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Impact of Land Reforms on Human Capital Formation Household Level Evidence from West Bengal

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*Selected Paper prepared for presentation at the American Agricultural Economics
Association Annual Meeting, Milwaukee, WI July 26-28, 2009*

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1. Introduction

Rural development policies are aimed at alleviating poverty in the rural households. Human capital formation and access to schooling are one of the key outcomes of any such successful strategy. Hence, human capital formation as outcome, as well as a cause, of poverty alleviation has garnered considerable interest across the disciplines.

Historically, land reforms have preceded economic development in several countries. Land reforms were also administered in India soon after independence. These comprised of three legal reforms – (1) abolition of ‘*Zamindari*’ or middlemen as revenue collectors, (2) imposing ceiling on landholdings and awarding of the surplus land’s rights to landless, and (3) tenancy reforms (Mearns, 1998). While abolition of intermediaries was implemented swiftly and successfully without much obstacle, the implementation of tenancy reforms and ceiling legislation was slow and thwarted by landlords who resorted to subdivision of land, eviction of tenants and reassuming self cultivation. The implementation effort differed across states, with most states showing a poor record of implementation. However, in the states of West Bengal and Kerala tenancy reforms were successfully carried out. Overall, land reforms in India remain one of the biggest redistributive exercises. Total area affected in India is more than three times what was involved in the well-known land reforms of Japan, Korea, and Taiwan together (King 1977).

Though land reforms in India were not targeted specifically at generating access to schooling, their impact on the same is crucial for economic growth. Using the data from the state of West Bengal, in this study we analyze the land reforms in India for their impact on human capital formation within the beneficiary households. This is the first attempt to measure the impact of the reforms on household decision to invest in human capital of its members. Unlike the past studies on the impact assessment of reforms, here the data on the household members’ education is available at the individual level, along with the household level variables.

2. Background and relation to the literature

Land reforms administrated in India constituted of three types of components in legislation. Here we are highlighting main types of land reform and the quantitative accomplishments under each of them. This section reviews the rationale for their impact on human capital formation, and also the strategy that will allow us to assess these empirically using the data at hand.

2.1 Land reform implementation in India

In India, land reform, implementation of which is the responsibility of individual states, has occupied a central stage in the policy debate for long time, given inequality in the distribution of productive assets, especially land, which the country inherited from its colonial masters. Reforms had three main elements (Mearns 1999), namely (i) abolition of intermediaries (*zamindars*) shortly after independence; (ii) tenancy laws to increase tenure security by sitting tenants by registering them and often imposing restrictions on the amount of rent they had to pay or the scope for new rental transactions;¹ (iii) ceiling laws that provided a basis for expropriating land held by any given owner in excess of a state-specific ceiling and subsequently transferring it to poor farmers or landless agricultural workers. While the first of these is considered to have been highly successful, progress on the remainder was initially very slow, accelerating only during the 1970s and slowing down again in the 1980s. Still, both types of intervention resulted in the transfer of rights to almost 10 mn hectares of land, an area more than three times what was involved in the well-known land reforms of Japan, Korea, and Taiwan together (King 1977). With the exception of few states, the political commitment to implement reforms was limited and sometimes outcomes were counter to what had been desired, as with large-scale tenant evictions to prevent them from gaining more permanent land rights in anticipation of tenancy laws (Appu 1997).

¹ Many states combined legislation to improve the situation of tenants with either a complete prohibition of land leasing or provisions to provide tenants who had been on the land for some time with very strong property rights, something that is likely to have limited new supply of land to the rental market (Deininger *et al.* 2007).

Table 2 provide summary statistics for the level of land reform implementation, measured as the share of rural population who received land through tenancy reform, the area transferred as a result of ceiling legislation, or the number of ceiling laws, by state based on a summary report that draws together official data from various annual reports by the Ministry of Agriculture (Kaushik 2005). Over and above the large amounts of land affected by *zamindari* abolition and private initiatives such as donations of land under the Bhoodan movement,² direct land distribution affected about 2.5 mn hectares under programs to redistribute of ceiling surplus land, and 7.35 mn hectares under tenancy reform, implying a direct transfer of 5.45% of the area to about 5.35% of the agricultural population for the country as a whole. Comparing this to what has been involved in other land reforms internationally illustrates the size of India's land reform.³ Ceiling and tenancy laws together resulted in the redistribution of about 10% of arable land, about the level of the Philippines, Brazil, or Zimbabwe before 2000, but below Asian countries such as Japan, Korea, and Taiwan (33.3%, 27.3%, and 26.9%) or even El Salvador, Bolivia, and Mexico (27.9%, 32.3%, and 13.5%). In terms of the share of rural households benefiting, India's accomplishment is at the lower end of the scale; while it exceeds what has been accomplished in the pre-1994 period in Kenya, Zimbabwe, and Brazil (1.6%, 3.1%, and 5.4% of the rural population, respectively), it remains considerably below other Asian countries such as the Philippines (24%), Japan (60.9%), and Taiwan (62.5%) or Latin American ones such as Mexico (67.5%), Bolivia (47.5%), and El Salvador (16.8%).

