A Comparison of Share and Cash Leasing

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Cash leasing and share leasing allocate risk very differently. With cash leasing, farmers assume all the risk because landlords get a fixed amount of money each year. Any profit the farmer earns on cash rented land is subject to variability in yields and prices. Yields are affected by a whole host of factors but most of these are weather driven. There are tools farmers can use to mitigate the effects of these risks, but the risks themselves are still present. Even with good risk management tools, farmers are likely to have variability in net income.

With a traditional share lease, both farmers and landlords share in the risks as well as the rewards. In a traditional share lease, farmers and landlords both get a percentage of the crop and both also pay the same percentages for the major expenses of seed, chemicals, and fertilizer. Farmers still have the same risks and same risk management tools as under the cash lease, but now the overall risk is less with the landlord bearing a share.

Economic theory tells us that those bearing the risk should earn more overall profit. Thus, farmers who cash rent land should make more money than those farmers with cash leases. Landlords, by contrast, should make more money with a share lease as they are taking on risk they would not have under a cash lease. This paper examines the cash versus share leasing arrangement to determine if farms actually make more money with cash leases. Farmland in central Illinois is examined to make this determination. In addition, this paper uses stochastic dominance and stochastic efficiency with respect to a function to determine which type of leasing arrangement a risk adverse producer would choose.

Data and Model

Data for this paper comes from the University of Illinois Farmdoc site (www.farmdoc.uiuc.edu). The data itself is derived from the Illinois Farm Business Farm Management (FBFM) program. This FBFM program uses field staff to collect cost and return data from farmers in Illinois. Currently 8 years of detailed cost and return data is available for 4 regions and corn and soybeans in the state on a per acre basis. This data includes, yields, crop returns, government payments, major expense items, and cash rent.

Two types of leasing arrangements are examined. The first is a cash lease where the farmer pays the landlord a set dollar amount per acre. Under a cash lease, the farmer-tenant receives all the government payments because the landlord assumes none of the production risks. Under a cash lease, the tenant has freedom to decide what to plant and how to grow the crop. Landlord involvement is minimal. Recordkeeping is also minimized as there is no crop or expenses to divide.

The second lease is a share lease when the farmer and landlord split the crop production as well as the major crop expenses. Typically, fertilizer, seed, and chemicals are the major expenses shared. Other expenses such as machinery, fuel, etc. are the responsibility of the tenant. Crop production and expenses are usually shared in the same proportion. Because the landlord is sharing in the production risk, he or she also shares in the government payments.

The typical share percentages vary depending upon the productivity of the soil. In Illinois, the better soils have 50-50 share arrangements. In southern Illinois, where the soils are

less productive, a two-thirds - one-third arrangement is common. Here the tenant gets two-thirds and the landlord gets one-third.

According to Table 1 (http://www.farmdoc.uiuc.edu/manage/Land_control.pdf), these are the land control arrangements for farmers in the FBFM program.

Table 1. Percentage of land owned, crop shared and cash rented for Illinois farms.

	2002	2003	2004	2005	2006	2007
Northern Illinois Pure Grain Farms						
% owned	22	22	22	17	18	18
% crop shared	33	30	29	30	29	28
% cash rented	45	48	49	53	53	54
Central Illinois Pure Grain Farms						
% owned	14	15	15	14	13	13
% crop shared	62	59	56	56	55	53
% cash rented	24	26	29	30	32	34
Southern Illinois Pure Grain Farms						
% owned	24	23	22	19	20	20
% crop shared	51	49	50	47	46	43
% cash rented	25	28	28	34	34	37
State of Illinois						
% owned	24	24	24	23	23	23
% crop shared	44	43	41	40	40	38
% cash rented	32	33	35	37	37	39

Source: Illinois FBFM Association and the University of Illinois

To develop the model, the 8 years of detailed cost and return data was applied to both share and cash leased land for the 4 regions and 2 crops. For both the northern and central Illinois farms, a 50-50 share lease was used. For the southern Illinois farms, a two-thirds/one-third arrangement was used with the tenant getting two-thirds of the crop and paying two-thirds of the fertilizer, seed, and chemical expenses. Both the tenant's returns and the landlord returns were calculated. Table 2 lists the means and standard deviations.

Table 2 - Mean Returns to Landlord and Tenant

Arrangement type	Mean return	Standard deviation
RtoT_cash_North_Corn	$90.86	98.70
RtoT_share_North_Corn	$56.43	46.54
RtoL_cash_North_Corn	$135.00	7.72
RtoL_share_North_Corn	$169.43	59.41
RtoT_cash_Central-High_Corn	$104.14	103.07
RtoT_share_Central-High_Corn	$73.71	53.22
RtoL_cash_Central-High_Corn	$145.71	10.19
RtoL_share_Central-High_Corn	$176.14	59.78
RtoT_cash_Central-Low_Corn	$91.57	101.64
RtoT_share_Central-Low_Corn	$57.64	51.31
RtoL_cash_Central-Low_Corn	$130.14	10.49
RtoL_share_Central-Low_Corn	$164.07	60.04
RtoT_cash_Southern_Corn	$52.43	83.87
RtoT_share_Southern_Corn	$60.27	56.96
RtoL_cash_Southern_Corn	$92.86	6.96
RtoL_share_Southern_Corn	$84.99	30.98
RtoT_cash_North_Beans	$48.43	70.85
RtoT_share_North_Beans	$43.21	32.58
RtoL_cash_North_Beans	$135.00	7.72
RtoL_share_North_Beans	$140.21	45.42
RtoT_cash_Central-High_Beans	$75.43	80.49
RtoT_share_Central-High_Beans	$65.36	42.39
RtoL_cash_Central-High_Beans	$145.71	10.19
RtoL_share_Central-High_Beans	$155.79	48.21
RtoT_cash_Central-Low_Beans	$70.00	78.01
RtoT_share_Central-Low_Beans	$54.14	39.92
RtoL_cash_Central-Low_Beans	$130.14	10.49

RtoL_share_Central-Low_Beans	$146.00	46.49
RtoT_cash_Southern_Beans	$43.57	43.04
RtoT_share_Southern_Beans	$58.84	29.63
RtoL_cash_Southern_Beans	$92.86	6.96
RtoL_share_Southern_Beans	$77.56	17.04

Figures 1 through 8 graph the yearly returns to tenants and landlords.

