Impact of Land Reform on Productivity, Land Value and Human Capital Investment
Household Level Evidence from West Bengal

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(Abstract)

While land reform has been the subject of considerable scholarly debate, most of the analyses have been at the aggregate level and focused on rather short-term effects. We use a listing of more than 90,000 households in some 200 villages in West Bengal to highlight the impact of the state's 1978 land reform program on human capital accumulation and current productivity of land use. While we ascertain a highly significant positive effect on long-term accumulation of human capital, our analysis also suggests that, partly because land that had been received through land reform is still operated under share tenancy arrangements, productivity on such land is significantly lower than the average. The combination of lower productivity of reform land relative to own land and land rental and sale's restriction of reform land is associated with significantly lower purchase and sale's price of reform land compared to own land. Programs to allow land reform beneficiaries to acquire full ownership could thus have significant benefits.

1. Introduction

Land holdings in India were historically distributed in a highly unequal fashion, and have always been used as a source of social power. Ensuring secure access to land for the poor and landless had been the key motivation for India's land reform since independence. Since then a number of land reforms have been carried out by the government – abolition of '*Zamindari*' or middlemen as revenue collectors, imposing ceiling on landholdings and awarding of the surplus land's rights to landless, and tenancy reforms (Mearns, 1998). While abolition of intermediaries has been implemented swiftly and successfully without much obstacle, the implementation of ceiling and tenancy reforms are vehemently challenged.

Land reforms have impacted 12.4 mn tenants on 15.6 mn acres of land, through redistribution of ownership rights or by providing them secure access, as per the Government of India records until 2002 (Hanstad et al., 2008). 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). However, the implementation of the land reform in India has varied vastly across

states.   The two states that have been most successful in implementing tenancy and ceiling reforms are West Bengal and Kerala (Ghatak and Roy, 2007). In West Bengal this was achieved by the launch of a tenant registration drive in 1978, popularly known as "Operation Barga". This was a program designed to implement tenancy laws that regulated rent and provided security of tenure to sharecroppers. Due to subsequent successful implementation of the tenancy laws in West Bengal, we look at the evidence of impact of reforms in this state.

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), quantitative evidence on their impact is limited. Up to now all of the evidence on land reform impacts has been at a highly aggregate level (state or district level) and failed to distinguish the types of reform with varying outcomes. The high aggregation clearly limits the policy relevance of these studies.

Besley and Burgess (2000) using all-India data exploit interstate variations and find that the number of identifiable land reform laws across states is positively related to the extent of poverty reduction but not agricultural productivity. Using the same data Ghatak and Roy (2007) find that the impact of land reform on agricultural productivity depends on the type of reform. They also check the robustness of results by using additional measures of productivity from alternate datasets. Banerjee, Gertler and Ghatak (2002) use district level data from West Bengal to conclude reforms improved productivity, and can explain 28 percent of the agricultural productivity growth occurring post reforms. Similarly, Bardhan and Mookherjee (2007) use a village level land reform data to conclude a positive impact on productivity. Reforms also affect the accumulation of human and physical capital of the beneficiary households (Deininger et al. 2008). Given the evidence that poor and landless are likely to benefit most from land reform (Besley and Burgess 2001; Deininger et al. 2008), role of tenancy reforms in enhancing human capital investment of children of bargadars household is an important long-term impact of these reform.

The policy relevance of study the impact of land reform at individual beneficiary level has well emphasized in the literature (Ghatak and Roy, 2007; Bardhan and Mookherjee, 2007). Data limitation is probably the single most important reason why almost all the studies on this topic are based on aggregate data. In this paper, we use a large sample of households from West Bengal, one of the Indian state where land reform implementation, through the award of permanent tenancy rights to *barga* land following the ascent to power of the Communist Party in 1978, has made the greatest advances. To contribute to the policy debate, we assess benefits and potential cost of such reform. Evidence of long-term benefits is obtained from exploring changes in educational advancement of beneficiaries' off-spring as well as beneficiaries' asset ownership compared to that of non-beneficiaries. While our data preclude inferences on the cost of implementation, it is likely that beneficiaries' continued need to pay rent to landlords causes considerable inefficiency. To test this, we test whether productivity of land use is affected by the share of land held under *barga*. Both of these together suggest that land reform did lead to long-term benefits but that at this point, ways of awarding full ownership to beneficiaries could be efficiency-enhancing.