Comparing the share of beneficiary households to that of the area transferred points towards considerable variation across states. In some cases, e.g. Kerala or West Bengal, 12.5% and 10.8% of the population benefited from transfer of 8.5% and 6.4% of the land area, respectively, plot sizes for land transferred remained considerable below the state average. While some states (e.g.

² The amount of land donated voluntarily and distributed under the Bhoodan movement amounted to 0.7 mn ha by 2004, with focus on Bihar, Orissa, and Uttar Pradesh (Government of India 2006a). While some of these donations may have been motivated by a desire to avoid being affected by ceiling laws, we subsume all of these under the indirect effects of legal measures.

³ Note that the two measures considered here, i.e. tenancy reform and distribution of above-ceiling land, are in addition to any lands transferred through *zamindari* abolition.

Gujarat or Tamil Nadu) provided beneficiaries with plots of about average size, in most of the states the fact that the share of beneficiaries remains significantly below the area share points towards transfer of above-average plot sizes, as in Maharashtra (27% of area distributed to 10.7% of population), Karnataka (15.4% and 5.3%), AP and MP (3.5% and 2.2% to 0.75% and 0.61% of population, respectively).

With 4.4% and 2.3%, the share of area redistributed overall or share of households benefiting from ceiling laws has been below the figures for tenancy reform. Although some states such as Rajasthan, UP, Bihar, and AP transferred more land (6.6%, 5.8%, 4.4%, and 8.3%) under ceiling legislation than through tenancy reform, results seem to have been biased towards transfer of above-average sized plots of land, suggesting that even where it was possible to acquire above ceiling land by the state, overcoming political pressures in the distribution of such land may have been difficult. In West Bengal, on the other hand, a state that ranks at or near the top for both measures and that counts with a formidable level of grassroots-level organization, land reform land appears to have been transferred in a very pro-poor fashion.

For the country as a whole, an average of 2.1 land reform laws had been passed per state with the mean law being about 13 years old in 1999. Despite the fact that the highest number of laws was passed in West Bengal where reform-induced transfers were also highest, the correlation between number of laws and the share of area transferred through or of rural households benefiting from reform is, with 0.28, low throughout. This supports the notion that legal provisions alone did not automatically translate into action on the ground, consistent with arguments that there is no *a-priori* reason to expect a positive link between passage of laws -which could be a result of an objective need for land reform and political mobilization or even lack of actual progress- and their actual implementation. In fact, in a number of states, high levels of legal activity appear to have been used to deflect attention from lack of progress on the ground.

While not differentiated in the table, a detailed look at the time dimension of reform measures allows a number of conclusions (Kaushik 2005): After a spurt of land transfers in the 1970s and 1980s, progress has slowed down considerably; in fact between 1995/96 and 2003/04, i.e. for almost a decade, progress in awarding land rights to tenants had come to a complete standstill; the increment in ceiling surplus land transferred during the period amounted to only 10,800 hectares. The latter represents about one tenth of the land declared ceiling surplus, with the remainder being tied up in litigation. This suggests that, unless there are significant changes in the overall parameters, progress in achieving further redistribution of ceiling land could be slow -it would take almost 90 years to dispose of remaining ceiling surplus cases if the current pace is maintained- but also that, by clogging up the court system and preventing it from quickly dispensing justice in other urgent matters, the ceiling legislation may impose external effects beyond land rental markets (Moog 1997).⁴ While broader changes in the legal framework could make much additional land available, they do not seem to be too likely in the current political environment.

