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ECONOMIC EVALUATION OF AN EQUIPMENT LEASE PROGRAM

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Economic Evaluation of an Equipment Lease Program
by
Eddy L. LaDue

One equipment supplier has developed a lease program with lease rates that appear attractive with today's high interest rates. The basic principal underlying this program is that the investment tax credit available with an investment may be more valuable to the equipment supplier than it is to the farmer. Thus, the equipment supplier (lessor) takes the investment tax credit (and depreciation) and makes the equipment available to the farmer (lessee) for a contract rate that may be lower than the annual interest rate that the farmer would have to pay if the equipment were purchased with borrowed funds. The intent of this paper is to provide an economic evaluation of this lease program. The analysis is conducted from a farmer's point of view.

Actual A.P.R.

The first point to keep in mind is that the stated contract rate (the rate used to determine the amount of the payment) is not an annual percentage rate (A.P.R.) because the payments are calculated as if the equipment had no value at the end of the lease period. Thus, the contract rate is an A.P.R. only if the value of the equipment at the end of the lease period (terminal value) is zero. The impact of incorporating salvage values into the rate calculation depends on the term of the loan and the magnitude of the terminal value as well as the initial contract rate itself (Table 1). For example, if a machine has a terminal value of 20 percent of its original cost, the A.P.R. for an eight year contract at a 7.95 percent contract rate would be 10.5 percent compared to 11.15 percent for a 12 year contract at a 9.95 percent contract rate.

Table 1 Annual Percentage Rate for Various Contract Rates and Terminal Values

Contract Rate (percent)	Terms (years)	Annual Percentage Rate (A.P.R.) if terminal value as a percent of new cost is:			
		0	10	20	30
7.95	8	7.95	9.29	10.50	11.59
8.95	10	8.95	9.86	10.69	11.45
9.95	12	9.95	10.57	11.15	11.69

Comparison of Leasing and Purchase with 100% Financing

It is frequently stated that leasing improves the after tax cash flow of the business. To illustrate the cash flow and cost impacts of leasing, an example situation is analyzed.

Example Situation:

Equipment Cost: \$40,000

Terminal Value: \$8,000

Marginal Tax Rate (state and federal): 30%

Opportunity Cost of Capital: 9 percent of after tax
(about 12% before tax)

Lease: 9.95% contract rate
12 years (monthly payments)
7.5 percent deposit (\$3,000) earns 5% interest
compounded annually and paid at the end of the lease

Loan: 11% interest rate
12 years (monthly payments)
14% investment tax credit (10% federal, 4% state)
Straight line depreciation
\$40,000 loan amount

The cost impacts are assessed by determining the present value of costs. The cash flows and net present value of costs for the lease and buy alternatives for the example situation are shown in Tables 2 and 3.

Table 2 Cash Outflows for Lease

Year	Description	Before Tax Cash Outflow	Taxes	After Tax Cash Outflow	Present Value Factor	Present Value of After Tax Cash Outflow
0	deposit	3000.00	--	3000.00	1.0	3,000.00
1	payment	5722.56 ^{a/}	-1716.77	4005.79	7.1607	28,684.26
2	payment	5722.56	-1716.77	4005.79		
.		
.		
.		
12	payment	5722.56	-1716.77	4005.79		
	purchase	8000.00	--	8000.00	.3555	2,844.00
	deposit	5387.70 ^{b/}	+ 716.31	-4671.39	.3555	<u>-1,660.68</u>
Total Present Value of Costs						\$32,867.58

a/ Twelve monthly payments of 5856.16 each.

b/ Includes interest income of \$2387.70.