The main objective of this study is to assess the potential benefit and cost of land reform that has been implemented a few decades ago. We use a listing of more than 90,000 households in some 200 villages in West Bengal to highlight the impact of the state's 1978 land reform program on human capital accumulation and current productivity of land use. We assess the long-term impact of land reform on educational attainments of household members in the reform beneficiary households. In addition, we assess and quantify potential inefficiency in crop cultivation associated with tenancy. This is achieved by regressing total gross revenue (before rent payment) of a household on the share of land reform land cultivated. Hedonic regressions of market prices for land are used to provide additional evidence to corroborate results on the net effect of productivity of land use and market restrictions associated with tenancy and ceiling reform land.

We find land reform significantly increased the education attainment for the members of beneficiary households. While we ascertain a highly significant positive effect on long-term accumulation of human capital, our analysis also suggests that, partly because land that had been received through land reform is still operated under share tenancy arrangements, productivity on such land is significantly lower than the average (by 21-35%). This is consistent with land price regressions which point to market price for owned land being 8-14% higher than that for land reform land after all other factors (including plot characteristics and village dummies) are controlled for. Programs to allow land reform beneficiaries to acquire full ownership could thus have significant benefits.

The paper is structured as follows. Section two discusses land reform in a global context and posits the hypotheses to be tested. Section three describes data sources and discusses descriptive statistics. The econometric results are presented in section four and section five concludes by briefly discussing policy implications.

2. Background and relation to the literature

This section reviews the rationale and level of land reform implementation -globally and in India-highlighting main types of land reform and the quantitative accomplishments under each of them. We use this as a basis to formulate hypotheses on the impact of different types of land reform and their evolution over time and to outline our strategy that will allow us to assess these empirically using the data at hand.

2.1 Land reform in a global context

A large body of empirical literature on agricultural production has shown that, due to the transaction costs involved in supervising hired labor (Carter 1984, Feder 1985, Eswaran and Kotwal 1985, Benjamin 1995), a farm structure based on owner-operated units is more efficient than one based on wage labor (Berry and Cline 1979, Binswanger *et al.* 1995). Although market mechanisms can, in principle, help to equalize the operational land distribution and thus

5

maximize aggregate production, challenges remain. First, transaction costs and borrowing constraints may reduce the number of market transactions well below the optimum. Second, to the extent that transactions in rental and sales markets require transfers of resources among the parties involved even productivity-enhancing transactions may have undesirable distributional implications. At low levels of development, and especially with high inequality in the land ownership distribution, landlords may be able to reduce the benefits to tenants by exerting market power. At higher levels of development, speculative elements may cause a discrepancy between the market value of land and its underlying 'fundamental' value based on profits from agricultural production, thereby preventing movement of land to the most productive producers. Third, with imperfections in other markets, e.g. those for labor or credit, market transactions may not achieve first best outcomes in terms of production. As a result, government interventions that aim to provide the most productive producers with land access can have significant social and economic benefits (Chau 1998, Carter and Zimmerman 2000).

In addition to its potential to increase productivity, land reform can, through its possible effect on credit markets, also affect productive investment. It can have additional impacts by overcoming some of the negative consequences of a highly unequal distribution of asset ownership and economic opportunities. One frequently cited issue is that, with credit market imperfections, the poor may not be able to attain the level of indivisible investment in human or physical capital that would correspond to their innate ability (Galor and Zeira 1993, Gersbach and Siemers 2005). In such situations, exogenous increases of asset endowments can bring the level of investment closer to the social optimum and also be beneficial to the individuals concerned. A second possible reason is that limited access to economic resources is likely to translate into limited political influence, possibly giving rise to a vicious and self-perpetuating circle of high inequality, bad institutions, and low economic growth (Acemoglu *et al.* 2004). Also, a tendency towards segregation may affect communities' ability to supply local public goods and, to the extent that

6

these are essential inputs into private production, trap the poor in an undesirable equilibrium (Durlauf 1996, Cardenas 2003). This can be pronounced in cases where what is produced are public "bads" such as violence, social unrest, and strife, which are associated with significant economic as well as social costs.[1]

