetch water when the number of trips is less than 10 or the time spent in fetching water is les that one hour (10%). However when we examine larger number of trips or time spent greater that one hour, up to 96% of the variance is explained by location. These results suggest that the distribution of water resources within villages is significantly discriminatory. They suggest that members of households that have to spend increased amounts of time or making a large number of trips to access water typically tend to belong to specific streets.

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Table 3 here

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Can governance produce outcomes related to water which could be the basis for improved welfare? Effective governance should empower different constituents- viz., the households- in such a way that there is both a more effective and efficient provision and enhanced access to public goods. This becomes possible because under effective local governance, the households are able to participate in the process of governance. The government of India has attempted to empower the weaker sections as well women through calibrated political reservations. Evidence from the survey points to the fact that political reservations empower women and enables them to participate effectively in gram sabha meetings. The incidence of women protesting and raising questions during the gram sabha meetings increase in reserved villages. From table 4, we see that 21% 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% in villages that never had reservations. The revealing statistic is the decline in the magnitude of participants in gram sabha meetings who were passively observing the proceedings. This has come down from 38% to 12%.

If members of the village participate in the process of governance will they then be willing to contribute to its development? The survey also asked about the 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, education being the choices). We find that women are willing to contribute towards many local PS but the magnitude of contribution towards improved provision of water is the highest. In table 4 we note that 33% of all women respondent are willing to contribute towards the development of water resources in villages that are reserved. The willingness to contribute goes up in reserved villages since the women believe that leaders of reserved Panchayat adhere to rules better (for example there are more gram sabha meetings held in reserved villages and women attend a larger proportion of such meetings)

The dichotomy between the supply of the demand for public goods and services can cause significant adverse consequences for household welfare. This is also indicative of allocative inefficiencies of resources. 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) are made outside the village at higher levels of the bureaucracy related to the

Panchayati raj. Table 5 shows the magnitude of such dichotomies in three types of village-ever reserved, reserved in current period, and never reserved. In Deininger et al. (2011) it has been shown that political, reservations have a legacy effect. That is if there are, for example, improved allocations during reservations, then even after reservations laps, such improved allocations remain in force. We find that the gap between the mean expected allocations and expected allocations is 8% in villages that have been reserved at least once, while it is 12 percent in villages currently reserved and 13% in villages that have never been reserved.

The survey also examined the possibility of women mobilizing to access resources. One question that was posed (independently) to both the male and female respondents was "the government will give Rs 100,000 (approximately $ 2000) towards the development of one public good but only if the majority vote. If you had the tie breaking vote which public good will you choose?" Table 6 shows that 70% of women all respondents reported that they would cast their tie breaking vote in favor of water. In fact with political reservations, both men and women mobilize. This is in line with the findings in the literature (esp. Deininger et al., (2011)) where political reservations lead to improved commitment on the part of the elected representatives. This suggests that women can, if empowered, mobilize to access resources even if this means that the village is likely to be deprived of other public goods. There is therefore a possibility that under political reservations, the provision of public goods and services need not necessarily be altruistic.

The survey findings reported in table 7 are of much importance to this paper, in particular the changes observed in the patterns of labor allocations by women in reserved and unreserved Panchayats over time. We find that the magnitude of time spent in household work declines sharply for women who reside in reserved Panchayats while this remains nearly stagnant for women in unreserved Panchayats. The number of days spent in household work is down to 50 days from 60 days in a year. Also the time spent in fetching water declines by more than 10%. What is also revealing is the increase in the magnitude of time spent in productive work by women. The number of days spent in tending to livestock, self employment, and, own cultivation, have all increased. The magnitude of increase is the largest for own cultivation. This has increased by more than 200%. Similarly, the number days engaged in self employment is up by nearly 300%. Such increases provide an important source of income for the household and are therefore welfare enhancing. They also point towards the need to

synchronize policies on land reforms, and micro credit with those of political reservations in the context of decentralisation and devolution of powers.

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4. Methodology

The relationship between the reduction in time spent by women collecting water and accessing other public goods and, transition to productive work depends on a number of factors related to intra household dynamics, as well as village level factors that might inhibit or allow such participation. Therefore, any attempt at making the link between time saved while accessing public goods and increased participation in productive work must take into account the range of village and household level inhibitors. Kevane and Wydick (2001) and Jayaraman and Lanjouw (1998) suggest that social norms might be significant factors in enabling women to choose between household work and productive employment. Factors related to shocks, access to land, existence of markets etc are also significant contributors to the ability of women to undertake productive work In Matsche and Young (2004) and Khandker (1998) we note that factors related to fertility, access to credit, household composition, as well as the occupation of the male counterparts could play a significant role in women's participation in productive work.

There however is a small but significantly increasing magnitude of work related to the improved access to public goods and the consequent ability of women to participate in labor markets (Ilahi and Grimard (2000), Menon (2009), Dinkelman (2009), Grogan and Sadanand (2009) and Lokshin and Yemtsov (2005)). This literature has examined the links between better access to water, improved provision of electricity, and in general better provision of infrastructure on household work and the ability of women to participate in labor markets and in particular productive work. However there is also literature suggesting that such established causality cannot be taken to be robust since there are significant effects caused by geography and the impacts caused by factors such as education, as well as health could be subsumed by factors related to geography (de Janvry and Sadoulet (2000), Fafchamps and Shilpi (2003) and McCarthy and Sun (2009). Our data in fact suggest that location could play a role in accessing water.

Given these observations, the ARIS/REDS data permits testing of the hypothesis relating to the following outcomes for women: (i) labor market participation, (ii) productive work, self employment and own-cultivation, in particular (iii) non-farm work participation and, (iv) household welfare. It has been shown elsewhere that political reservations provide incentives in a manner that would lead to intra-household reallocations of labor. In particular, it has been found that women are increasingly participating in productive work. The welfare impact -measured by real wage income –caused by increased labor market participation and, in particular, reducing the time spent on household work is estimated using a two stage instrumental variables procedure. Since the variables associated with work days will be endogenous to income, we instrument these with a range of variables that will enable us to link the results to policy. Consistent with the observations in the literature we also control for geographic factors such as location (street dummies), access to credit, inheritance, and household splits.

