DETERMINING EQUITABLE SHARE LEASE AGREEMENTS FOR FARMS WITH SUB-SURFACE DRIP IRRIGATION ON COTTON IN THE TEXAS HIGH PLAINS

Jay Yates
Jackie Smith
Texas AgriLife Extension Service
Lubbock, TX

Abstract

The rapid adoption of sub-surface drip (SDI) irrigation technology in the Texas High Plains has fostered the need to evaluate the terms of share lease agreements for land on which these systems are installed. Most of the early systems were placed on land owned and operated by the farmer. Increasingly, systems are being installed on land owned by someone other than the operator. In the Texas High Plains, the majority of land is rented under share lease agreements between landowners and the renters with the landlord providing the land and some percentage of the yield enhancing inputs in exchange for a percentage of the gross crop receipts. With the high capital investment required for SDI systems and an apparent yield increase, a new agreement will likely be necessary to provide for equitable treatment of both the landlord and renter. This study compares the most popular current share lease agreement with the alternatives of various shared percentages and cash leasing using the FARM Assistance program on a typical model farm. The Share Rent Analyzer, developed as part of the South Plains Cotton Profitability Project, was used to determine the alternative percentages to be analyzed. Results of this analysis show that changing the share rental arrangement to one-third/two-thirds for the first three years and then returning to one-fourth/three-fourths in subsequent years shifts a portion of the risk of the new investment to the landlord, while maintaining significantly better returns over furrow irrigating for both parties.

Introduction

According to the Farm and Ranch Irrigation Survey, included in the 1997 and 2002 Census of Agriculture, the number of acres irrigated in Texas using sub-surface drip increased by nearly five-fold during this period. Although the 2007 census numbers have not yet been released, the High Plains of Texas have continued that growth over the past five years. In recent years, much of that growth has occurred on land owned by someone other than the operator. Historically, the most common type of lease arrangement between landlords and tenants in the Texas High Plains has been a crop share agreement (Gueck et al). After evaluating a number of possible approaches to sharing the cost of a major investment in an irrigation system that could not be moved, it was decided to attempt to describe and fine-tune a common sense approach that has been developing in the high plains of Texas over the last several years. The authors have been both observing this for the last 3 years and often recommending it with adjustments to fit certain situations. This method has a major advantage that it can be used with the standard crop share arrangements with temporary adjustments when the conditions exist for this to be an optimum arrangement between renter and landlord. This approach of temporarily adjusting the crop share arrangement to address the issue of paying for a large investment that is permanently part of the land, can at least offer a starting point for negotiations between landlord and renter.

When a landlord is interested and willing to take on the added risk of bearing the full financial cost of a subsurface drip irrigation (SDI) system, an appropriate way to compensate him may be to increase his share of the crop for at least some time period until the system is paid for. It appears that for a change from row watering to an SDI system, if the renter and landlord agree to change to one-third/two-third shares until the system is paid for, in most cases the additional net income to the landlord will pay for the net cost of the system after the EQIP cost share within 3 to 4 years. In cases were the renter is more willing and able to handle the added financial risk, the landlord could be compensated by the renter with a fixed annual lease payment based on the amortized value of the system over a five year period.

As with most other crop share or lease arrangements, communication is very important. Especially when the share arrangement is to be adjusted even temporarily, both parties must be clear on all the details and be willing to share all relevant information with each other. The cost of the system after the EQIP cost share must be shared with the renter and they both must agree on any financing costs that are going to be included in the total amount to be accumulated from additional crop share rent received by the landlord.

There are many landlords who depend on their rental income for most or all of their income and will be not be interested in arranging financing and/or taking on the additional financial risk of paying for the drip system even if the expectations are that their long-run income would increase. There may be some cases where the renter's share might be increased to compensate the renter for the purchase of a drip system but this would require a long-term lease and possibly also some sort of clause in the agreement for a buy-out to compensate the renter if the rental arrangement is terminated. The permanency of drip systems lends itself to ownership of the system by landowner.