The potential productivity and social benefits from a more egalitarian distribution of land, often combined with arguments in favor of historical justice, have provided a justification for redistributive policies in many countries. The goal was to establish a foundation for an inclusive and broad-based pattern of economic development in some of the world's most unequal societies. The review of land reform episodes in table 1 illustrates that the magnitude of such efforts, in terms of the number of beneficiaries and the size of area redistributed, was enormous.[2] Well-known land reforms in Japan, Korea, and Taiwan at the end of World War II redistributed between 30% and 40% of the cultivated area, affecting about two thirds of rural households. Although they were drawn out over longer time periods, reforms in Bolivia, Nicaragua, Peru, and Mexico, affected sizeable portions of their countries' arable land endowment and benefited up to a third of the rural population.

Compared to the magnitude of these efforts, evidence on their effect is scant and often focused on outputs rather than impact based on a rigorous counterfactual. In Japan, Korea, and Taiwan, land reforms helped improve productivity and set the stage for an impressive increase in non-agricultural development (Jeon and Kim 2000). In the Philippines, early land reforms that benefited more than 0.5 million households and green revolution technology, improved household welfare (Otsuka 1991, Balisacan and Fuwa 2004) and increased investment and human capital accumulation (Deininger and Olinto 2001). Although quite effective, land reforms

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[1] For a theoretical underpinning for the relationship between distribution and provision of public goods, including social cohesion, see (Bardhan and Ghatak 1999). It has also been shown that, especially in rural environments where other markets are imperfect, such interventions can help improve their nutritional status, risk-bearing capacity, and investment incentives, in addition to enhancing their ability to access credit markets (Burgess 2001).
[2] The purpose of this table is illustrative, to provide an indication of the orders of magnitude involved. Figures on area redistributed and number of beneficiary households are taken from the cited sources and percentages have been calculated by taking the total area of arable land (from FAO statistics) and the rural population divided by 5 (to obtain an estimate of the number of rural households).

undertaken immediately after independence in some African countries, e.g. Kenya and Zimbabwe (Scott 1976, Gunning and et al 2000, Deininger *et al.* 2004) were often abandoned for political reasons (Kinsey and Binswanger 1993). In Latin America, reforms distributed comparatively large amounts of land (Barraclough 1970, Eckstein and Horton 1978, Jarvis 1989) but often failed to improve productivity and were insufficient to help overcome deep-rooted structural inequalities (de Janvry and Sadoulet 1989). Following a relative decline of interest in the topic during the late 1970s, it received renewed attention recently,[3] partly due to the fact that, even if accompanied by high levels of growth, macro-economic reforms in countries characterized by high land inequality often failed to narrow the gap between the rich and the poor. More importantly, the task which the original reforms set out to accomplish remains in many respects unfinished (Lipton 1993). Together with a strong political appeal of land redistribution, this has recently prompted countries as diverse as Brazil, Bolivia, South Africa, the Philippines, Venezuela, and Zimbabwe to renew their land reform efforts.

2.2 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;[4] (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

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[3] For recent contributions on land reform see (Boyce *et al.* 1998, Bandiera 2003, Bobrow-Strain 2004, Borras, Jr. 2005, Bradstock 2005, Eastwood *et al.* 2006).

[4] 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).

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).

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,[5] 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.[6] 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

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[5] 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.
[6] 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.

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. 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).[7] 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),

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[7] 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.

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 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).

2.3 Hypotheses on land reform impact

Contrary to most empirical studies that have derived estimates of land reform impact from aggregate data at the district of state level, we use household level information collected from a large survey in West Bengal. We expect that, by reducing credit constraints, tenancy reform as implemented there will have a positive impact on long-term human capital investment. On the other hand, we expect the reform land to have lower productivity compared to own with full ownership either due to the lower quality of land (*patta land*) or due to the fact that tenancy reform land (*barga land*) is also sharecropped land. Finally, partly due to its relative lower productivity, and partly due to the market restrictions against reform land, we would expect the purchase and sale's price of tenancy reform land to be lower than the own land.

Hypothesis 1: Tenancy reform reduces tenants' probability of being evicted and often also increases the share of output received by them. It will generally have a positive impact on

12

investment. As it also transfers wealth, tenancy reform that benefits producers who had earlier been prevented from making such investments 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.