The relationship between welfare and labor days worked as well as political reservation is written as follows,

$$\mathbf{Y}_{ivt} = \beta_v + \beta_1 R_{vt} + \beta_2 R_{vt} * Z_{vt} + \beta_3 R_{vt-1} + \beta_4 R_{vt-1} * Z_{vt-1} + \beta_5 R_{vt-2} + \beta_6 R_{vt-2} * Z_{vt-2} + \beta_7 I_{vt} + \beta_8 R_{vt} * I_{vt}$$
$$+ \beta_9 \mathbf{I}_{ivt} + \beta_{10} V_{vt} + \beta_{11} \mathbf{X}_{ivt} + \theta_{ivt}, \tag{1}$$

$$Inc_{ivt} = \hat{LD}_{ivt} + \hat{LD}^f_{ivt} + \hat{LD}^{nf}_{ivt} + \hat{Time}_{ivt} + \omega_{ivt} \tag{2}$$

Where vector $\mathbf{Y}$ indicates labor days – total, productive (f), and off-farm (nf) and time spent in household work. Labor days are instrumented out using the set of exogenous variables $\mathbf{R}$, $\mathbf{Z}$, $\mathbf{I}$, V and $\mathbf{X}$ as instruments in the first stage (equation 1). The variables in the vector $\mathbf{Y}$ that are potentially endogenous to household welfare, measured by real wage income, can be instrumented out. We assume that (i) $E(\mathbf{W}'\mathbf{M}) \neq 0$ (i.e., all instruments are relevant to the vector $\mathbf{M}$, endogenous regressors, and $\mathbf{W}$ affect $\mathbf{M}$) and, (ii) $E(\mathbf{W}'\theta) = 0$ (i.e., the instruments used are valid and uncorrelated with θ). Subscripts i, v, t in the equations, denote individuals, villages, and time periods respectively, β_v denote village fixed effects, R_{vt} is a dummy that takes the value 1 if a village v is reserved for women in time t, and 0 otherwise, R_{vt-1} and R_{vt-2} indicate lagged reservation dummies, i.e. we measure whether access to water and labor days worked are affected after reservation lapses. Z_{vj} is a dummy representing the female household members of village v reserved in the jth time period $j = t, t-1, t-2$. We interact

reservations with Z to examine whether females holding political positions could improve the conditions of women by reforming the system of service delivery, in particular access to water facilities, I_{vt} and $\mathbf{I}_{ivt}$, respectively, denote village- and household-level institutional characters specific to the water sector, such as expenses incurred on water by local government, whether household members approached pradhans to complain about water problems, and actions taken by local decision-makers (elected representatives) in re-solving water issues, V_{vt} indicates village-level shocks, and $\mathbf{X}_{ivt}$ represents the various household characteristics we control for, θ and ω are the respective errors in equations (1) and (2). The estimation strategy is along the following lines. We first regress work days on reservation, institutional characters and a range of other variables mentioned above. The predicted labor days $\hat{LD}_{ivt}, \hat{LD}_{ivt}^{f}, \hat{LD}_{ivt}^{nf}$, and predicted time $\hat{Time}_{ivt}$ obtained from the exogenous variables in stage 1 regression, are uncorrelated with the residuals and hence can be considered exogenous, which are then used in stage 2 to estimate household wage income (Inc_{ivt}), equation (2).

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 it may be concluded that the instruments are sufficiently relevant to explain the endogenous regressor. This test performs under the null i.e. the instruments lack the 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)[2]. If our specification is identified we wish to test whether the identification is strong or weak. For the purpose of this we have used the Cragg-Donald's F-statistic under the null of weak identification[3]. The Sargan test[4] has been used for over identification.

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[2] The under identification test is a Maximum Likelihood test of whether the equation is identified, i.e., that 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.

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

[4] The Sargan (1958) 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.

The instruments used in the regressions include: political reservations, reservations interacted with female members, village shocks, village water expenditure, its interaction with political reservations, and, commitment (i.e., being able to hold elected officials to account).

5. Results

The results conform to the findings of the extant literature and provide additional insights into the relationship labor market participation, household work, and household welfare. Broadly, the findings are as follows. (i) Political reservations and the ability of women to participate in the process of governance contribute to household welfare by allowing women to participate in labor markets. Such and outcome is possible since improved provision of public goods and in particular water, increases the productivity of household labor time. (ii) The concomitant decline in household work and increase in labor market participation is a robust indicator of increased productivity of household labor time being translated into productive work. In particular women participate in self employment and on cultivation. The effect on household incomes caused by members engaged in self-employment activities and own-cultivation is higher compared to effects caused by participation in off-farm wage labor. (iii) The literature on the relationship between time spent in household work and labor market participation suggests that not controlling for factors germane to geography, access to credit, and shocks could render the estimated results untenable. We find that including these factors make the results robust. Impact of residential location for example magnifies certain outcomes while leaving others either unaltered or in some cases reducing their magnitudes. (iv) Results from the various tests viz., a) excluded instruments, b) the Anderson canonical correlation likelihood ratio test under the null hypothesis that equations are under identified (Friedrichs and Hense, 2003), c) the Cragg-Donald's F-statistic (Cragg and Donald, 1993) under the null of weak identification and d) the Sargan test of over identification (Sargan 1958, Baum et. al. 2003, Staiger and Stock 1997) 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.

