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Transitions Out of Poverty: Drivers of Real Income Growth for the Poor in Rural Pakistan

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**Contributed paper prepared for presentation at the
International Association of Agricultural Economists Conference,
Gold Coast, Australia, August 12-18, 2006**

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Transitions Out of Poverty:

Drivers of Real Income Growth for the Poor in Rural Pakistan¹

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¹ We wish to thank Kelly Jones and Hina Nazli for their assistance with the statistical analysis presented in this paper. The views expressed in this paper are solely those of the authors and are not meant to represent the views of their respective institutions.

**Transitions Out of Poverty:
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I. Introduction

In the 1980s, rapid growth in agricultural GDP of 3.9 percent contributed to a steady decline in rural poverty from 49.3 percent in 1984-85 to 36.9 percent in 1990-91. In spite of substantial growth in agricultural real GDP in the 1990s (4.6 percent), however, rural poverty did not decline. Instead, the percentage of poor was essentially unchanged between 1990-91 (36.9 percent) and 1998-99 (35.9 percent), and may have risen slightly by 2001 to 38.9 percent.²

Several factors help explain the stagnation in rural poverty in the 1990s in spite of substantial agricultural growth, including overestimates of livestock income growth, a rise in the real consumer price of major staples, and the skewed distribution of returns to land coupled with a declining share of the crop sector in overall GDP (Malik, 2005; Dorosh, Niazi, and Nazli, 2003).

This study explores these questions related to agricultural growth and rural poverty using household panel data and secondary data sources to examine income dynamics in four districts of Pakistan from the late 1980s to 2002. Section 2 of this paper describes the sample and presents both primary and secondary data on the economic structure and infrastructure of the selected districts. Following earlier work on poverty transitions in Pakistan for a subset of the panel through 1992 (McCullough and Baulch,

² There remains considerable debate surrounding the 2001-02 poverty figures and the poverty lines used, however, and recent government figures for this year show a poverty decline. The figures in the text are from World Bank (2002), p. 20 and Government of Pakistan (2003), Pakistan Economic Survey, 2002-03).

2000) and in Bangladesh (Sen, 2003), section 3 includes compute poverty transition matrices over the period, and examines sources of income for poor households. Regressions on the determinants of household welfare, incorporating data on levels of infrastructure across villages and over time, are discussed in section 4. The last section presents conclusions and policy implications.

II. Economic Structure of the Sample Districts

Economic structure of the districts included in this sample varies substantially (Table 1).³ Attock and Lower Dir in northern Pakistan and Badin on the southern coast of Pakistan are primarily rural districts, with total populations of 0.7 to 1.3 million and only 6 to 21 percent urbanization rates. By contrast, Faisalabad district in north-central Pakistan, with a similar area to Attock and Badin, has a population of 5.4 million, a major industrial (textile) city (also named Faisalabad), and is 57 percent urban. Only one-quarter of the labor force in Faisalabad is employed in agriculture as a primary occupation, compared to 80 percent in Badin. Even in predominantly rural Attock and Dir, however, less than half of the labor force has agriculture as a primary occupation.

Agricultural land distribution and production also vary considerably, reflecting both agro-ecology and historical patterns of land accumulation. Most of agriculture in Faisalabad, as in most of the Indus basin of Pakistan is irrigated by canals, along with supplemental tubewell irrigation. Sixty percent of farms are 5 to 25 acres in size (2.0 to 10.1 hectares) and 91 percent are less than 25 acres in size. Wheat, the major staple of Pakistan, accounts for 37 percent of area cultivated in the district, but sugarcane and to a

³ Three of the four districts included in this study, Attock in Punjab province, Badin in Sindh province and Lower Dir in Northwest Frontier province (NWFP) were originally selected because they were among the poorest districts in Pakistan. The fourth district, Faisalabad in Punjab province, was selected as a control to represent a higher income district. See Alderman and Garcia (1993).

lesser extent, cotton are also major crops. Rice and sugar cane dominate cropping patterns in Badin, where large farms dominate: farms larger than 50 acres (20 hectares) account for about one-third of area cultivated. Most agriculture in Attock and Lower Dir is rainfed, and wheat accounts for one-half of area cultivated in Attock and three-fourths of area cultivated in lower Dir.