Hypothesis 2: As tenants will still have to pay rent, their incentive to undertake (non-contractible) land investment and to exert effort in cultivating it will be reduced, compared to what would be the case under full ownership. This will reduce the productivity of land use at any given point in time, thereby implying an indirect cost of this type of land reform. As ceiling land is more marginalized and fragmented land, we also hypothesize that ceiling land has lower productivity compared to land with full ownership.

Hypothesis 3: In West Bengal, purchase and sale of tenancy land is only allowed to occur between the landlord and the tenant. Tenancy land is also allowed to sublease to third party regardless whether the tenant household is still able to cultivate the land. This together with the relative lower productivity effect proposed in the second hypothesis is expected to be associated with a lower purchase and sale's price of tenancy land relative to the own land.

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. In addition to obtaining detailed information on land (both own and

13

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), literacy and years of education attained for all the members of the dynasty households (i.e. for the head of 1978 household, head of the current household and all the children) is available. These provide a unique opportunity to analyze the issues at hand.

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 (bargadas or partadas) 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

14

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. While we find descriptive evidence of positive impact on land and human capita investments, rental and sale's market participation, we find there exist 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 non landless 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.[8]

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

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[8] This is not surprising that patta beneficiaries are not landless because by the definition, they are land receivers.

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.

The last 3 rows of table 4 also provide some evidence for narrowing gap between the young generation's education and household head's education. Increase in the education attainment amongst the barga and patta beneficiary households is slightly greater than than the overall average of 2.46. Barga and patta beneficiary households registered gains of 2.46 and 3.70 years respectively. This has narrowed the disparity in education which existed earlier as seen from the education attained by the household heads. The gap between education of the children currently in school belonging to reform beneficiary households and the average household is insignificant and denotes the strides made in the educational attainment.

3.3. Estimation Strategy

The main descriptive findings are in general consistent with the hypotheses we proposed in the previous section. Specifically, we found that while land reform had positive impact on households' human capital investment, the productivity is lower for reform beneficiaries than non-beneficiaries. Whether these descriptive findings are borne out after we control as many factors as we could or not will rely on a more rigorous econometrics analysis. In this section, we specify the econometric equations to test for the three main hypotheses.

3.3.1. Impact on human capital investment

Our first analysis is to measure the impact of reform implementation at the household level on the human capital attainments of the individuals who obtained schooling after reform was implemented. This is accomplished by dividing the household members in the control and treatment group according to whether they obtained the education before and after the reform implementation. This dependent variable is the difference in averages of outcome post –treatment for the treatment group and pre-treatment for the control group. Thus, the difference in the years of education of these two cohort groups in any household is regressed on the beneficiary status of the household. The estimating equation is the following:

$$\Delta E_i = \alpha + \beta R_{ik} + \sum \phi X_{ij} + \delta D_r + \varepsilon_{ij} \qquad (1)$$

Where $\Delta E_i = E_{oi} - E_{yi}$, and E_{oi} is the years of education received by the household member of the old cohort (current household head's with atleast age …currently) and E_{yi} is the education in years of the young cohort (members currently in school). R_{ki} measures the reform participation by type of reform (barga dummy and/ or patta dummy) for the household i. D_r is the notation for district dummies, where r =1 to 20 districts in the sample. X_{ij} is the vector of

household characteristics, also including age and gender.

3.3.2. Productivity Equation

The equation to estimate the marshallian inefficiency with the household level

production data is as follows:

$$V_i = \alpha + \beta R_{ik} (or\, \eta S_{ik}) + \sum \phi X_{ij} + \delta D_r + \varepsilon_{ij} \qquad (2)$$

Where V_i is the gross revenue receipt of the household from the total land area under

Cultivation (including owned, rented, barga or patta), the variable S_{ik} is the share of the

reform land (distinguished by type k) in the total land cultivated. Either R_{ik} or S_{ik} is included to measure the reform.

