Supplemental Online Materials

Table S1. Average treatment effects on the treated of outcomes using the common support approach.

	Matching Algorithms									
Sample	**NN 5**		**NN 10**		**Kernel**		**Radius 0.01**		**Radius 0.02**	
Outcome: Rice yield (kilograms/hectare)										
Treatment: Full land ownership										
Small	115.4688	***	115.7656	***	125.375	***	124.8281	***	126.1488	***
	(26.2694)		(25.3125)		(25.5863)		(25.8831)		(25.7931)	
Midsize	69.77375	***	53.80875	**	51.06625	**	53.70688	***	53.18375	**
	(23.4456)		(22.8319)		(24.8125)		(25.0938)		(24.9925)	
Large	45.75813	*	43.63688	*	31.04313		38.42188		37.13313	*
	(24.6838)		(23.9650)		(28.2344)		(28.5588)		(28.4881)	
Treatment: Weak land ownership										
Small	59.75375	**	67.6525	**	58.34	*	65.4025	**	62.46125	**
	(29.9688)		(29.2269)		(30.9100)		(31.4338)		(31.2775)	
Midsize	−11.6756		−16.7031		−25.3475	***	−18.9725		−21.5744	
	(27.1056)		(26.4881)		(31.8594)		(32.6838)		(32.4650)	
Large	−31.0938		−17.0038		−26.0156		−24.1756		−23.0313	
	(30.9650)		(28.4613)		(34.6838)		(37.2656)		(36.8988)	
Outcome: Informal Debt (USD)										
Treatment: Full land ownership										
Small	−16.9079	**	−16.6814	**	−24.0248	**	−24.5253	**	−23.8904	**
	(7.4742)		(7.2275)		(24.0858)		(24.4782)		(24.3578)	
Midsize	−31.4379	**	−35.985	**	−37.867	***	−37.6186	**	−37.1972	***
	(12.4377)		(14.2342)		(16.3185)		(16.5409)		(16.4535)	
Large	−3.6079		1.3818		−21.4468		−19.1396		−19.8197	
	(34.9351)		(33.2108)		(42.8550)		(43.3162)		(43.2018)	
Treatment: Weak land ownership										
Small	−19.1194		−12.7742		−12.8767		−11.963		−12.0368	
	(18.1783)		(15.1473)		(17.8367)		(18.0871)		(18.0043)	
Midsize	−44.1565	**	−37.8387	**	−38.8004	***	−37.6686	***	−38.0038	**
	(17.8270)		(14.8407)		(23.4118)		(24.0851)		(23.9052)	
Large	−78.3085		−76.208		−74.4021		−71.3709		−70.0449	
	(61.5336)		(66.6165)		(54.9717)		(59.1400)		(58.5078)	

Notes: Single, double, and triple asterisks (*, **, ***) indicate significance at the 10%, 5%, and 1% level. Standard errors are reported in parentheses. The standard errors for all matching algorithms are estimated using bootstrapping with 50 replications, except for the nearest neighbor (NN1) and oversampling (NN5), for which we use the analytical standard error suggested by [33].

Table S2. Matching quality indicators with trimming approach corresponding to the potential outcomes with the treatment variable of the *full* land ownership.

	Before Matching		**After Matching**	
	Mean Bias	Pseudo R^2	% Mean Bias Reduction	% Pseudo R^2 Reduction
Outcome: Rice yield				
Small Farm				
NN 5	13.35	0.10	−86.63%	−98.04%
NN 10	13.35	0.10	−86.77%	−98.04%
Kernel	13.35	0.10	−89.47%	−98.04%
Radius caliper (0.01)	13.35	0.10	−87.56%	−98.04%
Radius caliper (0.02)	13.35	0.10	−87.91%	−98.04%
Midsize Farm				
NN 5	11.29	0.08	−90.26%	−98.73%
NN 10	11.29	0.08	−90.57%	−98.73%
Kernel	11.29	0.08	−90.14%	−98.73%
Radius caliper (0.01)	11.29	0.08	−90.98%	−98.73%
Radius caliper (0.02)	11.29	0.08	−90.96%	−98.73%
Large Farm				
NN 5	10.93	0.08	−82.82%	−96.10%
NN 10	10.93	0.08	−85.53%	−97.40%
Kernel	10.93	0.08	−86.54%	−97.40%
Radius caliper (0.01)	10.93	0.08	−85.85%	−97.40%
Radius caliper (0.02)	10.93	0.08	−86.10%	−97.40%
Outcome: Informal debt				
Small Farm				
NN 5	13.35	0.10	−88.12%	−98.04%
NN 10	13.35	0.10	−88.69%	−99.02%
Kernel	13.35	0.10	−91.11%	−99.02%
Radius caliper (0.01)	13.35	0.10	−89.17%	−99.02%
Radius caliper (0.02)	13.35	0.10	−89.61%	−99.02%
Midsize Farm				
NN 5	11.29	0.08	−91.71%	−98.73%
NN 10	11.29	0.08	−91.93%	−98.73%
Kernel	11.29	0.08	−91.44%	−98.73%
Radius caliper (0.01)	11.29	0.08	−92.37%	−98.73%
Radius caliper (0.02)	11.29	0.08	−92.33%	−98.73%