Materials and Methods

The FARM Assistance program is a computerized decision support system built on a foundation of more than twenty years of research by Texas A&M University System agricultural economists. The computer model projects the financial future of the agricultural operation for up to ten years in the future. This multi-year projection is a statistically based analysis, which uses the variability of the firms own past production on a farm-by-farm basis and combines that with the expert projections for crop and livestock prices and inflation rates for inputs from the Food and Agricultural Policy Research Institute (FAPRI) and the Agricultural Food and Policy Center (AFPC) research teams. An initial analysis, referred to as the baseline, takes the producer's operation as it exists today and projects a possible financial picture using the previously stated assumptions. The real strength in the program lies in the ability to make either minor or major changes in the farming operation and see how those changes impact the firm during the projection period. The FARM Assistance computer model was used to develop the baseline and alternatives for this study. The Share Rent Analyzer, developed as part of the South Plains Cotton Profitability Project, was used to estimate the differences in income and expenses for both the landlord and renter and arrive at an equitable time period for adjusting the share lease agreement.

Baseline Assumptions

The baseline consists of a 100-acre field currently furrow irrigated to achieve a yield of 750 pounds of lint and 0.525 tons of cottonseed per acre. The landlord receives share rent equal to 25% of the crop proceeds minus 25% of the cost of fertilizer, insecticide, harvest aid, ginning, crop insurance and boll weevil assessment. The price of cotton in the base year is assumed to be $0.54 per pound and the price of cottonseed is $200 per ton. Government program benefits are calculated using the entire 100 acres for the base (83.3 payment acres) and 750 pounds for both direct and counter-cyclical payment yields. Commodity sales and farm program payments combine in 2009 (Table 1.) for total gross revenue of $58,650 for the renter and $19,550 for the landlord. Total cash operating expenses are estimated at $54,620 for the renter and $8,580 for the landlord. With the addition of fixed expenses the renter ends up with a total net farm income of $880, while the landlord receives $9,770. The returns to the landlord remain somewhat constant for the 10-year period, while the renter has ever increasing losses. The base year for the analysis is 2009, and projections are carried through 2018. Commodity price trends follow projections provided by the Food Agricultural Policy Research Institute (FAPRI) with costs adjusted for inflation over the planning horizon.

Alternative 1 – Cash Lease of SDI System

The first alternative scenario consists of the same100-acre field with an SDI system installed to increase yield to 1,500 pounds of lint and 1.05 tons of cottonseed per acre. The landlord receives the same share rental percentages as in the baseline. The landlord receives an additional $11,550 cash lease for the first five years to cover the cost of the SDI system. The price of cotton and cottonseed is also the same as the baseline. Government program benefits remain the same as well. Commodity sales and farm program payments combine in 2009 (Table 1.) for total gross revenue of $101,100 for the renter and $45,250 for the landlord. Total cash operating expenses are estimated at $83,640 for the renter and $15,570 for the landlord. With the addition of fixed expenses the renter ends up with a total net farm income of $15,520, while the landlord receives $23,480.

Alternative 2 – Increase Landlord Share From One-Fourth to One-Third in the First Three Years

The second alternative scenario consists of the same100-acre field with an SDI system installed to increase yield to 1,500 pounds of lint and 1.05 tons of cottonseed per acre. The landlord's share of the crop and expenses is raised to one-third for the first three years of the analysis. The landlord receives the same share rental percentages as in the baseline in the fourth through the tenth years. The price of cotton and cottonseed is also the same as the baseline. Government program benefits remain the same as well. Commodity sales and farm program payments combine in 2009 (Table 1.) for total gross revenue of $89,910 for the renter and $44,890 for the landlord. Total cash operating

expenses are estimated at $69,010 for the renter and $18,270 per acre for the landlord. With the addition of fixed expenses the renter ends up with a total net farm income of $18,960, while the landlord receives $19,670.

Results and Discussion

The results of this study yield quite interesting insights into the differences in who bears the most risk in what are otherwise somewhat similar outcomes. Regardless of the method used to pay for the investment in the SDI system, the benefits of adopting the new technology are substantial for both the landlord and renter. Paying for the SDI system with a five year cash lease equal to the cost of the system amortized at 5% puts the risk of paying for the system squarely on the renter, as can be seen in Table 1. It yields lower net farm profit than the one-third share lease alternative and has a higher probability of a net operating loss. It does however provide a higher return to the landlord during the payoff period. The major benefit of using the share lease option to pay for the system is to reduce the risk to the renter in years of low yields due to adverse weather, which is not uncommon in the Texas High Plains. In either scenario the ten-year average net farm income for the renter is substantially increased from a loss of $14,760 for the furrow irrigated baseline to a profit of $12,600 for the cash lease and $16,780 for the share lease. Likewise, the landlord sees a significant increase in net farm income from a ten-year average of $9,320 in the furrow irrigated baseline to $22,280 in the SDI cash lease alternative to $18,040 in the one-third share lease alternative.