3.3.3. Land Price Equation

Market prices of own land and barga land is regressed on determinants of these such as plot quality and other characteristics, and any region specific difference in market prices by including a village dummy. Here, one of the characteristics is 'ownership type', which is captured by the barga dummy. The land purchase dummy indicates the nature of transaction, whether it is a sale or purchase. Interaction of barga dummy and the land purchase dummy is included. The estimating equation for this is:

$$P_i = \alpha + \beta_1 A_i + \beta_2 A_i^{irr} + \beta_3 Z_i + \beta_4 R_i + \beta_5 R_i * T_i + \delta_1 D_r + \delta_2 t + \sigma D_r * t + \varepsilon_i \quad (3)$$

Where P_i is the market price per acre of plot "i" reported by the household "j" in region "r" and year "t",[9] A_i is the total area of the land owned by the household, A_i^{irr} is total area which is irrigated, Z is the dummy for whether the partner belonged to the same village, R is the dummy for land being under any reforms or not, T is the dummy for land purchase, D_r are district dummies, t is a time dummy with $t = 1, 2, ...T$, and $D_r * t$ is the interaction of district and time dummies to capture any change in district specific secular trends.

4. Empirical Results

The econometrics results are largely consistent with our expectation and the descriptive evidence. We found that reform significantly increased the children's education. After controlling the households characteristics, the productivity and price is significantly lower for reform beneficiaries. The results also distinguish differential effect between patta and bagar reforms.

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[9] Since very few reported with sale and purchase at the same time, we can not and do not control household effects in this regression. Hence, subscription "j" does not explicitly appear in the equation.

Most of the results are consistent across different model specifications and using difference measure of reforms.

4.1. Education

Table 5 presents the 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 household head's (those who attained education before the reform). We find land reform significantly increased the education attainment for the members of beneficiary households.

All regressions include controls for head's age, children's age and district fixed effects. Column 1 reports the coefficients for barga and patta reform participation. Without controlling for additional household level variables, the reform dummy has a positive and significant impact on education attainment of members in the household. Columns 2-4 successively include additional controls for assets and land area owned, and the corresponding figures in the current period. The coefficients are highly positive for both the barga and patta dummy in all the regressions, indicating that both ceiling and the tenancy reforms had positive impact on the human capital accumulation of beneficiary households. The fact that the magnitude for patta land (0.9-1.2) is much larger than that for barga (0.3-0.4) may suggest that the ownership of land is indeed more important.

Table 6 includes the interaction of the beneficiary status and the landlessness dummy at the time of reform in 1978. It can be seen from the positive and significant coefficient that the landless household which are barga beneficiaries increased the human capital accumulation by nearly 1 year more than the rest. The impact of patta reforms on education of members was also larger for the landless households. In column 3, the specification controlling for land owned in 1978 and non-land assets (no. of buffloes) in 1978, the coefficients are smaller but positive and highly significant for barga beneficiaries. On the other hand, the coefficient of barga beneficiary itself become insignificant, suggesting the entire gain in education is from the landless households. The

negative coefficient of male dummy suggests that gap between male and female in general is narrowing.

4.2. Productivity Effect

To determine whether the productivity of reform land is indeed lower than that of land with full ownership as suggested in the descriptive analysis, we regress total net revenue of a household (before rent payment) on the share of reform land cultivated. These results of productivity of land use, presented in Table 7, are also consistent with expectations. Holding a variety of factors constant and for a wide range of specifications, the coefficient of both reform dummies (or of share of reform land in total land) is very significant and negative, suggesting significant inefficiency on both patta and barga land.

In Column 1 we regress the gross revenue receipts on the dummies for current status as barga or patta beneficiary. Since the data is not available at the plot level controls for the input intensity are not precise. However, controls for broad input measures at the household level are added in all regressions, controlling for share of irrigated area, total area cultivated and demographic variables as caste, head's age, household size, non-land assets and education of the head. The coefficients on irrigated and total area cultivated are significant as expected, with irrigation having a large impact on crop productivity. Column 2 includes share of both barga and patta land in total cultivated area as a key regressor. The coefficients are negative and highly significant for both these variables, indicating that barga and patta land cultivation is inefficient. Column 3 limits the sample to barga land cultivation (excludes patta cultivators). The coefficient of share of barga land in total cultivated is negative and significant as before. Column 4 limits the sample to the cultivators of both barga and own land, and finds share of barga in total area cultivated significantly reduces the revenue receipts. The magnitude of inefficiency is large, as column 4

20

indicates the productivity for a bargadas household with all the barga land is 35% lower than non-bargadas households who cultivated all his/her own land.[10]

4.3. Price Effect

Results from the hedonic land price differential regressions in Table 8. Based on the data, we did not find any patta land participated in either land purchase or land sale. This is not surprising because it is not allowed to sell. So only the comparison of price between own and barga land is relevant in the price regression. In the first two columns, the observation includes only the sale's plots. And for the last two columns we pooled all the land plots that either participated in land purchase or participated in land sale. We were able to pool because the same set of variables (including price and the plot characteristics) was reported regardless of sale or purchase. Another difference in the model specification among all the columns is that while time and regional dummies are included for all the four columns, columns (2) and (4) also include the interaction of time and regional dummies. The results are consistent with expectation and robust across model specifications. This is consistent with land price regressions which point to market price for owned land being 8 to 15 percent higher than that for land reform land after all other factors (including plot characteristics and village dummies) are controlled for.