Despite considerable interest in the topic at the policy level and a large literature documenting the way land reforms were put in practice at the state level (Yugandhar 1996, Thangaraj 2004), attempts to quantitatively assess their economic impacts at a national scale are surprisingly scant. One study finds that the number of identifiable land reform laws across states is positively related to the extent of poverty reduction but not agricultural productivity (Besley and Burgess 2000). While this could be used to make the case for land reform as a redistributive measure, e.g. through a wage effect, use of a measure only weakly linked to implementation of reforms is a shortcoming. Studies using data on implementation have only been conducted in individual states, mainly West Bengal. District level data point towards a positive impact of land reform on

⁴ Two main reasons for court cases are contestation by landlords and instances where beneficiaries were allocated land but were either unable to establish effective possession or were subsequently evicted. A field survey to explore this issue in Andhra Pradesh pointed to at least 20% of beneficiaries who were not able to access the property they had received although the number of those who are able to file court cases calling for their (re)instatement is much more limited.

productivity (Banerjee *et al.* 2002), a finding that receives support from household level evidence taking into account other political factors (Bardhan and Mookherjee 2006). However, as the policy environment in West Bengal is likely to be uniquely conducive to land reform, a national assessment of land reform impact based on actual implementation would be very desirable in view of the continued relevance of the topic in India's policy debate (Government of India 2006b).

2.2 Impact of land reforms and human capital formation

Previous studies have shown using district and village level data that land reforms impact the agricultural productivity and poverty level of the households. Besley and Burgess (2000) use state level data to show an overall negative impact of tenancy reforms on productivity. Banerjee *et al.* (2002) study the state of West Bengal, where the reforms were successfully implemented, and using a district level data find that tenancy reforms improved agricultural productivity. Bardhan and Mookherjee (2007) using village level data from West Bengal also find significant impact of the tenancy reforms on farm productivity. However, they attribute larger impact to general equilibrium effects of other programs administered in the villages. Deininger, Jin and Nagarajan (2008) using state-level variation in reform implementation also find that the land reforms had a significant and positive impact on income growth and accumulation of human and physical capital in the reform households.

In all, there is evidence of a significant impact of reform in West Bengal on farm productivity and poverty levels. Following this line of research findings indicating positive impacts, we expect changes in behavioral decisions of the household impacted. We hypothesize that by reducing credit constraints, tenancy reform will have a positive impact on long-term human capital investment. Reforms transfers wealth, and therefore producers who had earlier been prevented from making investments, in physical and human capital, due to credit constraints will increase the level of land-related investment as well as an impact on investment in physical or human

capital (Gersbach and Siemers 2005). As ceiling land is targeted toward landless and the poorest households, we also expect the positive impact of ceiling reform on investment in human capital.

3. Data and Estimation Strategy

Data used in this study comes from a listing exercise of the entire population from more than 200 selected villages in 10 districts of West Bengal. Altogether, about 94,000 households are listed. An official list of 1978 land reform beneficiaries was used to draw the village sample in which the bargadars were over sampled to make sure enough beneficiaries are included. The fact we have the official list of all beneficiaries in each village across all the districts allow us to create a weight for each selected village. Hence, the sample is representative after they are adjusted by the weights. Data contains detailed information on literacy and years of education attained for all the members of the dynasty households, and their off springs (i.e. for the head of 1978 household and his children, head of the current household and his children, and all the children currently residing in the household) . Data also contains information on land (both own and reform land), main physical assets as well as household demographic characteristics both at the initial period of 1978 and at present, detailed history of land change (either through inheritance or through market transactions).

3.1. Household characteristics in 1978

One of the key arguments that land reform is expected to have positive long-term impacts is because we assume the poor and landless households are ones who received the reform land. By comparing household initial characteristics between land beneficiaries (bargadars or pattadars) with those who were not affected by either type of the reform, we are able to assess whether the tenancy and ceiling reforms indeed served the redistributive role as initially intended. The descriptive evidence from Table 3 tends to suggest that the beneficiaries of both types of reform are indeed those households who had endowed with little or no land and were relatively poorer and whose livelihood was more dependent upon agricultural sector. In 1978, the average land

endowment, inclusive of patta land, for barga and patta beneficiary was respectively 1.92 acres and 1.31 acres, which was considerably lower than 2.54 acres, the average land endowment of those households who were not affected by the reform. While share of landless households between barga beneficiaries and non-beneficiaries is about the same in 1978 (55% and 57%, respectively), the share of landless households among the patta beneficiaries are considerably higher (75%), which is as expected as ceiling land is mainly to support the landless households.

Examining the occupational structure of the beneficiaries, it can be seen that both patta and barga households heavily rely on agricultural sector. While 91 percent of barga households and 87 percent of patta households reported that their head's main occupation is either working for agricultural wage or farming, 76 percent of the households who were not affected by reform reported so. The limited number of indicators for welfare that were included in the survey (i.e. namely the condition of roof and wall) tends to suggest that reform beneficiaries were poorer than non-beneficiaries. For example, 83 percent of barga and 90 percent of patta beneficiaries reported to have bad quality roof (ie. identified as thatched, or of plastic or mud) as compared to 70 percent of non-beneficiaries who reported so.