Our ability to test the stated hypotheses depends on the results related to the impact of improved provision of public goods and in particular water on reductions in household work. Therefore, the results that we are able to show relating political reservations and time spent in accessing water, and the fact that household work can retard labor market participation are the basis for the empirics of this paper. Can political reservations impact the time that

members spend in accessing public goods? In particular will it reduce the time spent by women in fetching water? The results shown in Appendix 1 suggest that political reservations significantly reduce the time spent in fetching water by women. More these results suggest a significant degree of persistence that is even after the reservations lapse, the impacts of improved adherence to rules and procedures related to allocation of expenditures on water will persist. If fetching water is a significant proportion of the household time spent by women, then, will reducing this through mechanism related to governance lead to welfare improvements for the household? The maintained hypothesis behind this question is that reducing the time spent in accessing water (and other pubic goods in general) will increase the productivity of household work and lead to reductions in its magnitude. Potentially such reductions could lead to women participating in productive work and provide impetus to increased household welfare. In Appendix 2 we show that reducing time spent in fetching water reduces household work-a significant barrier to labor market participation by women. Thus taken together the results in Appendices 1 and 2 suggest that improved local governance will alter the time spent in fetching water by the women members of the household have important welfare outcomes for the household.

There are three versions of the model that we estimate seriatim. Model 1 does not control for location of households, credit and wealth constraints. We condition the welfare outcomes on factors related to governance and in particular political reservations and the ability to participate in the process of governance. In model 2 is conditioned by predictors of access to credit and household wealth such as household splits, ownership of bank accounts (which also predicts financial empowerment), and inherited land. Inheritance and the ability to inherit land have been shown (Deininger et al 2011) to be able to alter intra household dynamics in favor of women. We introduce street level fixed effects (dummies) along with the household fixed effects in model 3. We observed in table 3 that location of households explain variance in both time spent in fetching water and the number of trips made for the same purpose. It is therefore important to control for the geographical location of households within a village while examining the relationship between reductions in time spent in household work and participation in productive activities.

The second stage results are revealing. The Sargan test of over identification shows that over identification is rejected for each of the three models. We therefore have robust estimates of factors that contribute to household welfare. Labor market participation and time spent in household work affect welfare in different ways. Under the specifications of model 1

increased participation in household work decreases real income by 58% and participation in self employment and own cultivation increases real income by 59%, *ceteris paribus*. Given what we are able to infer from table 7, improved provision of water increases the productivity of household time hence if time spent in household work declines, then this time is going to be allocated across three types of employment viz. other labor including salary work, self employment and own cultivation (including livestock rearing), and, off farm wage labor. We can also infer from table 7 that conditioned on political reservations women are more likely to choose to engage in self employment and own cultivation. If the actual participation by women in such activities increased then the contribution to household real income is significant and the statistics shown in table 7 can be used attribute much of the increases to self employment and own cultivation to women. Hence empowering women in ways in which they engage less in unproductive household work and participate in productive activities such as livestock management, cultivation in farms, and self employment in business will increase household incomes by as much as 59%. When we control for measures related to financial empowerment, as well as wealth effects (household splits) in model 2, we find that the impact of any potential declines in time spent in household work on household real income is magnified (73%) but the effects of labor market participation remain nearly the same. In fact the difference in coefficients related to employment in models 1 and 2 is statistically insignificant. One can conjecture that such measures of women's empowerment do not significantly alter or improve the status of women in the labor market. However it will be useful to examine the first stage outcomes to infer whether such a conjecture is valid. Munshi and Rosenzweig (2010) using the ARIS/REDS data have shown that there are significant returns to geographic location for households. Those that live in the same streets as elected representatives such as pradhans and ward members, have on an average improved access to public goods, credit, and employment. The second stage outcomes shown in model 3 therefore are quite revealing particularly taken the context of the findings in table 3. Location is able to explain a significant share of the variance if the number of trips and time spent is higher than a threshold. Once we control for residential location, the impact of reduction in time spent in household work as result of increased productivity is significantly translated into labor market outcomes. The magnitude of increases to real income caused by increased participation in self employment and own cultivation is nearly 67%. One way to interpret this finding in the context of the way the Indian villages are formed (streets identified by Jatis) is that geography allows households to realize the outcomes of increases

in productivity of household labor time due to externalities such as proximity to elected representatives, networks, and other factors as explained in Munshi and Rosenzweig (2010).

Our results have far-reaching implications. Engagement in self-employment activities is an indicator of the need for credit-market liberalization and delivery of microcredit through self-help groups. Such systems eliminate the need for collateral and are closely related to solidarity lending (collective borrowing by groups where one encourages another to repay), widely used by microfinance institutions. Furthermore, participating in own cultivation entails policies related to land reforms and individual land ownership.

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Tables 8 and 9 here.

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We next discuss the first stage results in detail. Table 8 presents the results of the estimation under the three different specifications. The impact on household real income from these three specifications are given in Table 9. Political reservations have significant effects on women members of the households both in the labor market as well as in intra household outcomes such as time spent in household work. The effects are persistent and in certain cases increase over time. We tested for $\gamma + \lambda = 0, \gamma_1 + \lambda_1 = 0$ and, $\gamma_2 + \lambda_2 = 0$ which were rejected. These are important results since political reservations are random and we should be able to observe lasting effects of such legislations. The results of excluded instruments, Anderson canonical correlation likelihood ratio test under the null hypothesis that equations are under identified, and, the Cragg-Donald's F-statistic under the null of weak identification show that no redundant instruments have been used, equations are not under identified, and there are no weak instruments

Village level expenditures on water, the ability of members to approach elected representatives for problem resolution on water, and, having these problems resolved, have significant impact on household work. The last two are indicators of improved governance. There is not much difference in the magnitude of impact caused by increased village level expenditures on water on household work between models 1 and 2. When such expenditures are conditioned on political reservations for women, there is up to 22% decline in the magnitude of household work (across models 1 and 2). Including variables related to

financial empowerment of women does not lead to any significant differences in these magnitudes. When conditioned on location of households (model 3)-consistent with our earlier claims regarding geography having a significant impact on outcomes germane to access to public goods- the magnitude of decline in household work for the same increases in village level expenditures goes up to 33%. The results for "the ability to approach elected representatives" and "having problems resolved" are quite interesting. We find that these produce effects on household work that are larger compared to political reservations. However when we include the impact of residential locations these magnitudes decline (they are 5% and 8% respectively in model 3 compared to 16% and 2 % in model 2 and 16% and 3% in model 1). The decline in magnitude pertaining to "approaching the elected representatives for solving problems" is due to the fact that location explains a significant part of this variable's potential impact on household work. We posit that location absorbs some of the explanatory power of variables related to governance.