There have been major changes in infrastructure in these districts between 1980 and 1998, the years of the last two national population censuses in Pakistan (Table 2). The percentage of households with electricity according increased from 42 to 61 percent in Faisalabad, 17 to 49 percent in lower Dir and 22 to 35 percent in Badin (no data for 1980 is available for Attock). Similar large gains were observed for piped water, though even by 1998 only 13 to 33 percent of households in these four districts had access to piped water. Less than half of households had latrines in 1998 in these districts except for the more-highly urbanized Faisalabad.

Considering only villages included in the household survey sample, almost all were electrified in 1988, except in Badin, where only 2 of the 19 villages had electricity in that year. By 2001, 10 of the 19 villages in the Badin sample had been electrified. There were major improvements in the number of villages with paved roads in Attock, Faisalabad and Badin, as well. Almost none of the villages had public drainage in either 1988 or 2001.

III. Household incomes and poverty transitions

The household data set used in this analysis is made up of 14 rounds of the International Food Policy Research Institute (IFPRI) sample from 1986/87 to 1990/91, together with a sub-sample of panel data households included in the 2001/02 Pakistan Rural Household Survey (PRHS). The 571 household sample used in the analysis includes only the “base” households. Households that have split off from the base household are not included in this analysis.

Note also that 103 households that had data for all five years of the IFPRI survey could not be traced after 11 years. On average, these households were poorer than the average household that could be traced: 24 percent lower real incomes per adult equivalent (Rs (2002) 11,756 compared with 13,842) and 39 percent lower value of household assets (Rs (2002) 160,314 compared with 264,144).

Table 3 presents data on the composition of average real incomes for the 1986/87 – 91/92 period by district, as well as the percentage change in 2002. The use of average real incomes in the first five year period is designed to provide a measure of medium-term incomes that smooths out transitory fluctuations in real incomes due to changes in crop output, prices and other factors from year to year (McCullough and Baulch, 2000). Unfortunately, there is only a single observation per household for 2002, a year of poor rainfall in much of Pakistan.

For the sample as a whole, real incomes per adult equivalent declined by 13.1 percent between the first and second periods, with most of the decline attributable to a decline in non-farm incomes and remittances. Non-farm incomes accounted for 33 percent of total incomes in the first period, and fell by 30.2 percent in real terms in 2002.

Remittances (both domestic and foreign), which accounted for only 13.2 percent of real incomes in the first period, fell by almost half (49.4 percent). Net crop profits (25.4 percent of incomes in the first period) rose on average by 37.8 percent, though these gains were partially offset by a decline in livestock incomes (13.9 percent of real incomes in the first period) of 18.3 percent.

There were sharp differences in both the structure of incomes and the changes across district, however. For the sample households, average real incomes per adult equivalent rose moderately between the 1986/87 – 91/92 average and 2002 in Faisalabad (11.7 percent) and Attock (9.2 percent) the two districts in Punjab province. In contrast, real incomes fell in Badin (-15.7 percent) and Dir (-60.5 percent). Large declines in non-farm income in Badin (-58.8 percent) and Dir (-67.3 percent), compared with only small changes in Faisalabad (1.4 percent) and Attock (-8.1 percent), explain much of these patterns in changes in real incomes across districts. These latter two districts are also the two districts with highest growth in net crop profits; (net crop profits actually fell sharply in Dir). The decline in remittance earnings for households in Faisalabad, Badin and Dir mirrors an overall decline in remittances from workers in the Middle East during this period. Remittance earnings actually rose slightly in Attock, though these earnings were mainly domestic earnings, largely from jobs in nearby Islamabad and Rawalpindi.

Poor households (defined as the bottom 40 percent of households in terms of average real income from 1987 to 1991) fared better on average than did non-poor households, in terms of percentage gains in real incomes (Table 4). Crop incomes rose faster (80.7 percent compared with 34.5 percent) for poor than for non-poor households. Non-farm incomes also fell by less (-15.7 percent compared with -39.6 percent). Finally,

remittance earnings actually rose for poor households (by 2.5 percent), but fell by 62.5 percent for non-poor households, as households that had received substantial foreign remittances in the first period were generally among the non-poor.