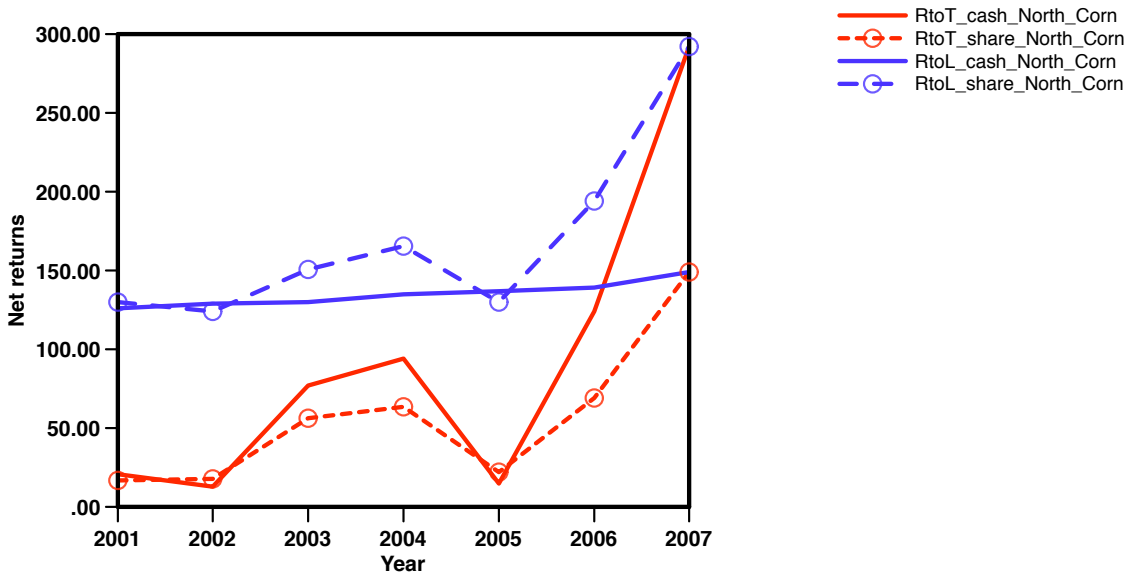

Figure 1. Net returns to Tenants and Landlords – Northern Illinois Corn

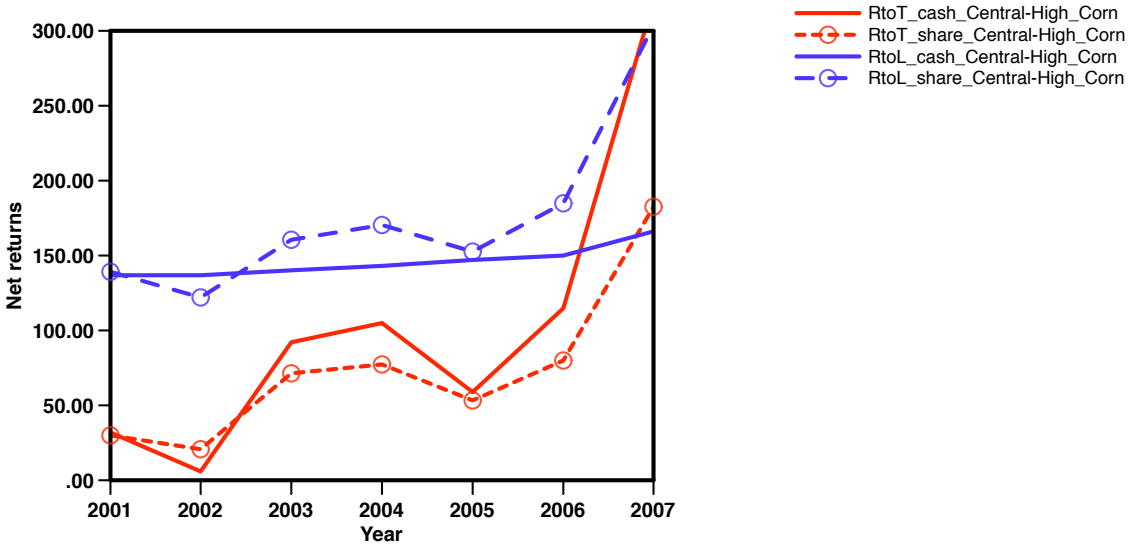

Figure 2. Net returns to Tenants and Landlords – Central Ill Corn – High Prod

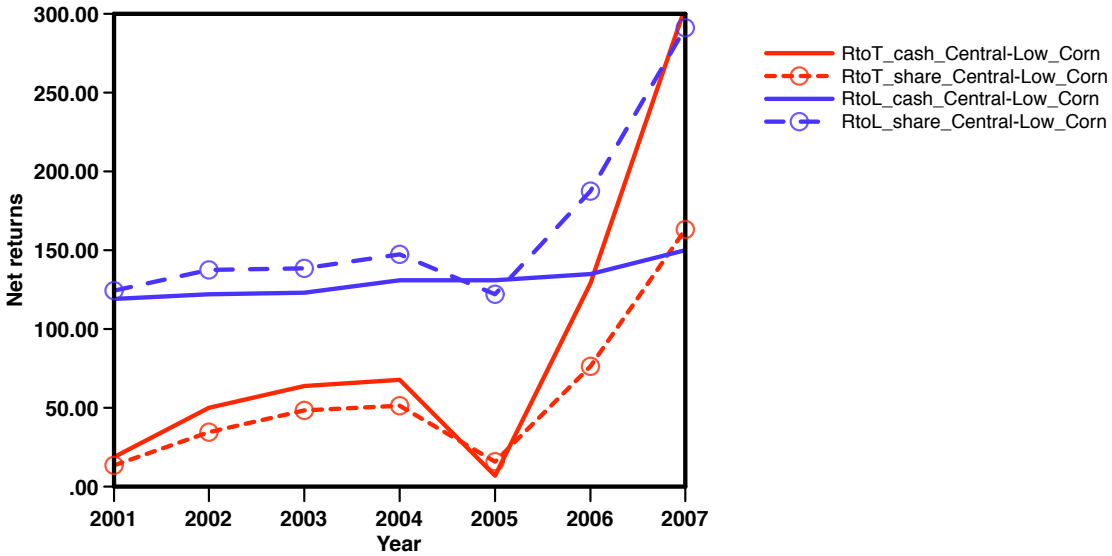

Figure 3. Net returns to Tenants and Landlords – Central Ill Corn – Low Prod