All variables related to governance have a positive impact on the magnitude of participation in own cultivation and self employment. The magnitudes of the coefficients for these variables are stable even after including variables related financial empowerment of women. The most interesting result here is that adherence to good governance produces effects that are larger in magnitudes compared to other variables related to governance such as financial allocations, and political reservations. For example in models 1, 2 and 3 the impact of "approaching the elected representatives" by women on self employment and own cultivation varies between 11% in model 1 to 8% in model 3. These magnitudes are larger compared to any the impacts caused by political reservations where women are at best 7% more likely to participate in self employment and own cultivation (model 1). The results on political reservations show both a cumulative as well as persistent impact on self employment and own cultivation suggesting that in the long run this will increase in the long run. Another way of interpreting the result is that any increased productivity of household work for women in particular is actualized only if their ability to approach the elected officials for problem solving and holding them accountable exists.

Village wide shocks adversely affect participation in labor markets. Our data however does not allow us to establish gender variegated impacts of such shocks. However such impacts can be indirectly inferred by examining various types of labor market outcomes and household work conditioned on location. We have already illustrated that households in certain streets are less well off with respect to accessing water. This then implies that the

adverse impact of a village level shock on households in such streets will be greater. The magnitude of household work in model 3 for example increased by 14.7% and there is between 6% and 22% reduction in participation in productive work. These outcomes exist even after conditioned on political reservations and practices related to good governance. This result suggests that decentralisation and devolution of decision making powers to the Panchayats are not able to adequately insure households against shocks. An interpretation is that this is reflective of coordination failures that exist in the context of decentralisation and provision of public goods.

Financial empowerment of women and wealth effects provide us with certain interesting insights into household work and labor market tradeoffs. We find that women having independent access to bank accounts (the account is in the women's name) spend less time in household work and are more likely to engage in self employment and own cultivation, and migrate towards off farm labor. However geography (residential location of households) magnifies these outcomes suggesting that not all women empowered in this manner are likely to increase self employment and own cultivation. For example the magnitude of increase in productive activities like self employment is 6.5% in model 3 compared to 1% in model 2 even though the degree of decline in household work under both models is the nearly the same (7.61% in model 2 compared to 7.13% in model 3). Productivity gains thorough financial empowerment is realized effectively when conditioned on geography. Similarly the wealth effects are magnified by residential location. Our results suggest that women who inherit land are able significantly increase participation in productive activities. This result is broadly consistent with the findings in Deininger et al., (2011) where it has been shown that inheritance that has been enabled under the Hindu Succession Act empowers women in such a way that intra household dynamics are altered, and participation by women in productive activities is increased. If inheritance in general and wealth in particular predicts the ability to access public goods and time spent in fetching water then conditioned on residential location, we find that wealthier women are not uniformly well off within villages. Being wealthy does not guarantee access but being wealthy and located in certain streets improves the ability to access public goods.

Since we are using data from 1999 and the 2006 surveys and in sense focusing on panel of households, it is important to include the effects of household splits. Foster and Rosenzweig (2002) have, tested their model of household splits using the ARIS/REDS and show that post splits, the level of household wealth declines. Their model also suggest that increased

variance in educational attainments is a significant contributor towards splits. One can infer from their model that members of households post splits will engage in productive activity such as. Our results show that productivity of household time in smaller households increases. Smaller households will have members engaging significantly in productive work. Since the average educational attainments are greater in such households, the ability to access public goods such as water also improves.

6. Conclusions

The time spent in fetching water by women represents nearly 22% of their working days and represents a significant unproductive component of their work time. Policies leading to improved provision of water to households will be welfare enhancing. In fact there is a significant variation in the time spent in fetching water by women owing to discrimination in the provision of this PS. Effective governance and improved allocations can help retard this discrimination greatly and the cumulative impact on household welfare therefore will be significant.

Improved access to water also retards the time spent by women in doing household work. Governance related variables (such as effective holding of gram sabha meetings, political reservations, and commitment) that lead to improved provision of water also help in altering the intra household dynamics in such a way that the time saved by women in terms of household work is translated into more productive alternatives such as self employment and cultivation. It has been argued in Deininger et al (2010) that improved access to land for women greatly enhances household welfare. In this paper we are able to supplement that finding by showing that women engaging in activities such as self cultivations and self employment brought about by time saving at the household level significantly adds to household incomes.

A third finding is that the growth in household income due to self employment and own cultivation is significantly greater compared to other avenues. It also is clear that time spent in household work retards household incomes. A significant contributor to the growth in self employment and own cultivation is women's participation in these activities Given the discrimination that exists against women in the labor market, increasing the ability of women to participate in activities such as self employment and own cultivation will contribute greatly to household welfare (even more compared to what is created by men) in the labor markets

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Table 1: Village and Household Characteristics