Figure 1 shows the rural poverty transitions over time, (again defining poverty as the bottom 40 percent of the income distribution for the 1987 to 1991 period). Several points can be noted. First, there was substantial movement in and out of poverty in the first period (1986/87 to 1990/91). Although poverty rates tended to rise slightly over this period, as reflected in the combined area of “poor” and “became poor” in the figure, about one quarter of households moved into or out of poverty each year. Second, over time, the number of households that were poor in the previous and were still poor in the next period rose from 18 percent in 1987/88 to 31 percent in 1990/91. Over the much longer period between 1990/91 and 2001/02, the percentage of “chronic poor” was only slightly higher (35 percent) than in 1990/91. Third, poverty in the sample rose substantially in 2001/02, though 15 percent of households made a transition out of poverty in this 11 year period, essentially the same percentage as in the earlier period.

Poverty transitions using the 1987-91 average income and the 2001/02 incomes are similar (Table 5). 33 percent of households were classified as poor in the first period and 64 percent were poor in 2002. Only 9 percent of households rose out of poverty and 40 percent fell into poverty. Half of the sample had no change in poverty status. Poverty actually fell among the households in the lowest two income quintiles of the first period (from 83 to 73 percent), with 23 percent of these households ascending out of poverty. Nearly one half of non-farm households in the sample descended into poverty in 2002, compared with 38 percent of the farm households.

IV. Determinants of Household Welfare

Table 6 presents the results of several regressions on measures of welfare (natural logarithms of real expenditures per adult equivalent and real incomes per adult equivalent) using the panel data set. Village level dummy variables are also included to control for unobserved fixed effects.

Regressions on the average real income per adult equivalent for the first period (1986/87 to 1990/91) are similar to the results of McCullough and Baulch (2000) for the entire sample (including the 103 households which could not be traced in 2001/02 (regression 1). Coefficients on household structure (number of male youths, number of children, number of female youths), education (number of males with secondary education), land (irrigated and non-irrigated) and capital (value of vehicles and tools) are all significant at the 95 percent confidence level. Regressions on 2001/02 real incomes per adult equivalent (not shown here) produced poor results, with few significant variables, likely reflecting the high degree of variability in income from year to year.

Instead of real incomes per adult equivalent, we therefore use real expenditures as a measure of household welfare that is generally more stable and a better reflection of medium-term welfare than current income. Using average real expenditures per adult equivalent as a dependent variable for 1990 and 1991 and period 1 averages for explanatory variables produces results similar to regression 1, though the variables for value of capital are no longer significant (regression 2). This regression performs well for the 2001-02 data, as well (column 3). Education appears as a more important explanatory variable in 2001/02, though, particularly education of the household head.

Regression 4 on real expenditure per capita uses a two-period panel of average 1989/90 – 1990/91 and 2001/02 controlling for random effects across households. The coefficient of 0.487 on percentage of males with secondary education implies that adding an additional educated male increases real expenditures by about $(0.2) \times (0.487) - 1 = 10.2$ percent; having a household head with primary education increases real expenditures by $\exp(0.1949) - 1 = 21.5$ percent. Owning 5 acres of either irrigated or non-irrigated land (a small farm by Pakistan standards) raises real expenditures by about 13 percent. The regression coefficients also imply that village electrification raises real expenditures by about 75 percent and paved roads approximately double real expenditures.

V. Conclusions and Policy Implications

The disaggregated analysis of household panel data for rural Pakistan presented in this paper shows levels and trends of income vary substantially across region and over time. Real incomes of many households declined between the early 1990s and 2002, in spite of modest gains in agricultural output at the provincial and national levels. Net crop income increased by 38 percent for the total sample and by 81 percent growth for poor farmers, whose total incomes rose by 23 percent. Nevertheless, rural non-agricultural incomes fell by 30 percent overall and by 16 percent for poor households. Thus, income and employment multipliers of agricultural growth were insufficient to lead to substantial gains in rural non-farm incomes. These findings emphasize the importance of raising non-agricultural incomes through other pathways in rural Pakistan.

The analysis also highlights the crucial importance of location-specific factors in driving rural incomes, not only because of agro-ecology, but also because of differences in infrastructure and even social networks for migration. The decline in international

remittances was a major factor in driving overall income and poverty changes in three of the four districts included in the sample.

Finally, this study shows the importance of education in raising real incomes in Pakistan. Returns to education are positive and significant in all regressions. Moreover, given the relatively low spillover effects of agricultural growth on rural non-farm incomes, some combination of out-migration, increased worker remittances or rural non-agricultural income growth separate from agricultural growth linkages, will be crucial for reducing poverty in the future. Education is thus likely to become even more important for raising households out of poverty in the future.