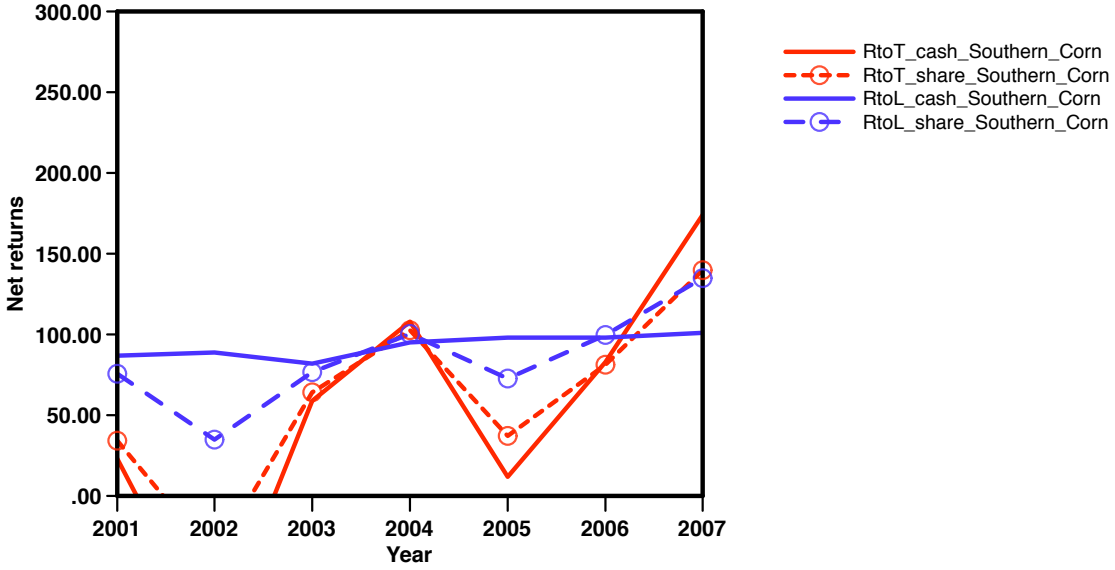

Figure 4. Net returns to Tenants and Landlords – Southern Ill Corn

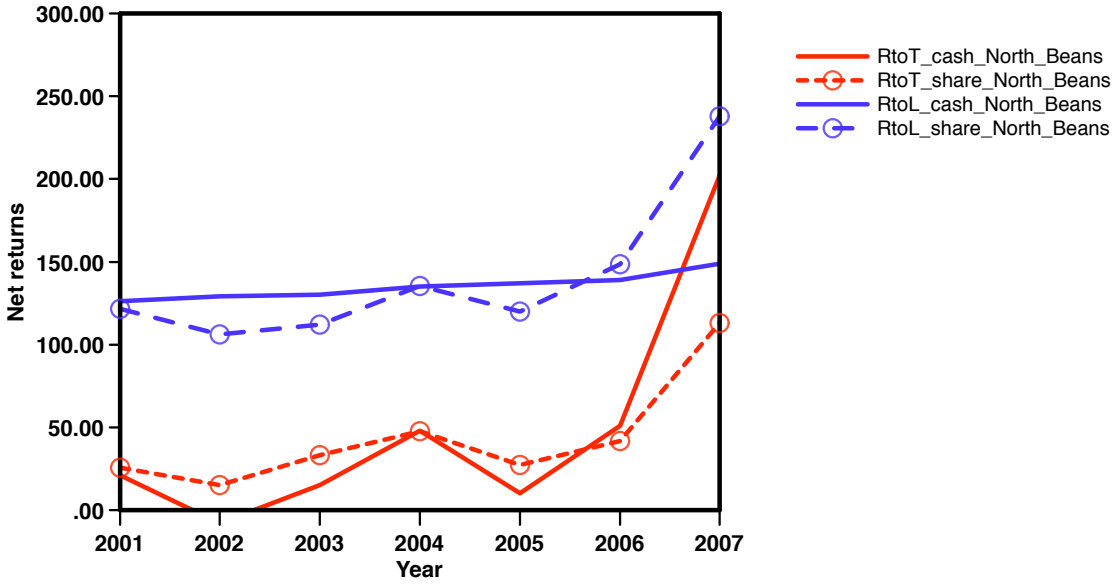

Figure 5. Net returns to Tenants and Landlords – Nouthern Ill Soybeans

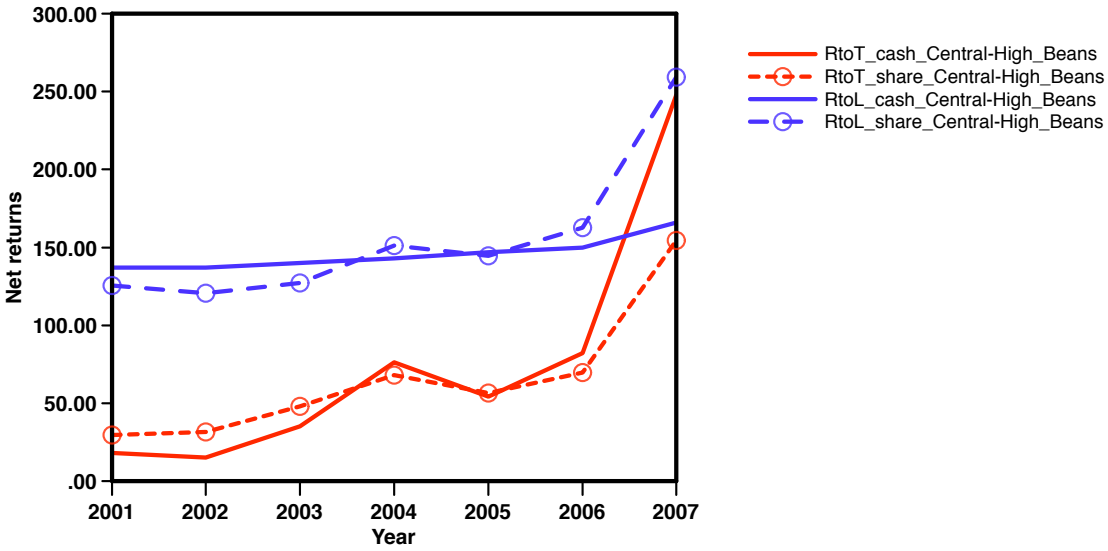

Figure 6. Net returns to Tenants and Landlords – Central Ill Soybeans – High Prod

