

Economics of Zero-Grade Rice Management from the Perspectives of the Landlord and the Tenant

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ABSTRACT

Water is becoming increasingly limiting in parts of Arkansas where rice has historically been produced. The majority of rice acres in Arkansas are flood irrigated using contour levee systems. Contour levee rice fields require large amounts of applied water to maintain a flood during the production season. Fields precision leveled to a zero-grade require significantly less applied water and provide significant savings in production costs relative to contour levee fields. However, zero-grade is a land improvement and requires a large initial capital investment, and much time may pass before economic benefits are received. Also, with the majority of rice acres in Arkansas owned or partially owned by someone other than the producer, it is beneficial to determine how the monetary benefits are distributed to landowner and tenant when a field is precision leveled. This study uses net present value (NPV) approach to evaluate the monetary benefits for both parties under alternative yield situations.

Precision leveling expenses were gathered by phone conversations with farmers and land leveling professionals during 2008. Monetary benefits to zero-grade were defined as the difference in per acre tenant and landlord net returns between zero-grade and contour levee management. Present values of monetary benefits to zero-grade were calculated for alternative planning horizons (years) assuming a typical rice-soybean rotation for contour levee management and a continuous rice rotation for zero-grade management and a discount rate of 6.5%. The NPV for each planning horizon was calculated as the sum of present values to zero-grade management less the initial per acre cost of precision leveling to a zero grade. Five different tenure arrangements were evaluated: 1) 75-25 straight share (**75-25ss**, landlord receives 25% of crop); 2) 75-25 cost share (**75-25cs**, landlord receives 25% of crop and pays 25% of fertilizer costs); 3) 70-30 straight share (**70-30ss**, landlord receives 30% of crop); 4) 70-30 cost share (**70-30cs**, landlords pays 30% of fertilizer expenses and receives 30% of crop; and 5) 50-50 cost share (**50-50cs**, landlord pays 50% of seed, fertilizer, and pesticide expenses, 100% of irrigation expenses, and receives 50% of crop).

The results in Table 1 indicate that under the 75-25ss the tenant would prefer the same arrangement after improvements if a 10% yield gain occurs. Renegotiating to a 50-50cs would be preferred if no yield gain occurred or a 20% yield loss occurred in the first year. Positive NPV would be captured renegotiating to a 70-30 unless a 20% yield loss occurred. It would take until year five for the tenant to achieve a positive NPV under this scenario. The 75-25cs arrangement renegotiated to both a 70-30ss and a 50-50cs would have a positive NPV under a 10% yield gain and no yield gain. The yield loss of 20% would give the tenant a positive NPV under the 50-50cs but a negative NPV under the 70-30ss.

Under a 75-25 straight share the landowner would benefit from greatest to least by increasing share rent by 5%, staying at the 75-25ss, and changing to a 50-50cs arrangement,

respectively. With a 10% yield gain and 5% increase in straight share, a landowner would have a positive NPV in year 10 but it would be negative in year 10 if yield loss was 20%. The worst scenario for the landowner would be to change from the 75-25ss to the 50-50cs arrangement. Under the new 50-50cs a 10% yield gain, 0% yield gain or a 20% yield loss would have a negative NPV for more than 20 years. A landowner with a 75-25cs arrangement would have a positive NPV in year 10 if a 10% yield gain occurs. Changing to a 50-50cs would have a positive NPV for a 10% yield gain but would be negative for a 0% yield gain and a 20% yield loss.

Table 1. Cumulative NPV for tenant and landowner under alternative land tenure and productivity.

Planning horizon (years)	Tenant					Landowner				
	75-25ss	75-25ss	75-25ss	75-25cs	75-25cs	75-25ss	75-25ss	75-25ss	75-25cs	75-25cs
	to 75-25ss	to 70-30ss	to 50-50cs	to 70-30ss	to 50-50cs	to 75-25ss	to 70-30ss	to 50-50cs	to 70-30ss	to 50-50cs
10% yield gain										
1	174.74	130.25	172.37	78.61	120.73	-727.23	-682.74	-724.86	-630.47	-672.59
5	714.74	516.06	704.14	347.57	535.64	-492.38	-293.70	-481.78	-123.53	-311.61
10	1,224.16	877.01	1,205.62	606.00	934.61	-311.52	35.62	-292.99	309.14	-19.47
15	1,623.27	1,165.18	1,598.81	800.08	1,233.70	-169.85	288.24	-145.39	656.78	223.15
20	1,907.72	1,366.73	1,878.84	944.38	1,456.49	-68.85	472.13	-39.97	898.38	386.27
0% yield gain										
1	120.48	79.76	136.97	28.12	85.33	-746.10	-705.38	-762.59	-653.11	-710.33
5	472.45	290.62	546.08	122.12	377.59	-576.62	-394.79	-650.25	-224.62	-480.08
10	800.81	483.11	929.47	212.09	658.45	-458.71	-141.00	-587.36	132.51	-313.85
15	1,064.63	645.39	1,234.40	280.28	869.29	-364.07	55.17	-533.84	423.71	-165.30
20	1,247.98	752.87	1,448.48	330.52	1,026.12	-298.23	196.88	-498.72	623.13	-72.48
20% yield loss										
1	11.95	-21.22	66.18	-72.86	14.54	-783.83	-750.93	-838.05	-698.39	-788.17
5	170.42	9.60	349.06	-158.90	180.57	-681.63	-507.28	-860.27	-350.63	-686.74
10	498.78	202.08	732.45	-68.94	461.43	-563.72	-238.27	-797.38	6.50	-523.08
15	762.60	364.36	1,037.38	-0.74	672.27	-469.08	-30.33	-743.86	297.70	-377.71
20	945.95	471.84	1,251.46	49.49	829.10	-403.24	119.89	-708.74	497.12	-288.35