Table 1. All Scenarios Compared Using Key Profitability Factors.

	Furrow		**Cash Lease SDI**		**1/3 Share Lease SDI**	
	Renter	**Landlord**	**Renter**	**Landlord**	**Renter**	**Landlord**
Total Cash Receipts ($1000)						
2009	58.65	19.55	101.10	45.25	89.91	44.89
2010	57.30	19.10	101.40	45.35	90.18	45.02
2011	58.12	19.37	104.68	46.44	93.09	46.48
2012	60.00	20.00	109.15	47.93	108.69	36.63
2013	60.61	20.20	110.55	48.40	110.41	36.80
2014	61.48	20.49	112.93	37.64	112.54	37.51
2015	61.85	20.62	114.67	38.22	114.23	38.08
2016	64.36	21.45	120.00	40.00	119.77	39.92
2017	65.08	21.69	122.22	40.74	121.63	40.54
2018	65.67	21.89	123.87	41.29	123.30	41.10
2009-2018 Average	**61.31**	**20.44**	**112.06**	**43.13**	**108.38**	**40.70**
Total Cash Costs ($1000)						
2009	54.62	8.58	83.64	15.57	69.01	18.27
2010	59.35	8.71	89.91	15.38	74.84	18.39
2011	66.68	9.29	99.82	15.96	84.18	19.30
2012	70.68	9.62	104.54	16.03	91.97	16.20
2013	74.71	9.93	108.83	16.03	95.73	16.18
2014	76.96	10.08	98.15	15.69	96.42	15.83
2015	77.60	10.15	96.76	15.79	95.11	15.88
2016	79.36	10.28	96.38	15.94	94.86	15.99
2017	81.64	10.46	97.09	16.22	95.66	16.23
2018	83.93	10.63	97.70	16.46	96.36	16.46
2009-2018 Average	**72.55**	**9.77**	**97.28**	**15.91**	**89.41**	**16.87**
Net Farm Profit or Loss ($1000)						
2009	0.88	9.77	15.52	23.48	18.96	19.67

	Furrow		Cash Lease SDI		1/3 Share Lease SDI	
	Renter	**Landlord**	**Renter**	**Landlord**	**Renter**	**Landlord**
2010	-5.21	9.18	9.53	24.26	13.38	20.17
2011	-11.79	8.85	2.86	25.20	6.91	21.13
2012	-14.01	9.11	2.54	26.99	14.66	14.72
2013	-17.54	8.96	-0.41	27.78	12.55	15.22
2014	-19.02	9.06	12.60	17.50	13.93	16.39
2015	-19.40	9.07	15.65	17.94	16.86	16.83
2016	-18.77	9.74	21.28	19.51	22.57	18.48
2017	-20.46	9.74	22.72	19.93	23.56	18.79
2018	-22.29	9.73	23.67	20.19	24.44	19.04
2009-2018 Average	**-14.76**	**9.32**	**12.60**	**22.28**	**16.78**	**18.04**
Prob. Net Cash Income < Zero (%)						
2009	52.00	1.00	35.00	1.00	31.00	3.00
2010	58.00	1.00	44.00	1.00	37.00	2.00
2011	70.00	1.00	49.00	1.00	43.00	3.00
2012	81.00	1.00	50.00	1.00	35.00	1.00
2013	91.00	1.00	53.00	1.00	35.00	1.00
2014	87.00	1.00	41.00	2.00	42.00	2.00
2015	89.00	1.00	27.00	1.00	29.00	1.00
2016	84.00	1.00	26.00	1.00	23.00	2.00
2017	87.00	1.00	22.00	1.00	21.00	1.00
2018	88.00	1.00	21.00	1.00	23.00	1.00
Prob. of Average Net Cash Farm Income						
< Zero, 2009-2018 (%)	**78.70**	**1.00**	**36.80**	**1.00**	**31.90**	**1.30**

The risk around Net Farm Income to the renter for each of the three scenarios is compared in Figures 1-6. Figures 1 and 2 compare the difference in profitability and risk of the furrow irrigated system with the alternative of cash leasing the system during the first five years for the landlord and the renter. Given the scenario depicted, it is no wonder the renter in this situation would be looking for something to change the predicted outcomes of consistent future losses over the next ten years. Without good communication the landlord may not be aware of the situation faced by the renter, since his projected returns for the 2009 crop year are $98 per acre. The reduced risk the landlord faces using the cash lease for the SDI system is displayed in Figure 2. The landlord's lowest likely annual return for the cash lease alternative is nearly as great as his average annual return in the furrow irrigated baseline.