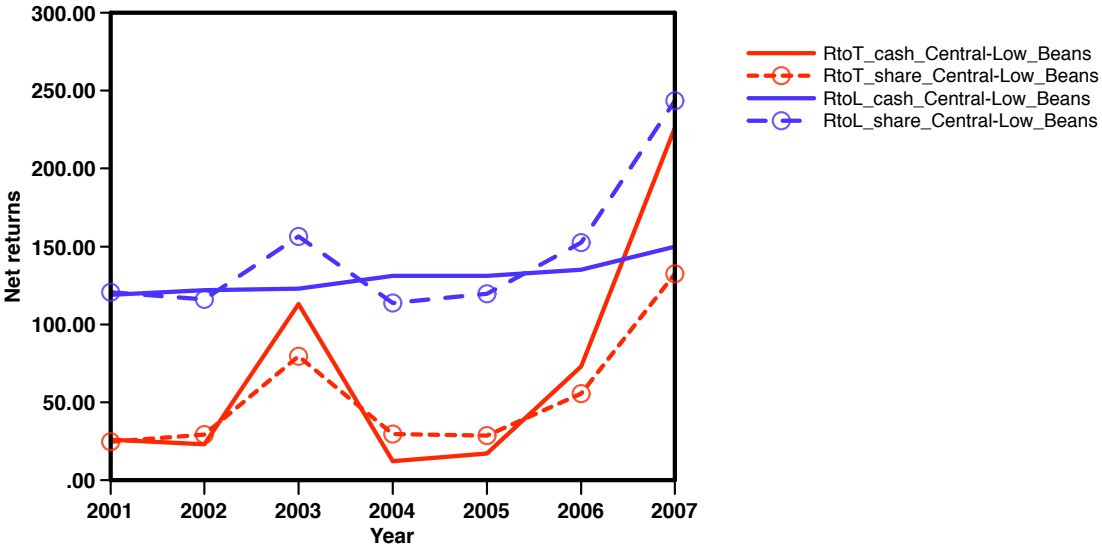

Figure 7. Net returns to Tenants and Landlords – Central Ill Soybeans – Low Prod

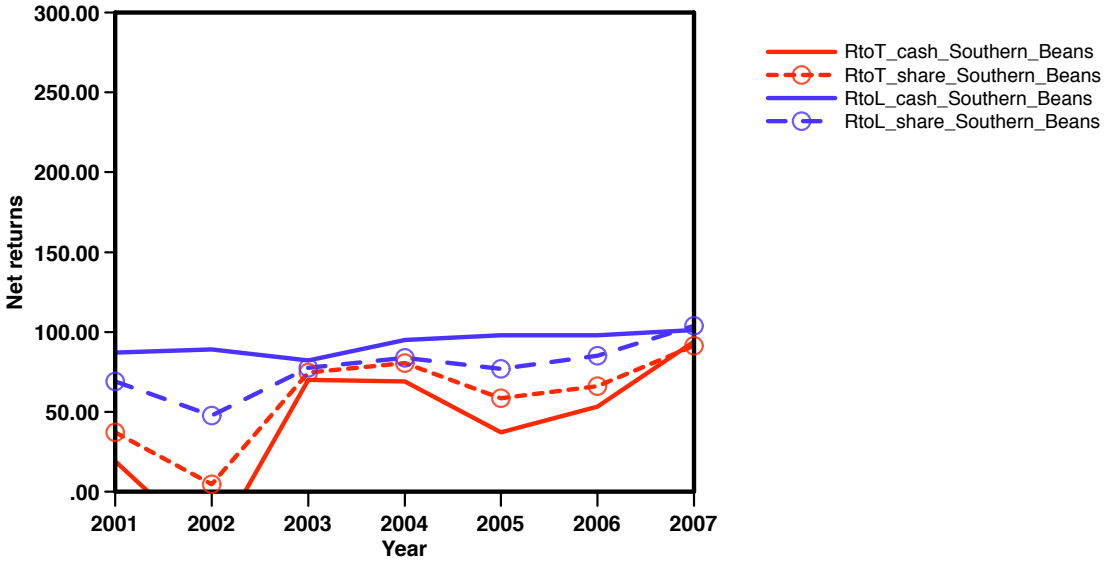

Figure 8. Net returns to Tenants and Landlords – Southern Ill Soybeans

The final step in the analysis was a simulation of the empirical distribution of returns to determine if risk adverse producers would prefer cash leasing over share leasing. When simulating returns, the share and cash leasing returns were simulated together since there seems to be a fairly obvious correlation between share and cash leasing returns. All of the simulation analysis was carried out using Simetar.

First degree stochastic dominance was initially used to compare the distribution of returns for share leasing and cash leasing. Stochastic dominance has the advantage of not needing to elicit a utility function is order to compare the distributions. First degree stochastic dominance will work as long as the CDF's do not cross, otherwise a different method is needed.

Stochastic efficiency with respect to a function (SERF) is used when the First degree stochastic dominance test is inconclusive. SEFT ranks the alternatives based on their certainty

equivalents for varying levels of an absolute risk aversion coefficient. The disadvantage of this approach is that a functional form of the utility function must be specified. Here, a negative exponential utility function is used.

Results

As shown in Table 2, The mean returns to a tenant from cash leasing are greater than the returns from share leasing except for the corn and soybean farms in southern Illinois. Also, in all cases, the standard deviation of returns is smaller for the share leases. The higher returns to cash leasing but with more variation is what was expected. However, the exceptions in southern Illinois could be explained by the lack of data or because not all farms in southern Illinois use a two-third/one-third arrangement (some southern Illinois farms use a three-fifths/two-fifths arrangement).

The results from all the comparisons between tenant share and cash leasing using first degree stochastic dominance are inconclusive. The CDF's all cross at some point. Figure 9 below shows how the CDF of returns to central Illinois high productivity soils growing soybeans compares for cash rented land and share leased land.