Finally, land reform also benefited more households from lower castes, as indicated by the fact that 56 percent of barga beneficiaries and 73 percent of patta beneficiaries are from the most marginalized Scheduled Castes & Scheduled Tribes (SC/ST) as compared to as compared to 43 percent of households who were not affect by reform were from SC/ST.

3.2. Household's current characteristics

By comparing households' initial characteristics and the current characteristics by land reform status, we try to gain some descriptive insights on the impact of land reform. We find descriptive evidence of positive impact on land and human capita investments, rental and sale's market participation; but significant negative correlation between current income or productivity and

reform beneficiaries. However, since we did not have any data on household income and productivity in 1978, we cannot interpret the negative correlation as causal effect.

Table 4 shows that the barga and patta beneficiaries currently own 1.17 acres and 1.33 acres respectively as compared to average of 1.35 acres. We notice that all the land declined over time, but the gap between reform beneficiaries and non-beneficiaries got smaller over time. In fact, the patta beneficiaries had as much land as the non-beneficiaries in 2006. The data also seems to suggest that more landless beneficiaries become landed over time. Seventeen percent of barga beneficiaries changed their status from landless to land owner (from 55% to 38%) and almost all the patta beneficiaries are now land owner.⁵

The reform beneficiaries maintain to be the poor group of population. The average income per capita of barga and patta beneficiaries is Rs. 4640 and Rs. 4400 respectively, as compared to Rs 5548 for those who were not affected. However, it is impossible for us to make any conclusion about the income impact because we do not have the initial level of income in 1978. There is also evidence that the crop productivity of the barga or patta beneficiaries are much lower than non-beneficiary households. The average crop sale from an acre of land reported by barga and patta beneficiaries is Rs 6327 and Rs 3434, respectively, considerably below Rs. 8079 for those who were not affected by the reform. The lowest value of patta beneficiaries may largely attributable to soil or plot quality being below average. While it is difficult for us to evaluate the impact of land reform on productivity or income because we do not know the initial productivity and income in 1978, the lower productivity together with the lower income of reform beneficiary compared to non-reform beneficiary however might suggest that some inefficiency even though the reform might have some positive productivity at the early stage of the reform.

In Table 4, we report the descriptive statistics of impact of both barga and patta reform combined on education of all the members of the dynasty household since 1978. The descriptive

⁵ This is by the definition, as patta beneficiaries are land receivers.

statistics show that the increase in education for the beneficiary households is larger than the non beneficiaries, and also than the overall average. The descriptive statistics clearly indicate, that prior to reforms, these poor households lagged behind in the human capital investment. This indicates that the reform enabled the households to catch up with respect to educational attainment of their children. We also find that over this period, female increased their education on average a year more than their male counterparts. We will further test the validity of these in the regression framework.

3.3. Estimation Strategy

We found that while land reform had positive impact on households' human capital investment. In this section, we specify the econometric equations to test for the impact of reform on education levels of the members of beneficiary households as compared to the non beneficiary households. We use difference in difference methods to estimate the impact of land reforms on off-springs' human capital investment.

Data on number of years of education received by every dynasty household member includes 1978 head's siblings to current head's children and grandchildren. To measure the impact of reform implementation at the household level on the human capital attainments of the individuals, we define a treatment and control group. These are respectively young and old members in the households, defined according to when they obtained the education- after or before the reform implementation. Specifically, each individual can be categorized as a treated individual if his/her household received reform land before he/she was 14 years old. This is accomplished by taking the dependent variable as the difference in the years of education of two cohort groups in any household. The dependent variable here is the difference between individual's education and the average education of household members' educated prior to 1978. This dependent variable is regressed on the beneficiary status of the household as dummy variable. The estimating equation is the following:

$$\Delta E_{vhi}^j = \alpha + \beta R_{vh} + \phi X_{vh} + \rho Z_{vhi}^j + \delta D_v + \varepsilon_{vhi}^j \quad (1)$$

Where, $\Delta E_{vhi}^j = E_{vhi}^{j,young} - \bar{E}_{vh}^{j,old}$

ΔE is the years of education received by the household member of the young cohort minus the average of the old cohort in the household. Subscripts v, h, i stand for the village, household and individual. Superscript j is an indicator of gender. R is the indicator for the household being a reform beneficiary. D is for the village fixed effects. X_{ij} is the vector of household characteristics, also including age and gender and Z is individual characteristics (gender, age, generation).

Assuming that the maximum impact of reforms on education would occur if the child was less than 14 years of age when reforms occur in their household in 1978, we draw these cutoffs to define the treatment group of individuals. We define the young cohort to be 14 to 44 years of age today, and corresponding old cohort as 14 to 34 years of age in 1978. This implies that children below 14 years of age today are not in the regression, and those individuals in the regression were 14 or less at the time of the reform. Age cut offs for corresponding placebo tests are defined accordingly.