Variables	2006	1999
Village Characteristics		
Average distance from Bus Stand (km.)	2.64	3.23
Average distance from School (km.)	1.95	1.64
Average distance from Pucca road (km.)	1.11	2.48
Average distance from Railway station (km.)	25.14	27.02
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 Street lights in a village	3.60	3.03
Average number of Public toilets in a village	0.67	0.39
Average number of households with brick houses	0.16	0.12
	(0.03)	(0.04)
Average number of households with huts	0.03	0.04
	(0.01)	(0.02)
Average number of households with mud houses	0.10	0.10
	(0.03)	(0.02)
Proportion of houses with electricity connection	0.49	0.43
Proportion of cultivated area irrigated	0.49	0.46
Proportion of Area irrigated by govt. Canal	0.17	0.16
Land Gini	0.55	0.56
Women Reservation: current panchayat	0.31	0.27
Village expenses incurred on water	60454.5	56256.0
Household Characteristics		
Household Size	5.24	6.23
Age of head	51.16	49.42
No. of Earners	1.86	1.74
Year of Schooling	5.11	4.46
Land owned	4.61	5.25
Irrigated land (in acres)	2.72	2.85
Un irrigated land (in acres)	1.88	2.39
Per capita consumption (Rs)	6568.2	5857.37
Poverty (Head Count)	24.98	30.60
Time to collect water (minutes)	70.98	93.4
Days spent in household work	156.3	175.6
No 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
Approached Pradhans to complaint about water problems	0.60	0.48
Actions taken to solve water problems	0.29	0.25
Household real agriculture wage income (Rs)	3257.5	3930.9
Household real non agriculture wage income (Rs)	4937.94	3735.5

Table 2: Income Inequality indices with respect to water collecting time

Time to collect water (minutes)	Gini indices	Head Count
0-30	0.37 (0.01)	0.18
30-60	0.48 (0.005)	0.26
60-120	0.53 (0.003)	0.33

Table 3: Does Location Explain Variations in Outcomes?

Variables	No of trips Daily	Time to collect water per day	Time 0-60 minutes per day	Daily trips 10-15	Daily trips greater than 15
R Square	0.16	0.10	0.47	0.65	0.96

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

Gram Sabha meetings	Reserved (SC/ST/Women)				Reserved (Women)			
	Male		Female		Male		Female	
	Res	Unres	Res	Unres	Res	Unres	Res	Unres
No of meetings attended	6.18	5.73	7.01	6.89	5.52	6.25	7.76	3.26
Nature of participation								
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
Households willingness to contribute for:								
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 & 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

Table 5: Demand-Supply dichotomy

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

Table 6: Willingness to Contribute (Tie Breaking).

	Drinking water		Other Public Goods	
Current panchayat	Mean	Std Dev	Mean	Std Dev
Male	0.69	0.46	0.32	0.29
Female	0.70	0.46	0.31	0.28
Previous panchayat				
Male	0.66	0.44	0.32	0.30
Female	0.67	0.44	0.29	0.30

Table 7: Labor market participation

	Entire sample Currently reserved			Female respondents Currently reserved			Male respondents Currently reserved		
	No	Yes		No	Yes		No	Yes	
Participation in									
Housework	0.789	0.797	***	0.926	0.930		0.653	0.670	***
Fetching water	0.724	0.733	*	0.614	0.601	**	0.344	0.337	
Other Productive work	0.651	0.669	***	0.552	0.568	***	0.750	0.766	***
Agric. wage labor	0.137	0.132	**	0.098	0.096		0.176	0.166	**
Non-agricultural. wage labor	0.086	0.101	***	0.015	0.014		0.157	0.183	***
Own cropping	0.240	0.260	***	0.150	0.169	***	0.330	0.347	***
Own livestock	0.376	0.410	***	0.366	0.401	***	0.386	0.418	***
Self employment	0.045	0.050	***	0.010	0.015	***	0.080	0.084	
No. of days spent									
Housework	38.07	37.19	***	61.05	60.61		15.10	14.82	*
Fetching water	32.03	26.50	*	48.11	45.47	**	21.52	20.37	
Other Productive work	34.41	36.77	***	19.31	20.67	***	49.49	52.14	***
Agric. wage labor	7.119	6.715	***	4.582	4.189	**	9.640	9.155	**
Non-agricultural. wage labor	5.518	6.540	***	0.780	0.694		10.26	12.091	***
Own crops	8.210	8.290		4.032	4.336	**	12.37	12.09	
Own livestock	8.819	9.840	***	8.672	9.796	***	8.959	9.897	***
Self employment	4.052	4.480	***	0.761	1.213	***	7.350	7.578	
No. of observations	58,513	26,770		29,212	13,105		29,301	13,665	

	Entire sample Reserved in past			Female respondents Reserved in past			Male respondents Reserved in past		
	No	Yes		No	Yes		No	Yes	
Participation in									
Housework	0.790	0.794		0.927	0.928		0.656	0.661	
Fetching water	0.785	0.752		0.672	0.648		0.300	0.296	
Other Productive work	0.660	0.653	**	0.566	0.546	***	0.753	0.757	
Agric. wage labor	0.142	0.128	***	0.103	0.090	***	0.180	0.165	***
Non-agricultural. wage labor	0.088	0.093	**	0.012	0.019	***	0.164	0.166	
Own cropping	0.257	0.235	***	0.165	0.146	***	0.348	0.322	***
Own livestock	0.396	0.374	***	0.388	0.362	***	0.405	0.386	***
Self employment	0.042	0.051	***	0.010	0.013	***	0.075	0.089	***
No. of days spent									
Housework	38.15	37.37	***	61.43	60.32	***	15.10	14.91	
Fetching water	35.13	31.42	*	51.18	51.02	*	22.51	21.64	
Other Productive work	35.05	35.26		20.10	19.29	***	49.81	50.96	**
Agric. wage labor	7.306	6.623	***	4.805	4.056	***	9.761	9.160	**
Non-agricultural wage labor	5.486	6.254	***	0.532	1.013	***	10.37	11.40	***
Own crops	8.625	7.776	***	4.442	3.755	***	12.76	11.71	***
Own livestock	9.029	9.270	**	9.053	8.981		9.001	9.560	***
Self employment	3.728	4.727	***	0.752	1.075	***	6.666	8.318	***
No. of observations	46,129	39,154		22,844	19,473		23,285	19,681	