5. Conclusion

Distinct results of this study tie together to enumerate the benefits and costs of the land reforms, and have clear policy implications for the state governments. Literature has already established that reform policies were necessary at independence and, overall, had a beneficial aggregate impact on rural poverty levels. In this study we find land reform also had a significant positive impact on educational attainment of beneficiary households' members. However, results also point out some negative ramifications which persist with tenancy. The land that had been received through land reform is still being operated under share tenancy arrangements as required

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[10] There is tradeoff between estimation efficiency and control of unobservables in each of the columns. Column 4 has the best control of unobservables among all the columns between only own land and bargadas are included, but it has the least number of observations. Column (4) is preferred because missing variables problem is more serious than loss of estimation efficiency, especially given sample size is still very large even in column (4).

by tenancy laws, and could be subject to standard Marshallian inefficiency. The results from the productivity and price regressions further suggest that a large and very significant gain could be achieved if the current tenants were converted to land owners. This is the future direction which the West Bengal's government is currently considering. Their assessment of administrative cost associated with any scheme to accomplish land transfers, by enabling tenants to buy out land from their landlords, would provide a clear guidance for future land policy action in West Bengal and other states.

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Table 1: Global extent and characteristics of land reforms

Country	Area		Beneficiary households		Area per household (hectares)	Implementation Period
	Total area (1000 hectares)	Share of arable Land (%)	Number (thousands)	Share of rural Households (%)		
Africa						
Egypt	390	15.4	438	10.0	0.89	1952–78
Kenya	403	1.6	34	1.6	11.85	1961–70
Zimbabwe	2,371	11.9	40	3.1	59.28	1980–87
Asia						
Japan	2,000	33.3	4,300	60.9	0.47	1946–49
Korea, Rep. of	577	27.3	1,646	45.5	0.35	1948–58
Philippines	1,092	10.8	1,511	24.2	0.72	1940–85
Taiwan, China	235	26.9	383	62.5	0.61	1949–53
Central America						
El Salvador	401	27.9	95	16.8	4.22	1932–89
Mexico	13,375	13.5	3,044	67.5	4.39	1915–76
Nicaragua	3,186	47.1	172	56.7	18.52	1978–87
South America						
Bolivia	9,792	32.3	237	47.5	41.32	1953–70
Brasil	13,100	11.3	266	5.4	49.32	1964–94
Chile	9,517	60.1	58	12.7	164.09	1973
Peru	8,599	28.1	375	30.8	22.93	1969–79

Source: Deininger (2003).

Table 2: 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 3: 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 4: 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
Difference in children and head's educ	2.46	2.65	3.70	-1.30	2.39
Head's years of educ.	3.19	2.81	1.73	8.40	3.27
Children's years of educ.	5.65	5.46	5.44	7.10	5.66

Table 5: Impact of land reform on Children's Education

	(1)	(2)	(3)	(4)
Barga beneificary	0.387	0.387	0.305	0.383
	(2.96)**	(2.96)**	(2.38)*	(2.94)**
Patta beneficiary	1.201	1.203	0.854	1.186
	(7.64)**	(7.64)**	(5.29)**	(7.62)**
Male child		-0.087	-0.101	-0.089
		(1.71)	(2.00)*	(1.73)
Area owned in 1978			-0.221	
			(3.83)**	
Number of bufflos in 78			-0.108	
			(5.24)**	
Area owned now				-0.035
				(1.68)
Number of bufflo/cows owned now				-0.011
				(0.62)
Number of Children			0.013	0.001
			(0.45)	(0.02)
Observations	48871	48871	48871	48871
R-squared	0.24	0.24	0.27	0.24