Alternative age cut offs are taken to check for robustness of results. In table 7 and 8, the age cut off for the young is 14 to 36 years of age today, with the corresponding old cohort as 14 to 36 in 1978. This means only those who were 6 years of age or less at the time of reforms, are included in these regressions. The estimates are robust to changes in age cutoffs of the cohorts.

4. Empirical Results

The econometrics results are largely consistent with our expectation and the descriptive evidence. We found that reform significantly increased the education for the members in the beneficiary households. Estimated results are consistent across different model specifications and using difference age cut offs to define the cohorts.

4.1. Impact on Education

Table 5 presents the difference- in- difference estimates to assess the long-term impact of land reform on increments in household members' educational attainment, defined as the difference between the level of education attained by the young (who attained education after the implementation of reforms) and average of the households' prior to reform implementation (those who attained education before the reform, disaggregated by gender). We find land reform significantly increased the education attainment for the members of beneficiary households.

All regressions include controls for age and district fixed effects and report the coefficients for reform participation. In Table 1.1 we find that there was increase in education of individuals aged 14 to 44 over the average of the household average of this age group in 1978. The overall increase in education in this time period is seen from the significant and positive coefficient on the constant term, which indicates trend increase of 1.3 years. Column 1 presents the estimate of the reform impact, given by the coefficient on reform dummy, to be significant and positive at .15 years of education. As given by the female dummy, increase in the educational attainment of the female is significant and positive regardless of the reform participation. This illustrates that in last thirty years, literacy and education of female has been improving as shown in the descriptive statistics. Similarly, the trend for landless households is negative and significant throughout the specifications.

Columns 2-4 include controls for generation, landlessness and caste. The interaction of beneficiary status with gender and generation of the individual in the household is included. Overall, the suggested effect is that on average the land reforms increased the education of the individuals in these households by .15-.34 years. The coefficients are highly positive for beneficiary status in all the regressions, indicating that the human capital investment for individuals receiving education post reforms had been impacted positively by household's participation in the land reforms. In table 5.2 we also introduce additional control for patta reforms to differentiate between the nature of reforms. The reform impact of patta does not differ from the reform from the overall effect, and the coefficients are insignificant at 5% level of significance. The landless and SC/ST status of the reform beneficiary also does not cause any significant difference from the overall reform impact for the first generation reform beneficiaries.

4.2. Second Generation Effect

The second generation in the households which were impacted by the beneficiary households, show a larger increase in educational attainment as compared to the overall average. As the overall impact of the reform dummy remains modest at .34, the second generation show an overall trend of .55 years of increase in education, which is also highly significant. Within these beneficiary households, investment in female education occurred in second generation allowing the females to catch up somewhat. In table 5.3 we find that the second generation beneficiaries in the landless households have even larger impact at .83 years of education. From Table 5.2 we see that when controlling for patta reforms separately, we find members in the household which received land in patta show large and significant increase in education only in second generation.

4.3. Female in the Household

Interaction of the beneficiary status with the female dummy indicated that the reform households did not invest in the education of the females in the first generation. The overall trend in the improvement of the female education was positive and large at .60 years. However, the females in

beneficiary households did not perform as well as the males in these households as indicated by negative and significant coefficient of the interaction of female and reform dummy. From column 4 we have inconclusive evidence that the female catch up in the second generation, as the coefficient turns positive but remains insignificant. From Table 5.2 we can see that females in the patta households performed worse on education attainment, with the second generation patta interaction with female dummy showing no improvement. However, controlling for the patta dummy, we have the impact on second generation of females positive and significant at 10% level of significance.

These interpretations rely on the assumption that there are no omitted time varying and group specific effects which are correlated with the reform. The two group – beneficiaries and non beneficiaries, do not differ systematically with respect to their decision on investment in education, and would have had the same increment in education in absence of the reform. To test this parallel trend assumption we define placebo test groups, which go back further in time, to test whether the two groups had differential investments in education before reforms were introduced. We define the young cohort in placebo to be 14 to 34 years of age at the time of reform in 1978 (education not impacted by the reforms) and the old cohort as 34 to 54 years of age in 1978. The estimates for these corresponding placebo tests are presented in Table 6. We can see that the coefficient on the “reform dummy” is negative and not significant throughout. Also, landless dummy still indicates a negative and significant coefficient. These estimates suggest that the households which later benefitted from the reform were investing less in education compared to the group of non beneficiaries. Land reform allows these households to catch by investing in education above the average post reforms. These results of the impact of reforms on education are also consistent across different age cut offs.