Note: Results with common support are very similar. The mean standardized bias (SB) before matching is given by:

$$SB_{before} = 100 \cdot \frac{\bar{X}_1 - \bar{X}_0}{\sqrt{0.5 \cdot (V_1)(X) + (V_0)(X)}}$$ and the SB after matching is given by

$$SB_{after} = 100 \cdot \frac{\bar{X}_{1M} - \bar{X}_{0M}}{\sqrt{0.5 \cdot (V_{1M})(X) + (V_{0M})(X)}}$$

where X1 (V1) is the mean (variance) in the treatment group before matching and X_0(V_0) the analogue for the control group. X_{1M} (V_{1M}) and X_{0M} (V_{0M}) are the corresponding values for the matched samples.

Table S3. Matching quality indicators with trimming approach corresponding to the potential outcomes with the treatment variable of the *weak* land ownership.

	Before Matching		**After Matching**	
	Mean Bias	Pseudo R^2	% Mean Bias Reduction	% Pseudo R^2 Reduction
Outcome: Rice yield				
Small Farm				
NN 5	13.20	0.11	−86.93%	−98.15%
NN 10	13.20	0.11	−85.06%	−98.15%
Kernel	13.20	0.11	−83.00%	−98.15%
Radius caliper (0.01)	13.20	0.11	−83.16%	−98.15%
Radius caliper (0.02)	13.20	0.11	−83.32%	−98.15%
Outcome: Informal debt				
Midsize Farm				
NN 5	12.18	0.10	−88.06%	−99.04%
NN 10	12.18	0.10	−86.72%	−99.04%
Kernel	12.18	0.10	−87.69%	−99.04%
Radius caliper (0.01)	12.18	0.10	−87.64%	−99.04%
Radius caliper (0.02)	12.18	0.10	−88.26%	−99.04%

Note: Results with common support are very similar. The mean standardized bias (SB) before matching is given by

$$SB_{before} = 100 \cdot \frac{\bar{X}_1 - \bar{X}_0}{\sqrt{0.5 \cdot (V_1)(X) + (V_0)(X)}}$$ and the SB after matching is given by

$$SB_{after} = 100 \cdot \frac{\bar{X}_{1M} - \bar{X}_{0M}}{\sqrt{0.5 \cdot (V_{1M})(X) + (V_{0M})(X)}}$$

where X1 (V1) is the mean (variance) in the treatment group before matching and X_0(V_0) the analogue for the control group. X_{1M} (V_{1M}) and X_{0M} (V_{0M}) are the corresponding values for the matched samples.

Table S4. Balancing test for the mean difference before and after matching corresponding to the potential outcomes with the treatment variable of the *full* land ownership.

		Outcome: Rice yield						Outcome: Informal debt			
Variable	**Sample**	**Small**		**Midsize**		**Large**		Small		**Midsize**	
Male	UM	−0.1070	***	−0.0796	***	−0.0509	***	−0.1070	***	−0.0796	***
	M	−0.0014		−0.0087		−0.0054		−0.0016		−0.0071	
Age	UM	2.8960	***	2.7490	***	2.9850	***	2.8960	***	2.7490	***
	M	0.0030		0.0700		−0.1640		0.0390		0.0730	
Primary education	UM	0.0158	***	0.0116	***	0.0161	***	0.0158	***	0.0116	***
	M	0.0069	**	0.0036		0.0041		0.0074	**	0.0031	
Single	UM	0.0211	***	0.0158	***	0.0141	***	0.0211	***	0.0158	***
	M	0.0057		0.0002		0.0039		0.0062		0.0004	
Pct agri labor	UM	−0.0078		0.0079		0.0359	***	−0.0078		0.0079	
	M	0.0022		0.0001		−0.0033		0.0027		0.0000	
Work in agri only	UM	−0.0176	**	0.0156	*	0.0052		−0.0176	**	0.0156	*
	M	−0.0015		0.0005		−0.0069		−0.0008		0.0014	
Hire permanent labor	UM	−0.0398	***	−0.0290	***	−0.0504	***	−0.0398	***	−0.0290	***
	M	0.0003		0.0044		0.0116		0.0013		0.0061	
Hire temporary labor	UM	0.0007		0.0005		0.0039		0.0007		0.0005	
	M	−0.0012		0.0015		−0.0012		−0.0010		0.0015	
Farmer group member	UM	0.0110		0.0186	***	0.0062		0.0110	*	0.0186	***
	M	−0.0039		0.0028		0.0027		−0.0031		0.0024	
Cooperative member	UM	0.0036		0.0006		0.0027		0.0036		0.0006	
	M	0.0065		0.0001		−0.0035		0.0056		0.0002	
Village fund member	UM	−0.0132	***	−0.0073	***	−0.0031		−0.0132	***	−0.0073	***
	M	−0.0010		0.0005		0.0011		−0.0008		0.0006	