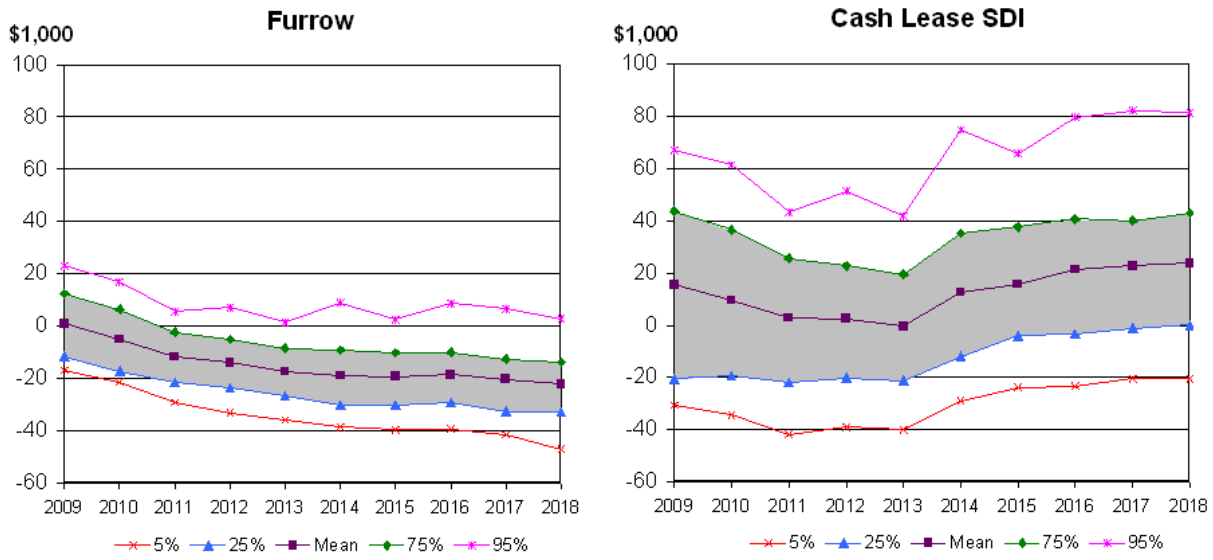

Figure 1. Variability in Net Farm Income for Furrow Baseline versus Cash Lease SDI Alternative - Renter.