Table 3 Cash Outflows for Purchase with 100% Financing

Year	Amount or Principal	Before Tax Interest Payments	Depre- ciation	Tax	After Tax Cash Outflow	9% P.V. Factor	Present Value of After Tax Cash Outflow
1	-5600.00 ^{a/}				-5600.00	.9174	-5137.44
	1701.13 ^{b/}	4315.93 ^{b/}	2666.67	-2094.78	3922.26	.9174	3598.28
2	1898.01	4119.06	2666.67	-2035.72	3981.32	.8417	3351.08
3	2117.62	3899.44	2666.67	-1969.83	4047.21	.7722	3125.26
4	2362.66	3654.40	2666.67	-1896.23	4120.81	.7084	2919.18
5	2636.09	3380.98	2666.67	-1814.30	4202.74	.6499	2731.36
6	2941.11	3075.95	2666.67	-1722.79	4294.25	.5963	2560.66
7	3281.44	2735.62	2666.67	-1620.69	4396.35	.5470	2404.80
8	3661.20	2355.87	2666.67	-1506.76	4510.28	.5019	2263.71
9	4084.87	1932.19	2666.67	-1379.66	4637.38	.4604	2135.05
10	4557.53	1459.53	2666.67	-1237.86	4779.18	.4224	2018.73
11	5084.96	932.11	2666.67	-1079.63	4937.41	.3875	1913.25
12	5673.38	343.70	2666.67	- 903.11	5113.93	.3555	<u>1818.00</u>
Total Present Value of Costs							\$25,701.91

a/ Investment tax credit.

b/ Twelve monthly payments of 501.42 each; annual total of \$6017.04.

For the example situation, the cost savings from purchase with 100% financing rather than leasing is \$7165.72.

Present Value of Total Costs of Leasing	\$32,867.58
Present Value of Total Costs of Purchase	<u>25,701.86</u>
Net Saving (present value)	\$ 7,165.72

However, this example assumes that the farmer can make use of the investment tax credit in the year of purchase. If the farmer's taxable income is low enough or the available investment tax credit from other investments is high enough that the investment tax credit cannot be used, the total costs of purchases would increase to \$30,839.30. In this case the advantage of purchase over lease would be reduced to \$2028.

Effect of Some Important Variables

Some of the characteristics of the example situation will be inappropriate for many farmers. In the analysis that follows the impact of some of these characteristics is analyzed. Unless otherwise stated the characteristics used in each analysis are those listed for the example situation for all variables except the variables being analyzed.

Terminal Value of Equipment

The value of the equipment at the end of the lease period (terminal value) can effect the relative cost of leasing. It influences the cost of the lease by changing the cost of purchasing the equipment at the end of the lease period. Although it is not required that the equipment be purchased, an appropriate comparison requires either purchase for the lease calculations or sale for the purchase alternative. Either will have the same effect on the net advantage or disadvantage of leasing.

The terminal value influences the cost of purchase through its effect on the amount of depreciation that can be taken. The lower the terminal value, the greater the depreciation that can be taken. Table 4 indicates the impact of varying the terminal value while holding all other variables constant.

Table 4 Impact of Terminal Value^{a/} on the
 Net Advantage of Purchase

Market Value at End of Period as % of Purchase Price	Present Value Advantage of Purchase Over Lease
20	\$7166
10	6460
5	6107
0	5754

a/ All other variables as listed for the example situation.

Tax Rate

If equipment is purchased, the interest and depreciation provide a tax shield. If it is leased, the lease payments provide a tax shield and taxes are increased slightly at the end of the lease period by the interest earned on the lease deposit. For both alternatives increasing the tax rate increases the amount of taxes shielded and lowers net costs. However, the total of interest and depreciation for a purchase exceeds the lease payments during the first years of the investment period when the present value of each dollar of taxes saved is higher. Thus, the advantage of purchase over leasing increases as the tax rate increases, but the amount of increase is modest.

Table 5 Effect of Tax Rate^{a/} on the Net Advantage of Purchase

Situation	Marginal Tax Rate		
	20	30	50
	- - - -present value of costs- - - -		
Leasing	\$36,880	\$32,868	\$24,842
Purchase	<u>29,785</u>	<u>25,702</u>	<u>17,538</u>
<u>Net Advantage of Purchase</u>	<u>\$ 7,095</u>	<u>\$ 7,166</u>	<u>\$ 7,304</u>

a/ All other variables as listed for the example situation.