Agri assoc. member	UM	−0.0023	**	−0.0008		−0.0021		−0.0023		−0.0008	
	M	0.0009		−0.0002		−0.0009		0.0004		−0.0002	
Off−farm income	UM	0.0880	***	0.0286	***	0.0323	***	0.0880	***	0.0286	***
	M	−0.0030		−0.0031		0.0042		−0.0065		−0.0058	
Ratio rice area	UM	0.1234	***	0.5899	***	0.2428	***	0.1234	***	0.5899	***
	M	−0.0018		0.0159		−0.0250		−0.0028		0.0166	
Ratio rice area^2	UM					−0.4280					
	M					−0.5080					
Area harvested rice	UM	−0.0010		0.0052	*	0.0355	***	−0.0010		0.0052	*
	M	−0.0095	***	−0.0087	***	−0.0096	***	0.0004		0.0028	
Integrated agriculture	UM	−2.6688	***	−2.0526	***	−0.8716	***	−2.6688	***	−2.0526	***
	M	−0.1981	***	−0.0879		−0.0695		−0.1903	***	−0.0881	
Irrigate	UM	−80000	***	−110000	***	−190000	***	−80000	***	−110000	***
	M	0		0		−10000		0		0	
Rainfall	UM	81.800	***	33.500	***	22.700	***	81.800	***	33.5000	***
	M	−2.5000		−5.0000	*	−4.0000	*	−2.9000		−4.7000	*
Temperature	UM	−0.0050	*	−0.0200	***	−0.0670	***	−0.0050	*	−0.0200	***
	M	0.0000		−0.0010		0.0000		0.0000		−0.0010	
Municipal area	UM	0.0511	***	0.0307	***	0.0176	**	0.0511	***	0.0307	***
	M	0.0133		0.0032		0.0046		0.0148	**	0.0037	

Note: The kernel matching with Gaussian function is used for the balancing test. It performs relatively well across samples in terms of the matching quality. Other matching algorithms also provide very similar conclusion. ***, **, * are significant at the 1, 5, and 10% level, respectively. UM and M are abbreviation of unmatched and matched samples, respectively.

Table S5. Balancing test for the mean difference before and after matching corresponding to the potential outcomes with the treatment variable of the *weak* land ownership.

		Outcome: Rice yield		Outcome: Informal debt	
Variable	Sample	Small		Midsize	
Male	UM	−0.0999	***	−0.0747	***
	M	−0.0040		−0.0077	
Age	UM	3.1940	***	2.7130	***
	M	−0.0770		−0.3520	**
Primary education	UM	0.0162	***	0.0082	**
	M	0.0036		0.0011	
Single	UM	0.0156	***	0.0090	**
	M	0.0034		−0.0021	
Pct agri labor	UM	0.0180	***	0.0391	***
	M	0.0150	***	0.0031	
Work in agri only	UM	−0.0053		0.0279	***
	M	0.0191	***	0.0091	
Hire permanent labor	UM	−0.0201	**	−0.0177	*
	M	−0.0187	**	−0.0054	
Hire temporary labor	UM	0.0027		0.0018	
	M	0.0013		0.0014	
Farmer group member	UM	0.0072		0.0102	
	M	−0.0087	*	−0.0015	
Cooperative member	UM	−0.0021		0.0021	
	M	−0.0023		0.0017	
Villageund member	UM	−0.0106	***	−0.0052	*
	M	0.0013		0.0005	
Agri assoc. member	UM	−0.0019		−0.0010	
	M	0.0004		−0.0001	
Off−farm income	UM	0.0583	***	0.0024	
	M	−0.0222	***	−0.0168	***
Ratio rice area	UM	0.1380	***	0.6634	***
	M	0.0134	**	0.0468	*
Ratio rice area^2	UM				
	M				
Area harvested rice	UM	0.0076	**	0.0138	***
	M	−0.0043	*	0.0044	*
Integrated agriculture	UM	−2.1995	***	−1.4653	***
	M	−0.1874	**	−0.0065	
Irrigate	UM	−130000	***	−180000	***
	M	−10000		−20000	**
Rainfall	UM	81.3000	***	37.0000	***
	M	−6.0000		−1.5000	
Temperature	UM	0.0010		−0.0360	***
	M	0.0010		−0.0040	
Municipal area	UM	0.0518	***	0.0249	***
	M	−0.0096		−0.0072	

Note: The kernel matching with Gaussian function is used for the balancing test. It performs relatively well across samples in terms of the matching quality. Other matching algorithms also provide very similar conclusion. ***, **, * are significant at the 1, 5, and 10% level, respectively. UM and M are abbreviation of unmatched and matched samples, respectively.