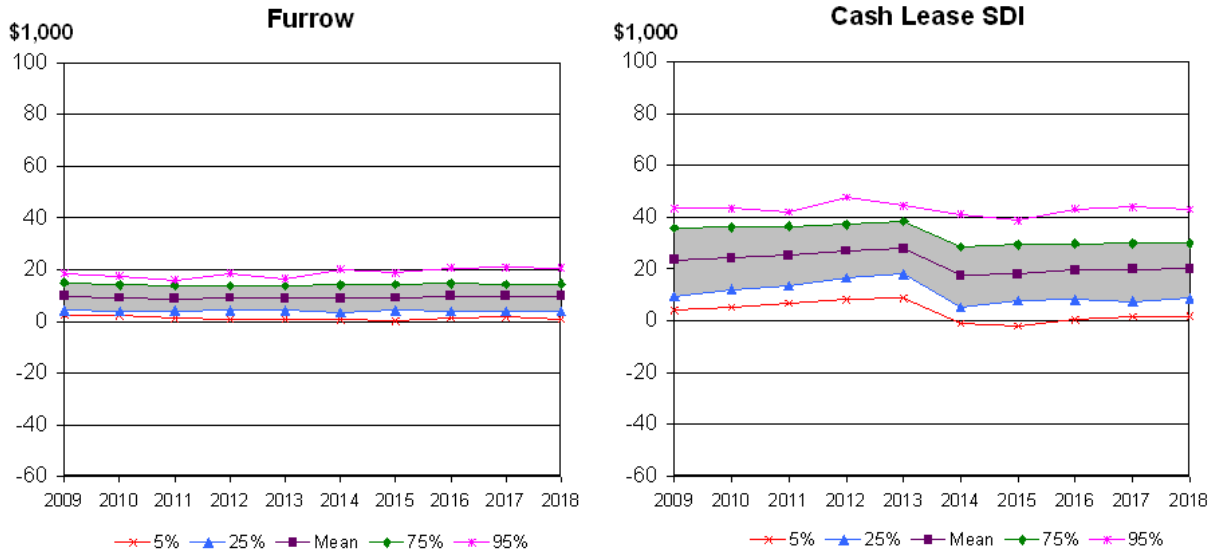

Figure 2. Variability in Net Farm Income for Furrow Baseline versus Cash Lease SDI Alternative - Landlord.

The difference in Net Farm Profit between the furrow irrigated baseline and the one-third share lease are displayed in Figures 3 and 4. Although there is still the possibility of significant losses, as indicated by the 25% probability line below $0, there is a sizeable likelihood of far greater returns on the positive side. Table 4 demonstrates the substantial increase in risk born by the landlord in this scenario. However, with greater risk comes the potential for greater reward.

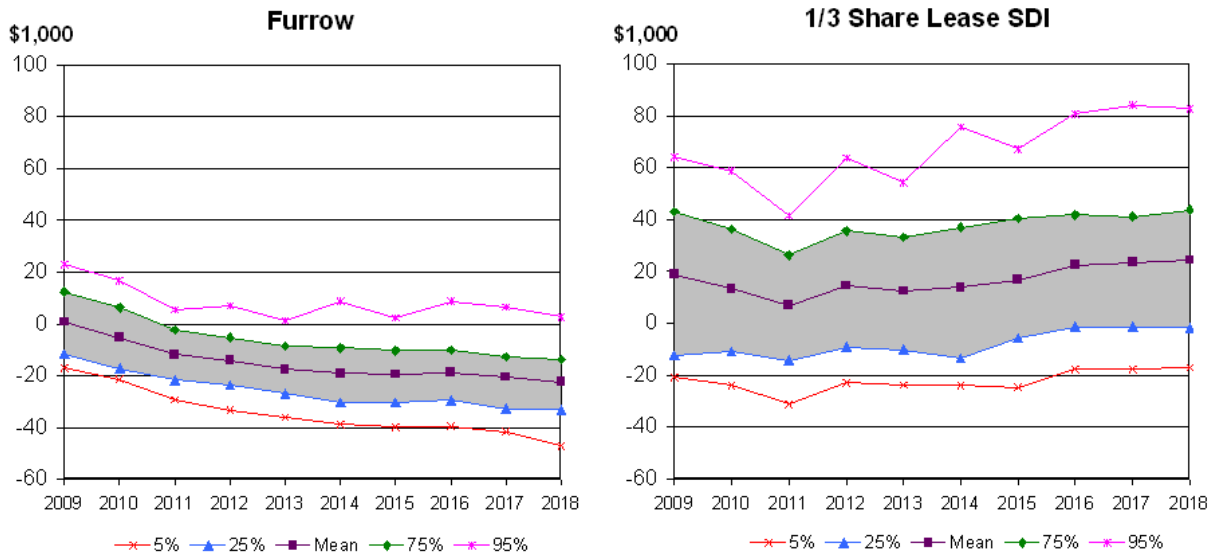

Figure 3. Variability in Net Farm Income for Furrow Baseline versus 1/3 Share Lease SDI Alternative - Renter.