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Table 1: Economic Structure of Sample Districts

District (Province)	Attock (Punjab)	Faisalabad (Punjab)	Badin (Sindh)	Lower Dir (NWFP)
Area (thousand square kms)	6.86	5.86	6.73	1.58
Population 1998 (millions)	1.275	5.429	1.136	0.718
Population density (1998)	185.9	927.1	168.9	453.3
Urban population	0.271	3.11	0.186	0.044
Urbanization	21.3%	57.3%	16.4%	6.2%
Labor force in agriculture (%)	32.3	25.2	80.2	45.8
Land distribution (2000) (percent of cropped area)				
Less than 5 acres	17.4	31.2	9.3	71.3
5 – 25 acres	49.5	59.9	40.3	27.8
25 - 50 acres	17.6	6.5	18.0	0.4
50 acres or more	15.4	2.5	32.4	0.6
Total	100.0	100.0	100.0	100.0
Change in Cropped Area 1990 to 2000	16%	5%	40%	-46%
Major crops (share of area, 2000)				
Wheat	49%	37%	12%	74%
Cotton	0%	8%	1%	0%
Rice	1%	4%	36%	13%
Sugarcane	0%	12%	13%	0%
Others	50%	39%	38%	14%
Wheat yields (2002, tons/ha)	1.52	2.82	1.58	1.30

Source: 1980 and 1998 Population Censuses. 2000 Agricultural Census. Agricultural Statistics of Pakistan.

Table 2: Physical Infrastructure of Sample Villages and Districts

District (Province)	Attock (Punjab)	Faisalabad (Punjab)	Badin (Sindh)	Lower Dir (NWFP)
Panel Data Sample (number of villages)				
Total villages				
1988	8	5	19	12
2001	7	5	19	11
Villages electrified				
1988	7	4	2	12
2001	7	5	10	11
Villages with paved roads				
1988	1	0	4	6
2001	7	5	12	8
Villages with public drainage				
1988	2	0	0	0
2001	1	1	0	1
District level Population Census data				
Road density (kms/square km)	0.30	0.34	0.29	0.22
% Households with electricity				
1980	n.a.	42	22	17
1998	67	61	35	49
% Households with piped water				
1980	n.a.	12	4	7
1998	27	28	13	33
% Households without latrine				
1980	n.a.	65	59	n.a.
1998	65	44	56	74

Source: 1988 and 2000 Pakistan Population Censuses; IFPRI-PRHS Household Surveys (various years).

Table 3: Real incomes in Rural Pakistan by Source and District, 1986/87-91/92 and 2002

District / Year	Rental earnings in crops	Net crop profit	Farm wage income	Non-farm income	Net livestock profit	Returns to capital	Remittances	Pension	Total income
All households by region									
Faisalabad									
1986/87-91/92 (Rs/hh)	1,139	4,708	186	5,232	2,269	1,276	1,709	56	16,480
1986/87-91/92 (share)	0.069	0.286	0.011	0.317	0.138	0.077	0.104	0.003	1.000
% change to 2002	-10.4%	82.3%	101.0%	1.4%	9.7%	-63.9%	-92.8%	28.2%	11.7%
Attock									
1986/87-91/92 (Rs/hh)	816	1,622	50	5,206	1,343	988	1,576	399	11,996
1986/87-91/92 (share)	0.068	0.135	0.004	0.434	0.112	0.082	0.131	0.033	1.000
% change to 2002	-61.4%	106.5%	221.8%	-8.1%	75.3%	-71.4%	7.8%	-47.7%	9.2%
Badin									
1986/87-91/92 (Rs/hh)	2,024	4,340	297	3,589	2,197	331	556	72	13,264
1986/87-91/92 (share)	0.153	0.327	0.022	0.271	0.166	0.025	0.042	0.005	1.000
% change to 2002	-29.5%	39.7%	5.7%	-58.8%	-32.7%	-19.2%	-82.6%	2.5%	-15.7%
Dir									
1986/87-91/92 (Rs/hh)	683	1,714	13	5,230	1,862	116	4,028	42	13,683
1986/87-91/92 (share)	0.050	0.125	0.001	0.382	0.136	0.008	0.294	0.003	1.000
% change to 2002	-17.6%	-47.7%	-61.8%	-67.3%	-92.8%	44.0%	-53.5%	104.2%	-60.5%

Source: Authors' calculations from IFPRI panel data set and PRHS (2001/02).