5. Conclusion

The results from the study indicate that reform positively impacted the decision to invest in education within the beneficiary households. The size of benefit was modest in first generation, and much larger in second. The second generation does not have a gender bias, allowing women to catch up in their levels of education. Moreover, we do not find any significant variation in initial investment behaviors of patta and barga reform beneficiaries. The impact for those who were initially landless is less, and the impact does not differ for ST/SC households. Given these results it is evident that the land reform benefits extend beyond the targeted outcomes of improvement in productivity, with beneficiary household's strategy of investing in education.

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Table 1: Shares of rural households and arable land area affected by different land reforms in Indian States

State	Tenancy legislation				Ceiling legislation	
	Area (%)	Pop. (%)	No. of laws	Average age	Area (%)	Pop. (%)
Andhra Pradesh	3.48	0.75	2	17.0	8.34	3.81
Bihar	0.00	0.00	3	18.3	4.42	4.00
Gujarat	15.00	11.20	2	15.5	1.95	0.31
Haryana	0.51	0.01	0	0	1.26	0.26
Himachal Pradesh	0.16	3.19	n.a.	n.a.	0.06	0.05
Karnataka	15.38	5.29	2	14.5	1.71	0.30
Kerala	8.47	12.49	4	10.8	1.30	1.04
Madhya Pradesh	2.15	0.61	1	24.0	2.69	0.71
Maharashtra	27.01	10.68	1	23.0	7.74	1.08
Orissa	0.15	1.43	3	9.0	2.24	1.28
Punjab	1.89	0.04	1	10.0	1.50	0.25
Rajasthan	0.00	0.16	0	0	6.63	0.75
Tamil Nadu	3.65	3.23	5	13.6	2.47	1.24
Uttar Pradesh	0.00	0.00	2	14.5	5.81	3.68
West Bengal	6.41	10.80	5	8.2	14.91	19.73
Total	5.45	5.35	2.1	13.03	4.41	2.27

Source: Kaushik (2005) for columns 1 to 4; Besley and Burgess (2000) for columns (5) and (6)

Table 2: Descriptives Statistics (1978)

	Total	Barga Beneficiaries	Patta Beneficiaries	Lose land	Not affected
household characteristics in 78					
Household size	6.21	6.49	5.84	7.35	6.19
Land endowment in 78 (inc'dg patta)	2.54	1.92	1.31	6.90	2.55
landless in 78 (exc'dg patta land)	0.57	0.55	0.75	0.10	0.57
SC/ST	0.45	0.56	0.73	0.17	0.43
78 head literate	0.25	0.22	0.14	0.68	0.25
Head's occup: Ag wage	0.36	0.30	0.54	0.04	0.36
Farming	0.40	0.61	0.33	0.60	0.38
Non-farm wage	0.12	0.05	0.07	0.04	0.13
Self-employment	0.12	0.04	0.06	0.31	0.12
Non-land assets in 78					
Bad roof (thatch/plastic/mud)	0.72	0.83	0.90	0.55	0.70
Bad wall (mud/bamboo)	0.70	0.85	0.78	0.59	0.69

Table 3: Descriptive statistics (current)

	Total	Barga Beneficiaries	Patta Beneficiaries	Lose land	Not affected
Current household's characteristics					
Household size	4.75	5.22	4.93	5.12	4.69
Area owned	1.35	1.17	1.33	3.56	1.30
landless (inc'dg patta land)	0.51	0.38	0.03	0.04	0.57
Share of heads literate	0.43	0.40	0.30	0.87	0.43
Head's occup: Ag wage	0.30	0.23	0.42	0.03	0.30
Farming	0.29	0.57	0.34	0.47	0.26
Non-farm wage	0.20	0.08	0.11	0.08	0.22
Self-employment	0.22	0.12	0.13	0.41	0.23
Current non-land assets					
Bad roof (thatch/plastic/mud)	0.32	0.45	0.52	0.14	0.30
Bad wall (mud/bamboo)	0.55	0.72	0.71	0.36	0.53
Income sources and crop productivity					
Income per capita	5467.94	4640.02	4400.40	10321.84	5544.80
crop productivity (Rs./acre)	7240.65	6327.87	3434.89	5388.75	8079.20

Table 4 : Descriptive Statistics (Human Capital Formation)