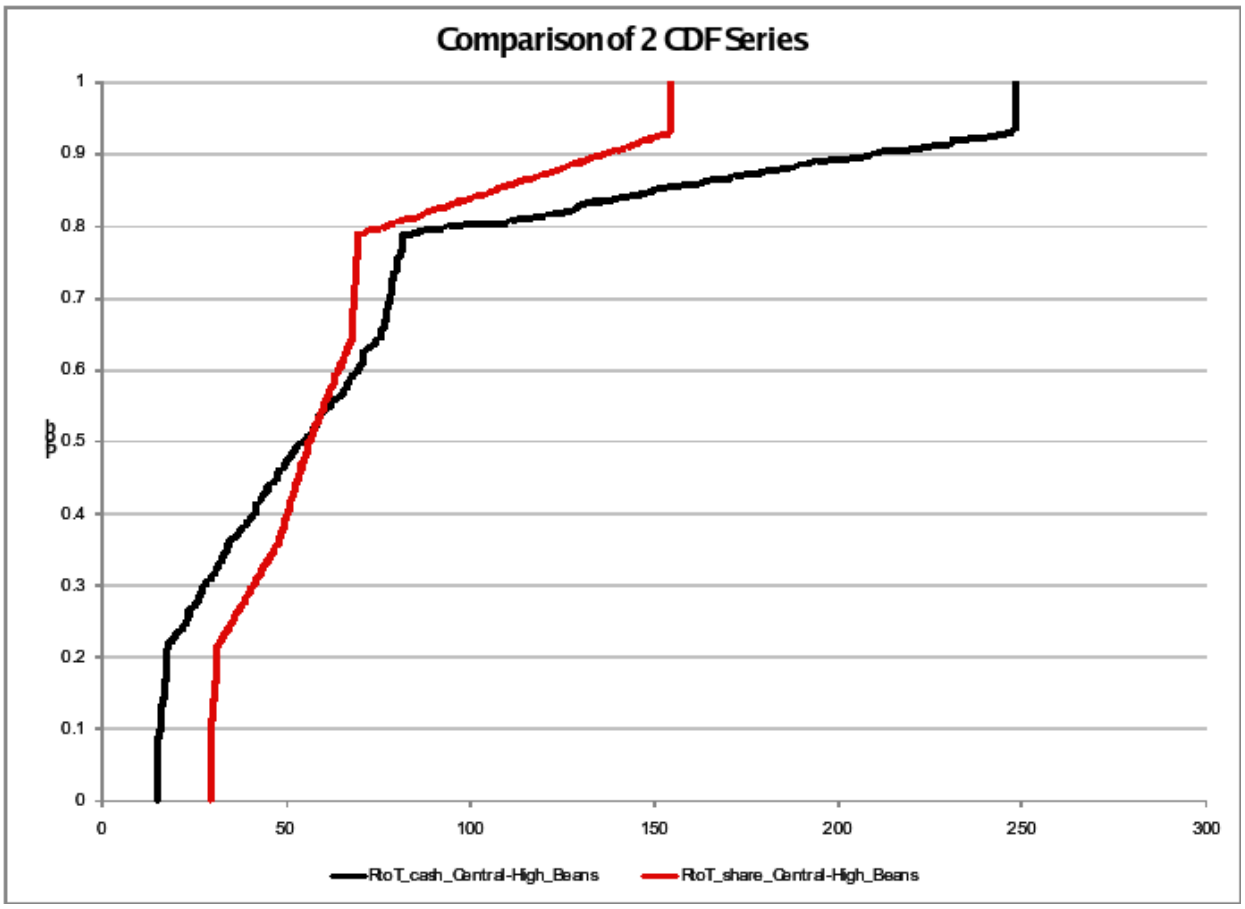

Figure 9. CDF of Returns to Central Illinois High Productivity Soils for Share vs Cash Lease

Since the first degree stochastic dominance test does not tell us anything, the next step is to examine the SERF figures. Figures 10 through 15 show these results.