Table 8: Labor market participation and Household welfare

VARIABLES	Model-(1)				Model-(2)				Model-(3)			
	Other Labor Days	Self employment + Own Cultivation	Off-farm labor	Household work	Other Labor Days	Self employment + Own Cultivation	Off-farm labor	Household work	Other Labor Days	Self employment + Own Cultivation	Off-farm e labor	Household work
Reserved (γ)	0.276*** (0.0302)	0.134*** (0.0251)	0.153*** (0.0308)	-0.0462*** (0.0108)	0.277*** (0.0293)	0.0915*** (0.0251)	0.136*** (0.0308)	-0.0533*** (0.0108)	0.624* (0.354)	0.155*** (0.0303)	0.875** (0.352)	-0.523*** (0.117)
Reserved *female (λ)	-0.077** (0.0323)	0.0708*** (0.0268)	0.0538 (0.0329)	-0.0391*** (0.0015)	-0.0813*** (0.0312)	0.0599** (0.0267)	0.0720** (0.0328)	-0.0906*** (0.0115)	-0.0595** (0.0283)	0.0609** (0.0242)	0.0463* (0.0281)	-0.0181* (0.00933)
Reserved lag1(γ_1)	0.294*** (0.0238)	0.0315 (0.0198)	0.0635*** (0.0243)	-0.168*** (0.00848)	0.256*** (0.0229)	0.0444** (0.0197)	0.0558** (0.0242)	-0.167*** (0.00849)	0.239*** (0.0362)	0.130*** (0.0311)	0.272* (0.153)	-0.222*** (0.020)
Reserved lag1*female(λ_1)	-0.00712 (0.0312)	0.0154 (0.0259)	0.0703** (0.0318)	-0.0207* (0.0111)	-0.00841 (0.0301)	0.0797*** (0.0258)	0.0548* (0.0317)	-0.0161 (0.0111)	-0.0209 (0.0272)	0.0639*** (0.0233)	0.071*** (0.0271)	-0.0760*** (0.00897)
Reserved lag2(γ_2)	0.0336 (0.0261)	0.265*** (0.0217)	0.211*** (0.0266)	-0.0318*** (0.00930)	0.0419* (0.0252)	0.244*** (0.0216)	0.234*** (0.0265)	-0.0330*** (0.00932)	0.470* (0.282)	0.792*** (0.241)	0.305*** (0.080)	-0.819*** (0.0929)
Reserved lag2*female(λ_2)	-0.0424 (0.0342)	0.0327 (0.0284)	0.125*** (0.0349)	0.0171*** (0.0122)	-0.0704** (0.0331)	0.0469* (0.0284)	0.0901*** (0.0349)	-0.0886*** (0.0122)	-0.0342 (0.0300)	0.0307*** (0.00257)	0.0614** (0.0299)	-0.0658*** (0.00991)
Log of water expenses	0.058*** (0.00149)	0.0118*** (0.00124)	0.0173*** (0.00152)	-0.00286*** (0.000531)	0.0546*** (0.00144)	0.0119*** (0.00123)	0.0161*** (0.00151)	-0.00274*** (0.000532)	0.0403** (0.0173)	0.0587*** (0.0148)	0.068*** (0.0172)	-0.0406*** (0.00570)
Log of water expenses *Reservation	0.158*** (0.0325)	0.0428*** (0.0270)	0.125*** (0.0331)	-0.212*** (0.0116)	0.110*** (0.0313)	0.0399*** (0.00269)	0.100*** (0.0330)	-0.215*** (0.0116)	0.847*** (0.271)	0.173*** (0.0233)	0.123*** (0.0270)	-0.336*** (0.0895)
Approached Pradhan to complain on water issues *female	1.106*** (0.0576)	0.110** (0.0479)	0.107* (0.0587)	-0.161*** (0.0205)	1.105*** (0.0555)	0.0905* (0.0476)	0.105* (0.0584)	-0.162*** (0.0205)	0.401*** (0.0592)	0.0847* (0.0508)	0.250*** (0.0589)	-0.0502** (0.0195)
Action taken to solve drinking water problem	0.541*** (0.0645)	0.0768 (0.0536)	0.0313 (0.0657)	-0.0274 (0.0230)	0.545*** (0.0621)	0.0863 (0.0533)	0.0326 (0.0653)	-0.0281 (0.0230)	0.1198*** (0.0640)	0.1660*** (0.0549)	0.189*** (0.0637)	-0.0854*** (0.0211)
Village shocks	-0.18*** (0.00417)	-0.0193*** (0.00347)	-0.0906*** (0.00425)	0.00916*** (0.00149)	-0.181*** (0.00401)	-0.0191*** (0.00345)	-0.090*** (0.00423)	0.00980*** (0.00149)	-0.229*** (0.00489)	-0.0628*** (0.00420)	-0.120*** (0.00487)	0.1477*** (0.00162)
Women have bank account					-0.239*** (0.0374)	0.0114*** (0.00321)	0.172*** (0.0393)	-0.0761*** (0.0138)	-0.236*** (0.0347)	0.0653** (0.0297)	0.0723** (0.0345)	-0.0713*** (0.0114)
Women have inherited land					-0.404*** (0.0179)	0.171*** (0.0154)	0.380*** (0.0188)	-0.00310 (0.00662)	-0.749*** (0.0171)	0.238*** (0.0147)	0.293*** (0.0170)	-0.1487*** (0.00565)
Predicted household splits					-3.558*** (0.179)	3.050*** (0.154)	1.865*** (0.189)	-0.279*** (0.0663)	-4.261*** (0.173)	2.657*** (0.148)	2.963*** (0.172)	-0.1688*** (0.0570)
Street dummy	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Test for excluded instruments	173.4***	121.58***	95.73***	159.75***	142.50***	118.93***	112.15***	128.66***	183.96***	128.98***	73.07***	109.78***
Anderson Canon LM		50.81***				83.70***				151.50***		
Cragg Donald Wald F		14.622***				15.99***				27.62***		
Observations	23632	23632	23632	23632	23632	23632	23632	23632	23632	23632	23632	23632