Table 4: Real incomes in Rural Pakistan by Source for Poor Households, 1986/87-91/92 and 2002

District / Year	Rental earnings in crops	Net crop profit	Farm wage income	Non-farm income	Net livestock profit	Returns to capital	Remittances	Pension	Total income
Full sample									
1986/87-91/92 (Rs/hh)	1,156	3,436	157	4,472	1,882	575	1,780	123	13,522
1986/87-91/92 (share)	0.086	0.254	0.012	0.331	0.139	0.043	0.132	0.009	1.000
% change to 2002	-24.4%	37.8%	37.2%	-30.2%	-18.1%	-49.7%	-49.4%	-15.7%	-13.1%
Poor households in 1986/87-91/92 (bottom 40 percent)									
1986/87-91/92 (Rs/hh)	215	1,705	167	2,911	1,476	75	648	61	7,239
1986/87-91/92 (share)	0.030	0.236	0.023	0.402	0.204	0.010	0.090	0.008	1.000
% change to 2002	-10.2%	80.7%	76.3%	-15.7%	-6.9%	60.0%	2.5%	22.0%	13.9%
Poor farm households									
1986/87-91/92 (Rs/hh)	245	2,313	177	2,300	1,733	100	593	61	7,498
1986/87-91/92 (share)	0.033	0.308	0.024	0.307	0.231	0.013	0.079	0.008	1.000
% change to 2002	-5.2%	80.7%	54.0%	-16.6%	3.0%	63.2%	6.3%	1.8%	23.1%
Poor non-farm households									
1986/87-91/92 (Rs/hh)	135	103	140	4,521	797	9	793	61	6,556
1986/87-91/92 (share)	0.021	0.016	0.021	0.690	0.122	0.001	0.121	0.009	1.000
% change to 2002	-33.9%	81.4%	150.8%	-14.4%	-63.4%	-30.0%	-5.0%	74.7%	-14.0%

Source: Authors' calculations from IFPRI panel data set and PRHS (2001/02).

Table 5: Poverty Transitions in Rural Pakistan: 1987-91 to 2002

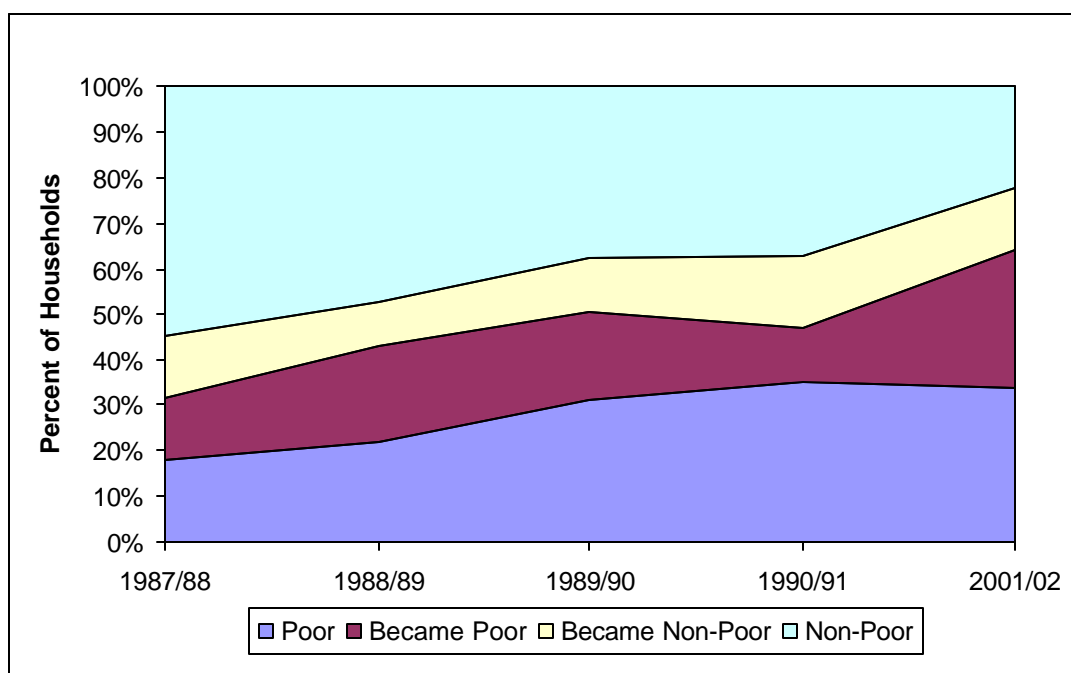
	1987-1991	2002	Chronic		Chronic		Sample
	Total Poor	Total Poor	Poor	Ascending	Non-Poor	Descending	Size
Entire Sample	33%	64%	24%	9%	26%	40%	571
Bottom 40%	83%	73%	60%	23%	4%	13%	229
Farm	32%	60%	22%	10%	30%	38%	431
Non-Farm	37%	79%	31%	6%	15%	48%	140