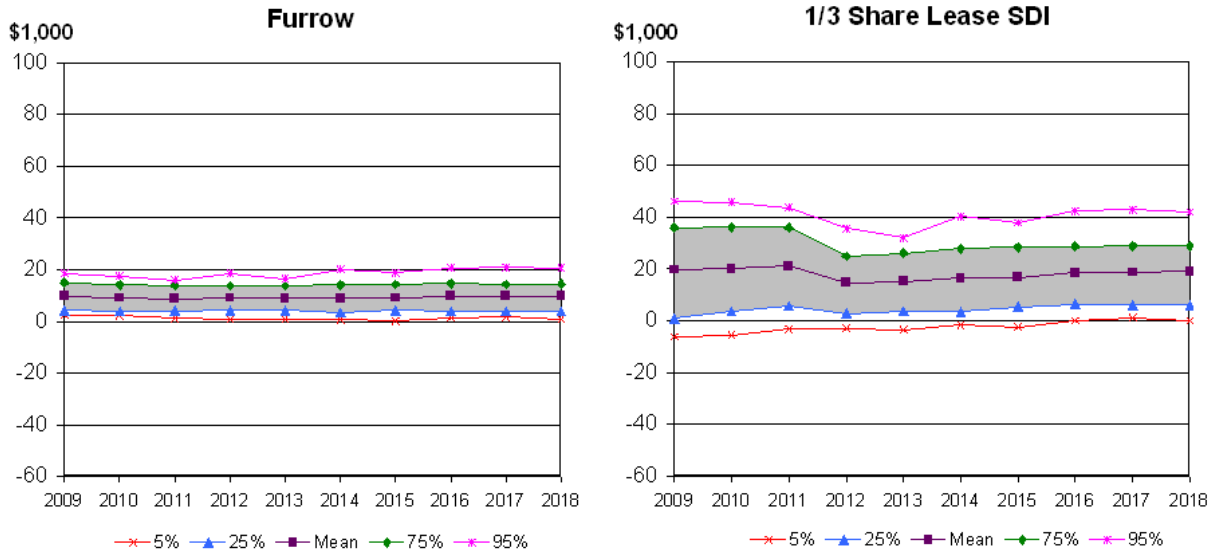

Figure 4. Variability in Net Farm Income for Furrow Baseline versus 1/3 Share Lease SDI Alternative - Landlord.

Figures 5 and 6 compare the effect on the renter's and landlord's profitability for the two alternative methods of paying for the system. The additional risk born by the renter in the cash lease scenario can be seen by comparing the 5% and 25% probability lines in the two graphs in Figure 5. There is a 5% chance that the cash lease alternative could generate losses between -$30,580 and -$41,690 during the first five years. In the share lease alternative the 5% level indicates losses between -$20,750 and -$31,090 during the payoff period. At the 25% probability level the cash lease option generates losses between -$19,230 and -$21,850 compared to -$10,750 and -$14,250 for the share lease alternative. The one-third share lease alternative has higher average returns and a lower probability of net losses over the ten-year planning horizon and it offers significant risk reduction to the renter. Much of the additional risk born by the renter in the cash lease scenario could be dealt with by the purchase of additional crop hail insurance to help cover costs in the event of a late season hail loss. The landlord assumes somewhat higher risk of loss in the one-third share lease scenario as indicated in Table 6. The cash lease alternative shows almost no risk of negative returns at any level, while the one-third share lease option has modest losses at the 5% level.

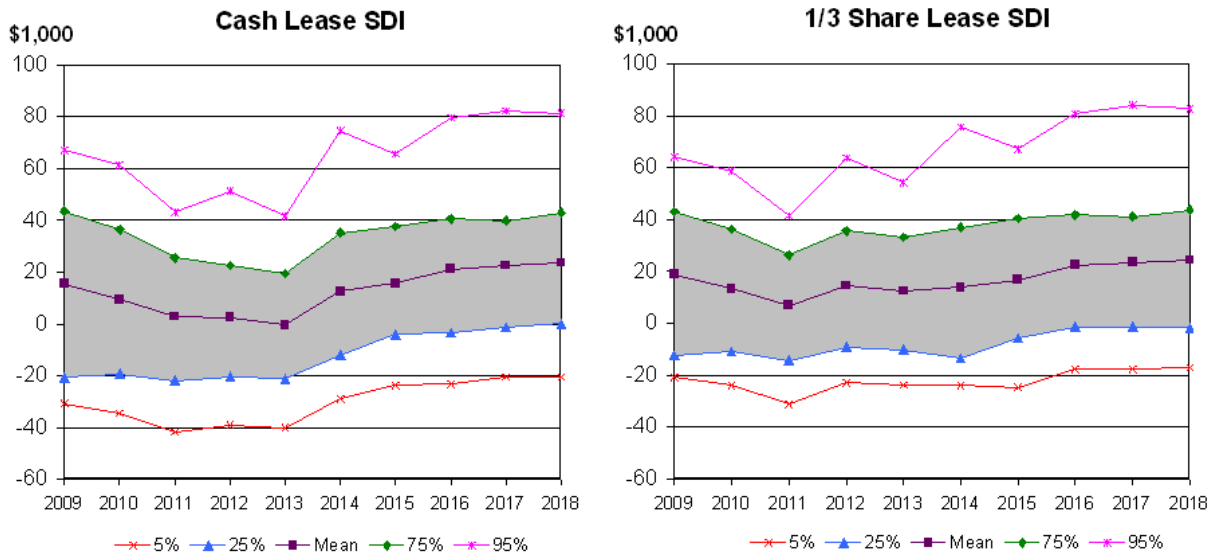

Figure 5. Variability in Net Farm Income for Cash Lease SDI versus 1/3 Share Lease SDI Alternatives - Renter.