	Average	Non-Beneficiary	Beneficiary
OLD COHORT			
All	2.34	2.48	1.52
Male	2.60	2.70	1.95
Female	1.06	1.14	.60
Landless	1.34	1.40	1.02
SC/ST	1.53	1.65	1.08
YOUNG COHORT			
All	3.68	3.74	3.25
Male	3.93	3.97	3.65
Female	3.26	3.36	2.65
Landless	2.84	2.87	2.66
SC/ST	3.12	3.19	2.80
CHANGE			
All	1.34	1.26	1.73
Male	1.33	1.27	1.70
Female	2.20	2.22	2.05
Landless	1.50	1.47	1.64
SC/ST	1.59	1.54	1.72

Young Cohort is 14-44 years in 2008; Old cohort is 14-34 years in 1978

Table 5.1: Impact of Land Reform on Human Capital Formation

	(1)	(2)	(3)	(4)
Beneficiary	0.153*** (0.0397)	0.345*** (0.0454)	0.324*** (0.0458)	0.329*** (0.0460)
Female	0.602*** (0.0271)	0.700*** (0.0293)	0.701*** (0.0293)	0.701*** (0.0293)
Beneficiary * Female		-0.650*** (0.0744)	-0.656*** (0.0745)	-0.675*** (0.0759)
2 nd Gen Beneficiary			0.554*** (0.160)	0.408** (0.197)
2 nd Gen Beneficiary * Female				0.420 (0.329)
Landless	-0.119*** (0.0295)	-0.119*** (0.0295)	-0.118*** (0.0295)	-0.118*** (0.0295)
SC/ST	-0.0452 (0.0455)	-0.0438 (0.0455)	-0.0429 (0.0455)	-0.0430 (0.0455)
Constant	1.360*** (0.112)	1.334*** (0.112)	1.336*** (0.112)	1.336*** (0.112)
Observations	100941	100941	100941	100941
R-squared	0.204	0.204	0.205	0.205

Robust standard errors in parentheses

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

Dummy for children's age are included

Cluster effect at village level is controlled

Young Cohort is 14-44 years in 2008; Old cohort is 14-34 years in 1978

Table 5.2: Impact of Land Reform on Human Capital Formation

	(1)	(2)	(3)	(4)
Beneficiary	0.163*** (0.0493)	0.283*** (0.0570)	0.268*** (0.0576)	0.279*** (0.0579)
Patta Beneficiary	-0.0250 (0.0723)	0.142* (0.0832)	0.127 (0.0841)	0.116 (0.0845)
Female	0.602*** (0.0271)	0.700*** (0.0293)	0.701*** (0.0293)	0.701*** (0.0293)
Beneficiary * Female		-0.404*** (0.0951)	-0.410*** (0.0952)	-0.445*** (0.0974)
Patta * Female		-0.578*** (0.139)	-0.575*** (0.139)	-0.536*** (0.142)
2 nd Gen Beneficiary			0.347* (0.202)	0.0913 (0.253)
2 nd Gen Patta			0.525 (0.329)	0.812** (0.400)
2 nd Gen Beneficiary * Female				0.686* (0.410)
2 nd Gen Patta * Female				-0.788 (0.692)
Landless	-0.118*** (0.0296)	-0.118*** (0.0296)	-0.118*** (0.0295)	-0.117*** (0.0295)
SC/ST	-0.0449 (0.0455)	-0.0420 (0.0455)	-0.0412 (0.0455)	-0.0415 (0.0455)
Constant	1.360*** (0.112)	1.331*** (0.112)	1.333*** (0.112)	1.334*** (0.112)
Observations	100941	100941	100941	100941
R-squared	0.204	0.205	0.205	0.205

Robust standard errors in parentheses

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

Dummy for children's age are included

Cluster effect at village level is controlled

Young Cohort is 14-44 years in 2008; Old cohort is 14-34 years in 1978

Table 5.3: Impact of Land Reform on Human Capital Formation

	(1)	(2)	(3)	(4)
Beneficiary	0.183*** (0.0594)	0.159*** (0.0599)	0.181*** (0.0605)	0.189*** (0.0647)
Landless	-0.112*** (0.0313)	-0.112*** (0.0313)	-0.112*** (0.0313)	-0.112*** (0.0313)
Beneficiary * Landless	-0.0512 (0.0751)	-0.0470 (0.0751)	-0.0818 (0.0763)	-0.0770 (0.0773)
2 nd Gen Beneficiary		0.519*** (0.160)	0.0274 (0.249)	-0.0546 (0.261)
2 nd Gen Beneficiary * Landless			0.835*** (0.323)	0.749** (0.333)
Patta				-0.0260 (0.0744)
2 nd Gen Patta				0.353 (0.340)
Female	0.602*** (0.0271)	0.602*** (0.0271)	0.602*** (0.0271)	0.603*** (0.0271)
SC/ST	-0.0446 (0.0455)	-0.0439 (0.0455)	-0.0437 (0.0455)	-0.0437 (0.0455)
Constant	1.356*** (0.112)	1.358*** (0.112)	1.359*** (0.112)	1.359*** (0.112)
Observations	100941	100941	100941	100941
R-squared	0.204	0.204	0.204	0.204