Notes:

The bottom 40 percent is defined according to the 5-year average of real income per adult equivalent from 1987 to 1991.

Farmer households have a minimum average of 0.5 acres of land in operation (on average?) over the 1987 to 1991 period.

Poverty is defined relative to the national poverty line of 3,648 (1991) Rs/adult equivalent/year.

Figure 1: Rural Poverty Transitions in Pakistan, 1987/88 to 2001/02

Source: Authors' calculations from IFPRI panel data set and PRHS (2001/02).

Table 6: Determinants of Real Incomes and Expenditures in Rural Pakistan, Regression Results

Period Dependent variable	Average 87-91		Average 90-91		2002		Panel changes	
	Real income		Real Expenditure		Real Expenditure		Real Expenditure	
	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	z-statistic
Share of remittances in income	---	---	-0.0459	-0.30	0.0020	0.07	0.0055	0.13
Male youths (% of household)	-0.9445 **	-5.20	-0.7631 **	-2.69	-0.1289	-0.49	-0.4667 *	-1.89
Children (% of household)	-0.6292 **	-4.89	-0.6510 **	-3.30	-0.4005 *	-1.75	-0.4698 **	-2.92
Female youths (% of household)	-0.8836 **	-4.96	-0.6765 **	-2.78	-0.5691 **	-2.17	-0.5499 **	-2.32
Males w/ basic educ. (% of males)	0.1145	0.73	-0.1592	-0.76	-0.1146	-0.97	-0.1844	-0.90
Males w/ second. educ. (% of males)	0.9198 **	5.06	0.6295 **	2.73	0.3489 **	2.15	0.4869 **	2.14
Females w/ basic educ. (% of females)	0.0316	0.16	0.0663	0.25	-0.0677	-0.36	-0.1544	-0.62
Females w/ sec. educ. (% of females)	0.1913	0.38	-0.6054	-0.94	0.2846	0.96	0.4752	0.74
Household head basic educ. (yes = 1)	0.0788	1.44	0.0126	0.18	0.1854 **	2.78	0.1949 **	3.01
Rainfed land owned (acres)	0.0066 **	3.07	0.0078 **	3.84	0.0088 **	3.24	0.0099 **	4.45
Irrigated land owned (acres)	0.0163 **	7.04	0.0115 **	2.67	0.0049 **	2.61	0.0096 **	5.15
Value of vehicles (th 2002 Rs)	0.0016 **	2.23	0.0004	0.54	0.0000	0.92	0.0008 **	2.23
Value of tools (th 2002 Rs)	0.0028 **	3.13	0.0002	0.15	0.0000	0.05	0.0018 **	2.56
Own a tractor (yes = 1)	0.0960 **	2.04	0.0023	0.03	0.0099	0.09	-0.5273 **	-8.78
Village electrified	0.1101	0.39	-0.0575	-0.15	0.7528	1.41	0.5659 **	8.89
Village - paved road	0.4614	1.38	-0.6392	-1.47	0.3503 *	1.68	0.6975 **	14.55
Village - public drainage	-0.4702 **	-1.92	-0.0817	-0.43	-0.5613	-0.99	-0.0103	-0.12
Constant	9.2359 **	24.37	8.7335 **	11.03	8.5548 **	108.06	7.6577 **	87.01
N	571		571		571		1142	
R-squared	0.545		0.259		0.259		0.339	
within	---		---		---		0.4745	
between	---		---		---		0.175	

* Significant at 90 percent confidence level; ** Significant at 95 percent confidence level.

Note: Regression 4: Random effects estimation: $u_i \sim \text{Gaussian}$, $\text{Wald } \chi^2(17) = 576.36$. $\text{corr}(u_i, X) = 0$ (assumed), $\text{Prob} > \chi^2 = 0.000$.

Source: Authors' calculations.