Table 9: Second Stage

VARIABLES	Model-(1) Household Real Income	Model-(2) Household Real Income	Model-(3) Household Real Income
Other labor days	0.392*** (0.125)	0.400*** (0.0782)	0.410*** (0.0207)
Self Emp+ Own cultivation	0.589* (0.469)	0.597** (0.353)	0.667*** (0.0438)
Off-farm wage labor	0.320*** (0.275)	0.385*** (0.119)	0.417*** (0.0226)
Household work	-0.584** (0.228)	-0.734*** (0.185)	-0.866*** (0.0473)
Sargan Test Stat	1086.838	1460.692	2800.04
Observations	23632	23632	23632

Appendix I

Impact of Political Reservation on time spent in collecting water

Since reservations will be in place for a limited time, their impact can be fully appreciated only by looking beyond the immediately reserved period. If members from disadvantaged groups who entered office through reservations are not accountable and direct public goods or programs towards cronies or a narrow constituency, effects observed during the reserved period may be reversed -or over-compensated- once reservations have expired. This hypothesis receives support from the ambiguous longer-term effects of reservations on access to and quality of public goods found in longer-term studies that consider outcomes for more than just one period (Bardhan et al., 2010, Raabe et al., 2009). On the other hand, long-term effects of reservation can be more positive than what appears in the short term if this measure helps to change either the way in which public goods are provided or the pattern of political participation and the associated political equilibrium. If the experience of female leaders prompts voters to revise long-standing prejudices that affect future voting behavior (Beaman et al., 2009), long-term effects of quotas could be more positive than what emerges in the short term. The same would hold if reservations allow those who were excluded or lacked voice to more effectively participate in political decision-making and, through such a shift in political participation, alter the nature of the median voter. In fact, the desire to prevent local capture in this way was one of the factors motivating adoption of this policy (Singh 2007).

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) and South India (Besley et al., 2005) as well as urban Mumbai (Bhavnani, 2009). This is plausible as previously ignorant voters may require time to learn about how to access and use information to most effectively hold leaders accountable. Second, they may trigger a process of learning and revision of prejudices as in cases where exposure to female leaders led to and revision of stereotypes regarding female'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. These will be relevant because, even if key infrastructure such as roads or schools has been established (e.g. through central funds), its lifespan and effectiveness will be significantly enhanced by efforts towards local maintenance or monitoring to prevent service providers (e.g. school teachers) from shirking. The underlying mechanisms have been studied in a range of contexts (Bagnoli and Lipman 1989, Messer and Zarghamee 2007), though few studies explore the willingness to contribute to better service quality in India (Chandrasekhar 2008).

We use village-fixed effects in our regressions to control for the diverse institutional structures across states affecting the relative power of the elected woman pradhan. We hypothesize that access to water facilities improve in reserved villages and more so for females in reserved villages. We estimate the following model using OLS,

$$Y_{ivt} = \beta_v + \beta_1 R_{vt} + \beta_2 R_{vt} * Z_{vt} + \beta_3 R_{vt-1} + \beta_4 R_{vt-1} * Z_{vt-1} + \beta_5 R_{vt-2} + \beta_6 R_{vt-2} * Z_{vt-2} + \beta_7 \mathbf{X}_{ivt} + \varepsilon_{ivt}, \qquad (Al)$$

Where subscripts i, v, t denote individuals, villages, and time periods respectively, Y_{ivt} is the outcome variable of interest measuring time to collect water, β_v denote village fixed effects, R_{vt} is a dummy that takes the value 1 if a village v is reserved for women in time t, and 0 otherwise, R_{vt-1} and R_{vt-2} indicate lagged reservation dummies, i.e. we measure whether access to water is affected after reservation lapses. Z_{vj} is a dummy representing the female household members of village v reserved in the jth time period $j = t, t-1, t-2$. Political reservations are interacted with Z to examine whether females holding political positions could improve the conditions of women by reforming the system of service delivery, in particular access to water facilities. The vector $\mathbf{X}_{ivt}$ represents the various household characteristics we control for. The main parameters of interest are $\beta_1 to \beta_6$.

The results (Table A1) indicate that political reservations will help significantly reduce the time spent by households in fetching water. Gender based political reservations, in particular, help increase allocations. Increased allocations if managed efficiently lead to optimal provision of public goods. The results also show that women are benefitted but only in the longer run. Such a finding is consistent with the finding in Deininger et al (2011) where the impact of political reservations is persistent but slow to emerge. We find that the time spent by women in fetching water will decline over time but only gradually. The implication of this is that welfare effects that emerge out of women using the time saved to engaging in productive work will also be slow to emerge.

Table A1

Model	
Reserved (γ)	-13.56*** (3.53)
Reserved*female (λ)	-3.98** (1.09)
Reserved lag1 (γ1)	-6.98** (3.50)
Reserved lag1*female (λ1)	-1.91** (0.85)
Reserved lag2 (γ2)	-11.41*** (3.30)
Reserved lag2*female (λ2)	-0.93 (1.63)
Test for γ + λ = 0	29.74***
γ1+ λ1 = 0	14.19**
γ2+ λ2 = 0	22.62***
R square	0.31

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Appendix II

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Can Political Reservation increase the magnitude of productive work for Women

We wish to establish that there are significant barriers to participating in productive labor caused by time spent in household work. Time spent in household work causes substantial gender-variegated differences in productive labor. Political reservation can bring about a substantial impact on intra-household dynamics because female reservation can lead to improved provisions of public goods on which women spend a substantial part of their time. So institutional reforms in terms of political reservations can reduce the time spent in household work by women and increase the magnitude of participation in productive work. This leads to reduction in gender-bias that exists in productive labor force participation. In order to establish these we use the Heckman two-stage procedure.

In the first stage of the two-stage Heckman procedure, we formulate a model for the probability of time spent in household work, which takes the form of a Probit

$$P(Y = 1 \mid \mathbf{X}) = \Phi(\mathbf{X})$$

Where Y indicates time spent in household work ($Y = 1$ if the respondent spends less time in household work, $Y = 0$ if s/he spends more), $\mathbf{X}$ is the vector of explanatory variables, and Φ is the cumulative distribution function of the standard normal distribution. In the second stage, we correct for self-selection by using the transformed individual predicted probabilities obtained from the first stage as an additional explanatory variable (inverse mills ratio) in the regression.