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

Robust standard errors in parentheses

Dummy for children's age are included

Cluster effect at village level is controlled

Young Cohort is 14-44 years in 2008; Old cohort is 14-34 years in 1978

Table 6: Placebo Test for Impact of Land Reform on Human Capital Formation

	(1)	(2)	(3)	(4)
Beneficiary	-0.0886 (0.0670)	-0.114 (0.0744)	-0.115 (0.0744)	-0.114 (0.0744)
Female	-0.801*** (0.0496)	-0.816*** (0.0532)	-0.816*** (0.0532)	-0.816*** (0.0532)
Beneficiary * Female		0.106 (0.134)	0.106 (0.134)	0.102 (0.134)
2 nd Gen Beneficiary			0.679 (1.864)	-1.791 (2.743)
2 nd Gen Beneficiary * Female				4.586 (3.737)
Landless	-0.890*** (0.0513)	-0.889*** (0.0513)	-0.890*** (0.0513)	-0.890*** (0.0513)
SC/ST	-0.694*** (0.0783)	-0.694*** (0.0783)	-0.694*** (0.0783)	-0.694*** (0.0783)
Constant	3.580*** (0.198)	3.583*** (0.199)	3.583*** (0.199)	3.583*** (0.199)
Observations	32633	32633	32633	32633
R-squared	0.304	0.304	0.304	0.304

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

Robust standard errors in parentheses

Dummy for children's age are included

Cluster effect at village level is controlled

Young Cohort is 14-34 years in 1978; Old cohort is 34-54 years in 1978

TABLE 7: Alternate cohorts' age cut offs (Impact of Land Reform on human capital)

	(1)	(2)	(3)	(4)
Beneficiary	0.121*** (0.0455)	0.344*** (0.0522)	0.312*** (0.0530)	0.321*** (0.0533)
Female	0.718*** (0.0309)	0.829*** (0.0334)	0.830*** (0.0334)	0.830*** (0.0334)
Beneficiary * Female		-0.734*** (0.0849)	-0.739*** (0.0849)	-0.770*** (0.0872)
2 nd Gen Beneficiary			0.554*** (0.155)	0.392** (0.188)
2 nd Gen Beneficiary * Female				0.489 (0.321)
Landless	-0.167*** (0.0339)	-0.166*** (0.0339)	-0.165*** (0.0339)	-0.165*** (0.0339)
SC/ST	-0.0798 (0.0523)	-0.0800 (0.0523)	-0.0791 (0.0523)	-0.0792 (0.0523)
Constant	1.449*** (0.110)	1.417*** (0.110)	1.420*** (0.110)	1.420*** (0.110)
Observations	77545	77545	77545	77545
R-squared	0.204	0.205	0.205	0.205

Robust standard errors in parentheses

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

Dummy for children's age are included

Cluster effect at village level is controlled

Young Cohort is 14-34 years in 1978; Old cohort is 34-54 years in 1978

TABLE 8: Alternate cohorts' age cut off (Placebo Test)

	(1)	(2)	(3)	(4)
Beneficiary	-0.136** (0.0671)	-0.158** (0.0741)	-0.158** (0.0741)	-0.158** (0.0741)
Female	-0.998*** (0.0499)	-1.011*** (0.0534)	-1.011*** (0.0534)	-1.011*** (0.0534)
Beneficiary * Female		0.0938 (0.135)	0.0910 (0.135)	0.0893 (0.135)
2 nd Gen Beneficiary			2.175 (2.136)	-0.272 (4.051)
2 nd Gen Beneficiary * Female				3.389 (4.768)
Landless	-0.932*** (0.0512)	-0.932*** (0.0512)	-0.933*** (0.0512)	-0.933*** (0.0512)
SC/ST	-0.813*** (0.0781)	-0.812*** (0.0781)	-0.812*** (0.0781)	-0.812*** (0.0781)
Constant	1.383*** (0.0741)	1.387*** (0.0743)	1.387*** (0.0743)	1.387*** (0.0743)
Observations	32780	32780	32780	32780
R-squared	0.334	0.334	0.334	0.334

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

Robust standard errors in parentheses

Dummy for children's age are included

Cluster effect at village level is controlled

Young Cohort is 14-36 years in 2008; Old cohort is 36-56 years in 1978