Interest Rate

Since the lease is frequently considered most seriously by those with limited capital resources, the interest rate that would be paid with the purchase option could be considerably above the 11 percent assumed in the example. Increasing the interest rate increases the cost of purchase by the amount of the added interest paid minus the tax saving resulting from the larger tax shield of the increased interest expenses. As indicated in Table 6, leasing is the preferred alternative when the loan interest rate exceeds approximately 16 percent.

Table 6 Effect of Interest Rate^{a/} on the Net Advantage of Purchase

Situation	Interest Rate - Percent				
	9	11	13	15	17
	- - - - - present value of costs ^{a/} - - - - -				
Leasing	\$32,868	\$32,868	\$32,868	\$32,868	\$32,868
Purchase	<u>23,051</u>	<u>25,702</u>	<u>28,493</u>	<u>31,414</u>	<u>34,350</u>
<u>Net Advantage of Purchase</u>	<u>\$ 9,817</u>	<u>\$ 7,166</u>	<u>\$ 4,375</u>	<u>\$ 1,454</u>	<u>-\$ 1,582</u>

a/ All other variables as listed for the example situation.

Opportunity Cost of Capital

To determine the impact of the opportunity cost of capital in the desirability of leasing, the example situation was analyzed using a

6 percent after tax cost of capital (equivalent to approximately 8.5 percent before tax) and a 12 percent after tax cost of capital (equivalent to approximately 17 percent before tax). As indicated in Table 7, the magnitude of the opportunity cost of capital had little effect on the net advantage of the purchase option.

Table 7 Effect of Opportunity Cost of Capital^{a/}
on Net Advantage of Purchase

Situation	After Tax Opportunity Cost of Capital - Percent		
	6	9	12
	- - - - - present value of costs - - - - -		
Leasing	\$38,238	\$32,868	\$28,668
Purchase	<u>31,098</u>	<u>25,702</u>	<u>21,488</u>
Net Advantage of Purchase	\$ 7,130	\$ 7,166	\$ 7,180

^{a/} All other variables as listed for the example situation.

Depreciation Method

Interest payments and straight line depreciation provide a larger tax shield in the early years of the investment than do the lease payments (Tables 2 and 3). However, the amount of depreciation and thus tax shield in these early years can be significantly increased by use of faster depreciation methods. For example, use of special 20 percent first year depreciation and the double declining balance method will increase first year depreciation to \$13,334 from the \$2667 available with the straight line method. The effect of this depreciation method change over the life of the investment is to delay the payment of taxes and, thus, decrease the present value of costs with the purchase option by \$1896. Some farms will not have sufficient income to effectively use the larger amounts of depreciation during the first few years of the investment. For these farms the net advantage of leasing could not

be improved by change of depreciation method. For these farms with sufficiently high incomes to make effective use of the higher level of depreciation during the early years of investment life, the net advantage of purchase for each of the analyses discussed in preceding sections of this paper should be increased by \$1896.

Investment Tax Credit

Under the lease being evaluated in this paper, the leasing company, as owner of the equipment, takes the investment tax credit. The above analysis assumes that the farmer could effectively use the investment tax credit (ITC) if the equipment were purchased. If the farmer cannot make use of the ITC, the cost of purchase is raised by the value of the investment tax credit not utilized. A farmer may be unable to use the ITC because income is not high enough to require that amount of tax, or more frequently, because there is sufficient investment tax credit from other investments to offset all taxes otherwise due. Since the investment tax credit is received at tax time in the year following the investment the present value of the ITC is slightly less than the nominal tax credit (it is discounted one year).