Robust t statistics in parentheses; * significant at 5%; ** significant at 1%
Dummy for head's age, dummy for children's age are included
District dummies are included
Cluster effect at village level is controlled

Table 6: Impact of land reform on Children's Education (interaction of landless and beneficiaries included)

	(1)	(2)	(3)	(4)
Barga beneificary	-0.103	-0.102	0.074	-0.092
	(0.67)	(0.66)	(0.47)	(0.60)
Patta beneficiary	0.900	0.902	0.909	0.896
	(5.72)**	(5.73)**	(5.90)**	(5.64)**
Barga beneificary×Landless in 78	0.970	0.970	0.458	0.938
	(5.15)**	(5.16)**	(2.07)*	(5.02)**
Patta beneficiary×Landless in 78	0.427	0.427	-0.073	0.412
	(2.22)*	(2.21)*	(0.34)	(2.12)*
Male Child		-0.088	-0.101	-0.089
		(1.71)	(2.00)*	(1.74)
Area owned in 1978			-0.219	
			(3.80)**	
Number of bufflos in 78			-0.108	
			(5.31)**	
Area owned now				-0.034
				(1.68)
Number of bufflo owned now				-0.009
				(0.51)
Number of children			0.013	0.002
			(0.47)	(0.07)
Observations	48871	48871	48871	48871
R-squared	0.24	0.24	0.27	0.24

Robust t statistics in parentheses; * significant at 5%; ** significant at 1%
Dummy for head's age, dummy for children's age are included
District dummies are included
Cluster effect at village level is controlled

Table 7: Productivity of Reform Land versus Own Land

	(1)	(2)	(3)	(4)
Current bargadas	-0.147			
	(3.87)**			
current pattadas	-0.192			
	(4.66)**			
Share of barga land in total cultivated area		-0.215	-0.216	-0.352
		(4.14)**	(2.49)*	(2.99)**
Share of patta land in total cultivated area		-0.254		
		(4.67)**		
Share of irrigated area in total cultivated area	0.353	0.353	0.452	0.596
	(5.42)**	(5.41)**	(4.53)**	(6.78)**
Years of educ of head	0.010	0.010	0.013	0.007
	(3.74)**	(3.74)**	(2.19)*	(1.16)
ST/SC caste	-0.195	-0.191	-0.076	-0.111
	(4.60)**	(4.51)**	(1.14)	(1.77)
Head's age	0.001	0.001	0.002	-0.001
	(1.41)	(1.43)	(1.20)	(0.41)
Total area cultivated (log)	0.668	0.657	0.557	0.710
	(37.36)**	(35.02)**	(11.89)**	(12.83)**
Household size (log)	0.067	0.066	0.032	0.026
	(4.15)**	(4.06)**	(0.85)	(0.57)
Own bufflo/cow	0.059	0.055	0.092	0.001
	(1.75)	(1.62)	(1.35)	(0.01)
Observations	40091	40091	5907	3189
R-squared	0.48	0.48	0.34	0.37

Robust t statistics in parentheses; * significant at 5%; ** significant at 1%

Cluster effect at village level is controlled

(1) and (2) for full sample; (3) sample with barga land; (4) sample with own land and barga land

Table 8: Land price differentials between own land and reform land

	(1)	(2)	(3)	(4)
Land Size (log)	-0.102	-0.098	-0.049	-0.114
	(4.76)**	(4.58)**	(3.71)**	(5.97)**
Partners from own village	0.057	0.057	0.011	0.016
	(2.03)*	(2.13)*	(0.70)	(0.72)
Barga Land	-0.147	-0.133	-0.102	-0.068
(α)	(2.91)**	(2.76)**	(2.34)*	(1.08)
Barga land*dummy for land			0.022	-0.027
purchase (β)			(0.59)	(0.65)
Irrigated Area	0.380	0.357	0.182	0.356
	(5.67)**	(5.78)**	(3.23)**	(6.00)**
Test for $\alpha+ \beta=0$			-0.080	-0.095
			(1.91)*	(1.98)*
Observations	14342	14342	22742	22742
R-squared	0.20	0.24	0.36	0.23

Robust t statistics in parentheses; * significant at 5%; ** significant at 1%;
District dummies are included throughout;
Districts, time dummies and their interaction terms are included in column (2) and (4);
Cluster at village level is controlled