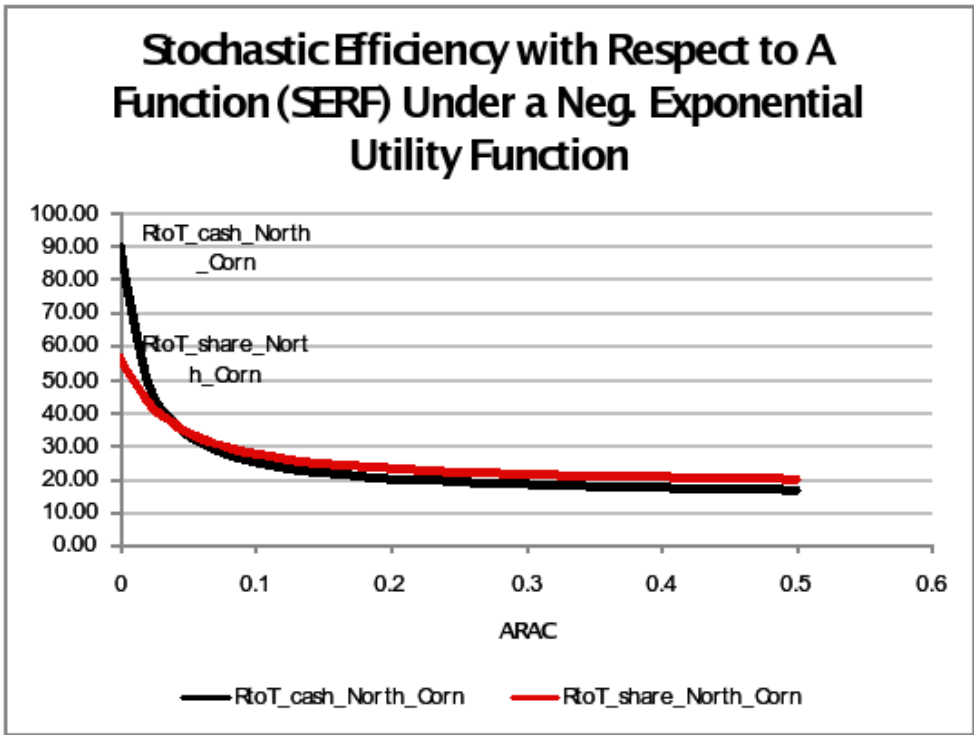

Figure 10. SERF Function for Northern Illinois Corn

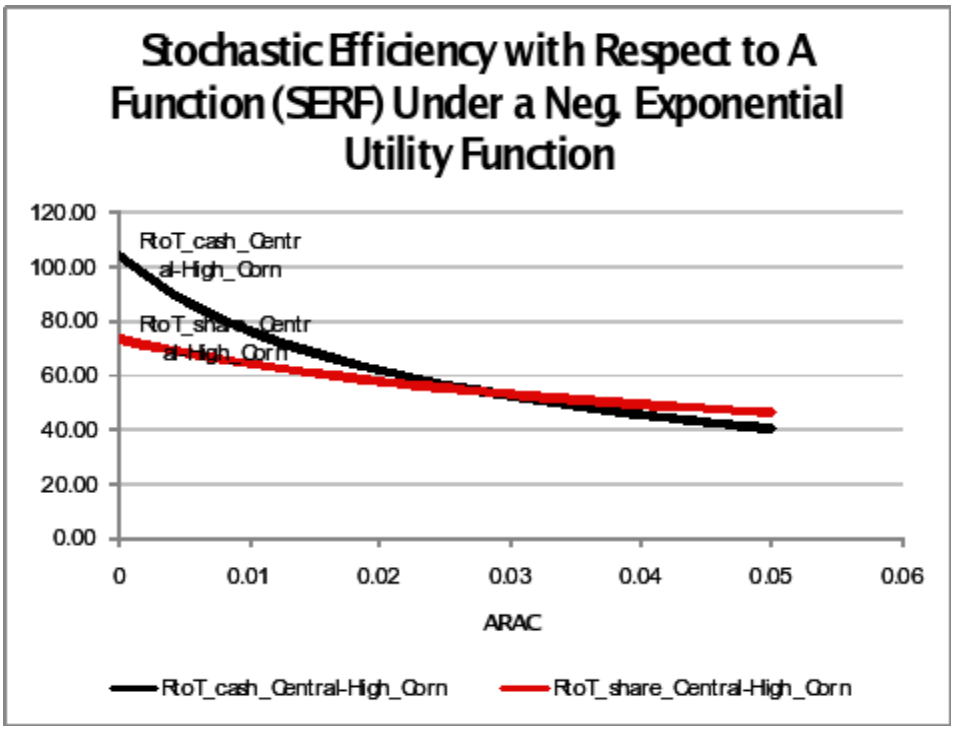

Figure 11. SERF Function for Central Illinois Corn - High Productivity Soils

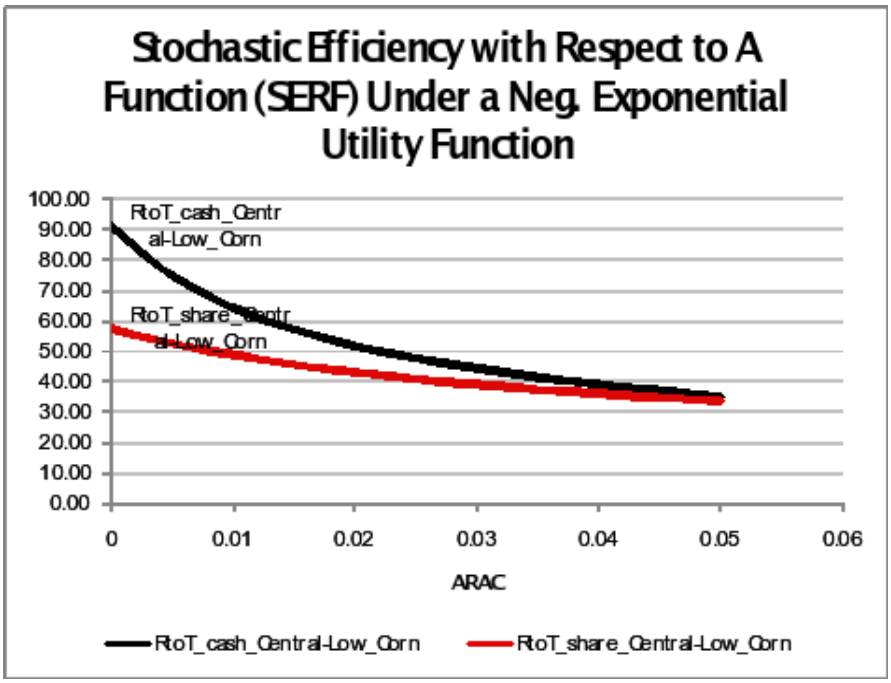

Figure 12. SERF Function for Central Illinois Corn - Low Productivity Soils

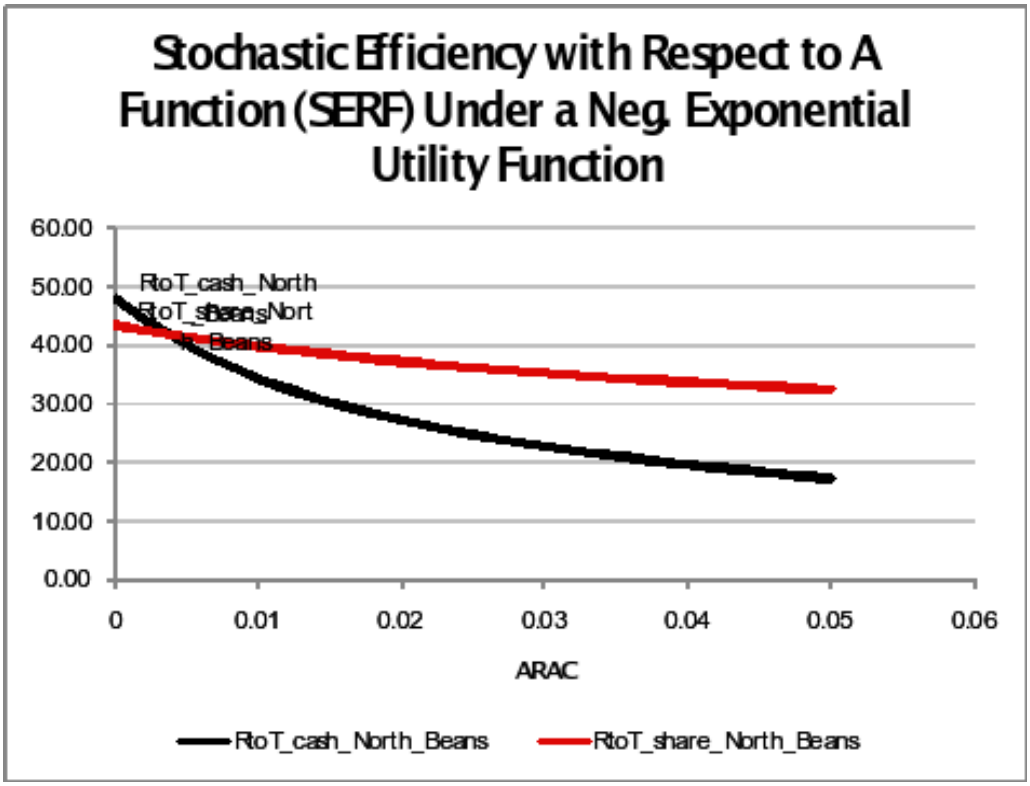

Figure 13. SERF Function for Nothern Illinois Soybeans

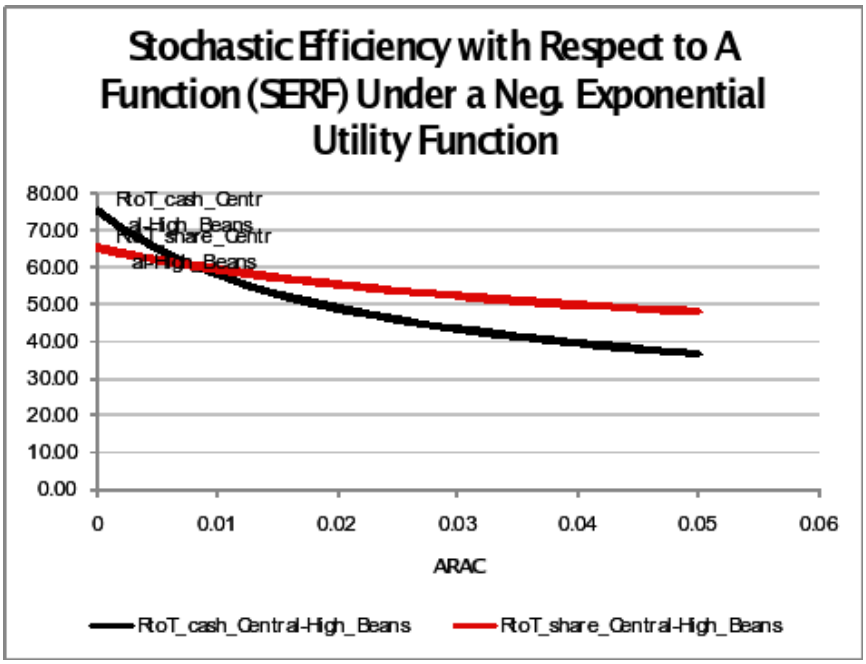

Figure 14. SERF Function for Central Illinois Soybeans - High Productivity Soils