In the preceding analysis conducted in this paper the only variables that significantly influenced the relative profitability of leasing versus purchase were interest rate and terminal value of the equipment and depreciation method. A farmer who is unable to take advantage of investment tax credit with an investment is also likely to be unable to make effective use of fast depreciation methods. Therefore, the effect of investment tax credit was evaluated for various interest rates and terminal values (Table 8). In general, leasing is more profitable for a farmer in the example situation who could not make effective use of

the additional investment tax credit in his business if the interest rate on borrowed funds is 12-13 percent or higher.

Table 8 Net Advantage of Purchase Option With No Investment Tax Credit for Various Interest Rates and Terminal Values^{a/}

Interest Rate (Percent)	Market Value at End of Period as % of Purchase Price	
	20	10
	----- Net Advantage of Purchase -----	
9	\$4680	\$3974
11	2029	1323
13	- 762	-1468
15	-3683	-4389
17	-6719	-7475

a/ All other variables as listed in the example situation.

Other Lease Terms

Lease terms other than those specified in the example situation are available. The leasing company also offers leases for 10 years at an 8.95 percent contract rate and for 8 years at a 7.95 percent contract rate. Since these terms exceed 7 years the investment tax credit and other tax implications of these leases are similar to those indicated in the example situation.

Tables 9 and 10 present the results of analyzing these lease terms using the same example situation and procedures as those used for the 12 year, 9.95 percent contract rate analyzed above. The loan used with the purchase alternative is set at the same number of years as the lease to which it is being compared. That is, an eight year lease is compared to an eight year loan.

Table 9 Net Advantage of Purchase Over 10 Year Lease
With an 8.95 Percent Contract Rate

Interest Rate on Loan (Percent)	Investment Tax Credit Usable by Farmer?			
	Yes		No	
	20% Terminal Value	10% Terminal Value	20% Terminal Value	10% Terminal Value
9	\$8564	\$7645	\$3427	\$2508
11	6276	5357	1139	220
13	3881	2962	-1256	-2175
15	1379	460	-3758	-4677
17	-1218	-2137	-6355	-7274

In general, if the farmer can make use of the investment tax credit available with purchase, the farmer is better off to buy the equipment and finance 100 percent of the purchase price unless the cost of borrowed funds exceeds approximately 16 percent. If the farmer is unable to make use of the investment tax credit, the lease is the preferable option whenever the cost of borrowed funds exceeds approximately 12 percent. With an eight year lease and a ten percent or lower terminal value of the equipment, the lease is preferred over a loan at 11 percent interest.

Table 10 Net Advantage of Purchase Over 8 Year Lease With
7.95 Percent Contract Rate

Interest Rate on Loan (Percent)	Investment Tax Credit Usable by Farmer?			
	Yes		No	
	20% Terminal Value	10% Terminal Value	20% Terminal Value	10% Terminal Value
9	\$7809	\$6631	\$2692	\$1514
11	5912	4734	775	- 403
13	3937	2759	-1200	-2378
15	1888	710	-3249	-4427
17	- 232	-1410	-5369	-6547

Summary and Conclusions

An economic analysis of the leasing program of one equipment supplier indicates that the tax rate and the opportunity cost of capital have little impact on the relative profitability of leasing versus a 100 percent financed purchase alternative. Rapid depreciation methods provide a greater tax shield in the early years of the investment life for the purchase option than occurs with the lease.

The variables most important in determining the relative profitability are (1) whether the farmer can make effective use of investment tax credit generated by the investment, (2) the interest rate on the loan if equipment is purchased and, (3) the market value of the equipment at the end of the lease period. In general, if the farmer can make effective use of the investment tax credit, the lease evaluated would be more profitable than purchase only if the interest rate were 16 percent or above. If the farmer cannot make effective use of the investment tax credit, the break even interest rate is approximately 12 percent. With a 10 percent (rather than 20%) ending market value (terminal value), the shorter term lease (8 years, instead of 10 or 12) was more profitable than purchase with an 11 percent interest rate when investment tax credit was not usable by the farmer.

This paper has not analyzed all the pros and cons of the specified leasing program nor for leasing in general. However, it does provide an economic basis for evaluating some of the characteristics of this lease program.