The selection (unobserved) equation can be specified as,

$$Y^* = \beta' \mathbf{W} + \phi, \quad \phi \sim N(0, 1),$$

$$\text{Where} \quad \begin{aligned} Y' &= 1 \quad if \quad Y^* < Y^*_{median} \\ &= 0 \quad if \quad Y^* \geq Y^*_{median} \end{aligned}$$

Where $\mathbf{W}$ is the vector of explanatory variables, ϕ is the random error and $Y = 1$ if the individual's time spent in household work is lower than the median (threshold) time and $Y = 0$ otherwise.

The second stage (observed) equation is specified as,

$$L = \gamma' \mathbf{Q} + \vartheta, \quad \phi \sim N(0, \sigma^2)$$

Where L (number of days worked) is observed if and only if the individual spends less than median time in household work (i.e. $Y = 1$).

The Heckman two-stage model (the selection and observed equations) is specified as,

$$selection\ eqn: Y'_{ivt} = \beta'_v + \beta'_1 R_{vj} + \beta'_2 S_{vt} + \beta'_3 V_{vit} + \beta'_4 P_{vit} + \beta'_5 \mathbf{X}_{ivt} + \phi_{ivt}, \quad (A2)$$

$$observed\ eqn: L_{ivt} = \gamma'_v + \gamma'_1 R_{vj} + \gamma'_2 Sh_{vt} + \gamma'_3 Sh_{vit} + \gamma'_4 W_{vit} + \gamma'_5 imr_{ivt} + \gamma'_6 \mathbf{X}_{ivt} + \vartheta_{ivt}, \quad (A3)$$

Where Y'_{ivt}, a binary variable (defined as above), indicating time spent in household work by individual i in village v at time t, and L_{ivt} the number of labor-days worked, are the dependent variables in equations (A2) and (A3). Regime change is measured by R_{vj} ($j = t, t-1, t-2$) i.e. villages ever reserved for women, S_{vt} measures expenses allocated by local government for effective public service delivery, V_{vit} indicates whether household members voiced concerns in village meetings, P_{vit} denotes whether members approached Pradhans to solve local problems, Sh_{vt} and Sh_{vit}, respectively, indicate village-level or covariance shocks (*vi.*, drought) and household-level or idiosyncratic shocks (*viz.,* death of an earning member) that might be attributing to variations in productive workdays, W_{vit} in equation (A3) indicates whether household member is an agricultural worker, imr_{ivt} is the inverse Mills ratio obtained from the first stage estimation, $\mathbf{X}_{ivt}$, as earlier, represents several household characteristics we control for, and finally β'_v and γ'_v denote village fixed effects.

The selection equation (A2) is estimated using maximum likelihood as an independent Probit model to determine the time spent in household work from the sample consisting of all household members. A vector of inverse mills ratio (estimated expected error) is generated from the regression. Labor market participation equation (A3) (i.e. labor days worked) is observed only when the selection equation equals 1 (i.e. individual spends less than threshold time in household work), which is then regressed using the mills ratio as an explanatory variable removing part of the error term correlated with the explanatory variable and avoiding the bias. Sample selection bias is corrected by the selection equation, which determines whether an observation can be included in the non-random sample.

The results (Table A2) of the first stage estimation indicate that governance related variable such as increased allocations to the village, political reservations (specifically regime change that involves electing a woman Pradhan), effective participation in gram sabha meetings, and commitment lead have significant negative effects on the time spent in doing household work. Increased allocations will lead to effective provision of public goods like water that will lead to less time spent in accessing these. Empowerment as indicated by the voicing concerns during gram sabha meetings alter intra household dynamics in favor of women and enable them to switch to more productive work

The second stage results suggest that suggest that there exist discrimination against women labor markets. Taken together with the Oaxaca Blinder decomposition we can claim that factors related to provision of public goods create this distortion. Improved provision of public goods and in particular water, empowering women to access these public goods will enhance their ability top participate in productive work and reduce the gender gap that exists in this sphere.

Table A2
First stage regressions (time spent in household work)

Variables	Time	Time	Time
	Total sample	Male	Female
Regime change (political reservation)	0.313***	0.272***	0.334***
Amount allocated by local govt	0.019***	0.018***	0.021***
Voiced concerns in village meetings	0.565***	0.398***	0.688***
Approached pradhan to solve local problems	0.035***	0.042***	0.010***
No. of obs	22010	10885	10847

Notes: Binary Probit regressions with time indicated by 1-0 dummy. *** denote significance at 1% level. Village fixed effects, household and individual characteristics (age, education, marital status, caste, household size) included in the regressions.

Second stage (labor days worked)

Variables	Labor Days	Labor Days	Labor Days
	Total sample	Male	Female
Regime change (political reservation)	24.58***	23.36***	3.23*
Agricultural Worker†	12.17***	18.88***	-1.10
No of covariance shocks	7.98***	7.88***	3.05***
No of idiosyncratic shocks	16.99***	16.46***	-0.30
Inverse Mills Ratio	160.98***	122.42**	24.30**
R square	0.68	0.73	0.75

Notes: † Small/Marginal, landless farmers and large, medium farmers, respectively, indicated by a 1-0 dummy. *, *** denote significances at 10% and 1% levels respectively. Village fixed effects, household and individual characteristics (age, education, marital status, caste, and household size) included in the regressions.

Blinder-Oxaca l (Decomposition of labor market participation)

Total Labor Days	Coefficient	z-values
Group 1: Male	21.49***	21.00
Group 2: Female	10.16***	18.01
Difference	11.33***	9.71
Endowment	1.33**	2.09
Coefficient	12.29***	8.69
Interaction	-2.29*	-1.99