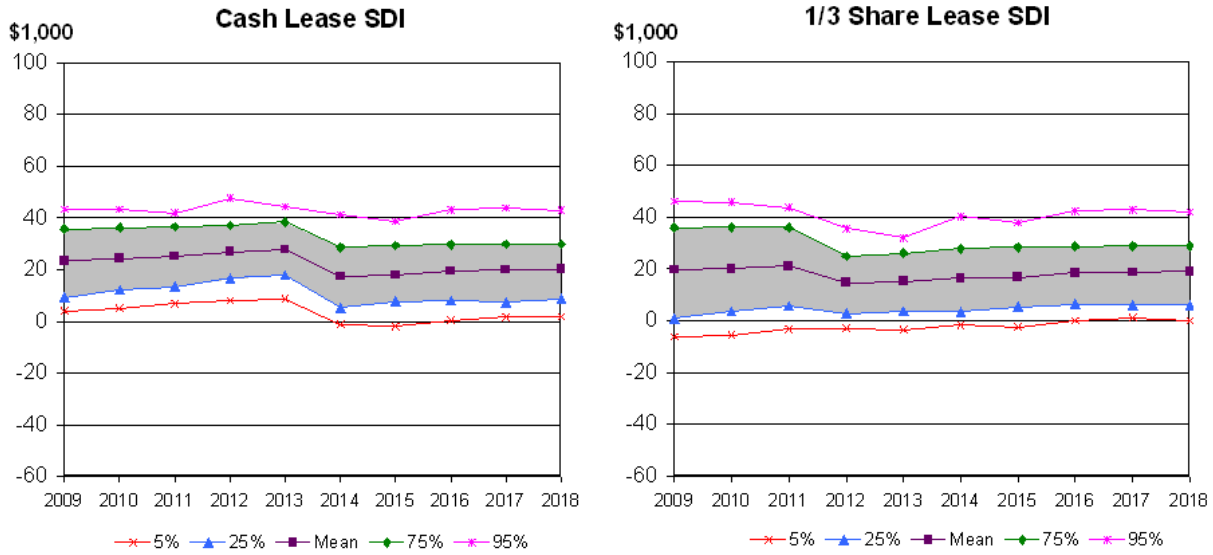

Figure 6. Variability in Net Farm Income for Cash Lease SDI versus 1/3 Share Lease SDI Alternatives - Landlord.

Summary

For this approach to be successful, the circumstances have to be right. SDI systems have proven to be very efficient and yield enhancing investments. When EQIP cost share of about 50% is available, it usually results in a payoff of the system in three to five years. Most systems have been installed on land farmed by the owner, but there will be situations where landowners will be willing to install a system that can benefit him as well as the renter. The approach discussed in this paper suggests that a landlord who is willing to pay for the SDI system can be compensated if his crop share is temporarily increased to one-third from the traditional one-fourth share until the system is paid for by the additional net income. Additionally, compensating the landlord by amortizing the cost of the system over five years, with the renter paying a cash lease payment equal to that cost for the first five years, returns similar results. The renter would bear more of the risk in the cash lease scenario, where the landlord bears more of the risk in the increased share rental scenario. In either case, the landlord has to be willing and able to take on the additional financial risk and the landlord and renter must carefully lay out a plan and freely share information.

Also the renter must make a commitment to learning how to manage the new technology to achieve the increased yields and minimize the length of time it takes to pay for the system.

References

USDA, National Agricultural Statistics Service. 1997 Census of Agriculture. 1998 Farm and Ranch Irrigation Survey.

USDA, National Agricultural Statistics Service. 2002 Census of Agriculture. 2003 Farm and Ranch Irrigation Survey.

Gueck, Nicole, DeDe Jones, Jay Yates and Steven Klose. 2008. Examining Share Lease Arrangements for Grain Operations in the Texas Panhandle under Changing Market Conditions. p. 1. Submitted to the Southern Journal of Agricultural Economics.