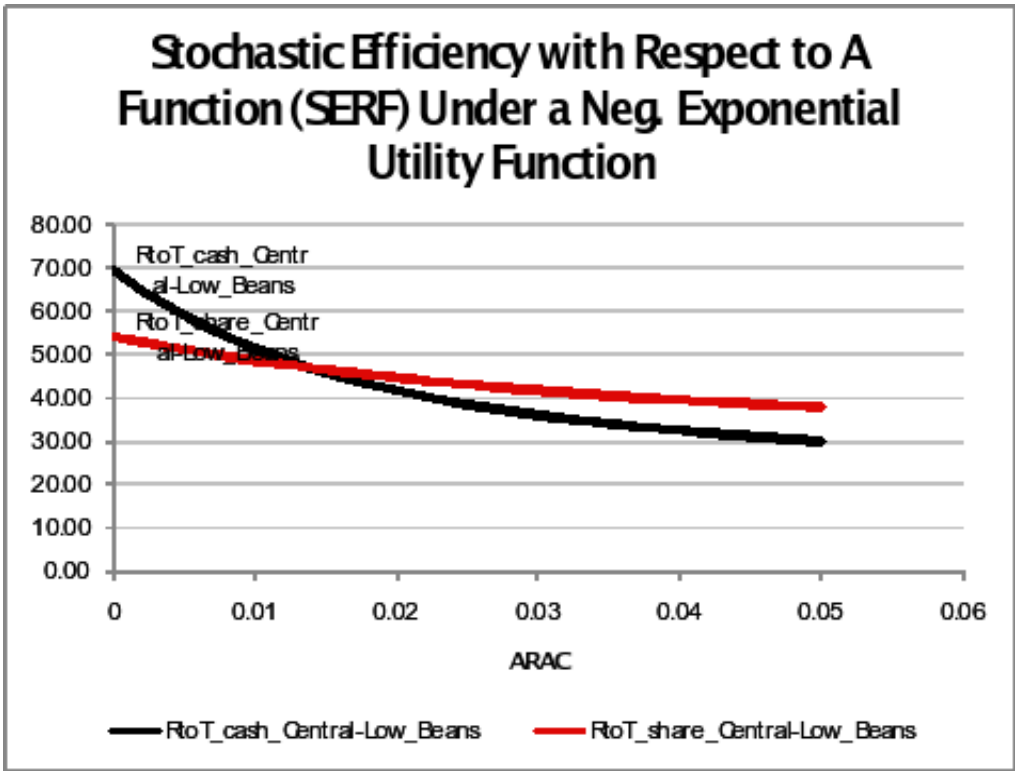

Figure 15. SERF Function for Central Illinois Soybeans - Low Productivity Soils

As these six figures indicate, tenants who are risk neutral will prefer a cash lease but as they become more risk adverse, they prefer a share lease. The risk adverse coefficient is highest for central Illinois low productivity soils growing corn. The risk adverse coefficient is lowest for northern Illinois soils growing either corn or soybeans

Conclusions

Data points are not as numerous as desired and this will be addressed. With only 8 years of data, an outlier could easily affect the results. Still the results so far indicate that cash rents seem reasonable to expected returns and other methods of controlling farmland. Only in southern Illinois is this not the case.

Corn ground over the last 8 years seems to produce the best results as well and central Illinois soils seem to support cash rents better than nothern Illinois or southern Illinois soils as well.