

LEASE VERSUS BUY DECISION FOR A DEPRECIABLE ASSET:
A LOTUS SPREADSHEET TEMPLATE

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As a manager, once you have decided to replace or acquire a depreciable asset, you are faced with a question of whether to lease or buy the asset. Analysis to answer this question is not simple because of the complex interplay between tax laws, financing alternatives available, your taxable income, and different timing of cash flows.

Historically, agribusiness people have acquired machinery and equipment through outright purchase or by obtaining a loan. In recent years, however, many agribusiness managers have begun to look for alternatives when considering the acquisition of machinery, equipment, or other depreciable assets. Many managers are faced with increased capital requirements for both machinery and agricultural operations, as well as decreased availability of traditional working capital, high rates of interest, and fears of machinery obsolescence. All of these factors have led managers on a search for financing alternatives and consequently an increasing use of leases as a way to acquire assets.

The enclosed diskette will help you, as a manager, make the decision between leasing and purchasing an asset. The spreadsheet program is designed to show you which option minimizes the after-tax cash outlay over the expected life of the equipment. While the model is designed to indicate the least cost option, there may be other considerations which are important in your decision.

SOME ADDITIONAL CONSIDERATIONS

Agribusiness Size

The size of your agribusiness may influence your decision to lease or buy an asset. For example, if you find that capital funding is not readily available for a large outlay, then leasing may be a more viable proposition. Further, leasing may give an agribusiness flexibility when considering expansion possibilities because leases can be arranged such that asset-fixity does not become a hindrance to the expansion plans of your firm.

Machinery Obsolescence

If you are concerned about possible asset obsolescence, leasing may be a better alternative to purchasing, as the risk of obsolescence lies with the lessor when the machine is returned at the end of the lease.

Cash Flows

Undertaking the acquisition of an asset will require the expenditure of cash resources from your firm. It is important to understand the cash requirements and the differences that may exist between leasing and purchasing. For example, if purchasing an asset requires a large down payment that your firm cannot afford, a lease, with smaller initial payments, may make the acquisition possible. Conversely it may turn out that the total cash outlay for the lease will be higher over the life of the asset.

In order to ascertain which option is the most desirable for you, it is necessary to list relevant cash inflows and outflows including their sizes and when they occur. Totalled monthly, annually, and over the life of the asset, it is possible to see if any barriers to entry exists.

If both leasing and purchasing are possible then it is important to have a method to compare the cash flows over the life of the asset. Discounting the expected cash flows back to their present value is the procedure used in such cases. This procedure is based upon the premise that a dollar received or paid in the future is not worth as much as the same dollar received or paid today. To have comparable values we discount future values into present day values by multiplying the future face value by a discount factor. A discount factor is based on current interest rates and reflects the rate of return that could be received through comparable investment alternatives. In general the discount rate should be at least as high as the interest rate paid to borrow money. The model you have purchased uses this methodology so that you can compare the total net present value of cash outflows from a lease option with those from a purchase option. Obviously, you want to choose the one with the least total discounted cash outlay.

THE MODEL

Input Requirements (Range A1...G24)

The model (LVB) runs with Lotus 1-2-3 or Symphony on all IBM PC and compatible computers. You should make a backup copy before you start using it. (Your Lotus manual tells you how to do this if you need help).

The model is fully automated, such that it provides the net present value of cash outflows for both leasing and purchasing an asset. To run the model you must supply facts about purchasing and leasing the asset as well as your taxable income and tax status. When you load the LVB file into your spreadsheet you will see the information in Figure 1 requested on the screen:

This template is to be used to evaluate the financial difference between leasing an asset or purchasing that same asset. The decision criterion is the NPV of cash out between lease and purchase.

	ASSET:COMBINE	DECISION:	1
		buy=1	
		lease=2	
PURCHASE FACTS		LEASE FACTS	
PURCHASE PRICE:	120000	LEASE YEARS:	5
DOWN PAYMENT:	36000	LEASE AMOUNT:	27143
LOAN AMOUNT:	84000	SALVAGE VALUE:	54000
INTEREST RATE (%):	13.9	LEASE BUY OUT:	12000
LOAN YEARS:	5		
PAYMENTS PER YEAR:	1		
A.C.R.S. (3,5):	5		
TAXABLE INCOME:	60000	FILING STATUS :	2
TAX NO INVESTMENT:	14564.1	SINGLE = 1	
B.T. INCOME CHANGE:	0	MARRIED = 2	
DISCOUNT FACTOR:	11.0	CORPORATE = 3	

Figure 1. Information Input

As an example, we have entered data regarding the acquisition of a combine. The purchase price is \$120,000 with a down payment of \$36,000. The program assumes that difference is the loan amount (\$84,000). We entered the interest rate (13.9), the loan years (5), payments per year (1), and selected an accelerated depreciations schedule (ACRS), in this case, five years (5).

For lease facts we entered the lease years (5), the lease amount per year (\$27,143), the salvage value (\$54,000), and the lease buy out amount (\$12,000).

The final information required is your beginning taxable income, the discount factor you wish to use and your tax status. In our example we have entered these respectively at: \$60,000, 11%, and "2" which correlates with a tax filing status of married filing jointly.

Once all the data is entered, or any data is changed, the calculations are initiated by pushing the calculation key. After the model has finished its calculations (which takes a few minutes) the decision to lease or purchase based on minimizing cash expenditures, can be determined. In this example the decision is to purchase as can be seen in the upper right-hand corner of Figure 1.

Detailed Financial Calculations

For each option, purchasing or leasing, the spreadsheet details all of the cash flows over the life of the asset. A printout using our example is presented in Figure 2.

The Purchase Option (Range A26...045)

The LVB model handles all of the appropriate entries for financing the combine, including principal and down payment, interest, depreciation, investment credit, and salvage income.¹ Given a starting income, the model makes appropriate tax deductions and calculates a new income for each consecutive year. As a default setting, the model assumes the same taxable income as was originally entered (\$60,000 in our example), however, before tax income changes are possible. For example, if the

(PURCHASE)

END OF YEAR	DOWN & PRINC.	INTEREST	DEP. (ACRS)	INV. CREDIT	TAX DED.	SALVAGE INCOME	INCOME INCREASE	NEW INCOME	NEW TAXABLE INCOME	TAX ACCOUNT (TABLE)	TAX PAYMENT	TAX SAVINGS	CASH OUT AFTER TAX
0	36000												36000
1	12733	11676	17100	12000	28776	0	0	31224	31224	4908	0	14564	9845
2	14503	9906	25080	7092	34986	0	0	25014	25014	3402	0	14564	9845
3	16519	7890	23940	3690	31830	0	0	28170	28170	4145	455	14109	10300
4	18815	5594	23940	0	29534	0	0	30466	30466	4719	4719	9845	14564
5	21430	2979	23940	0	26919	54000	0	87081	87081	25748	25748	-11184	-18407
6	0	0		0	0	0	0	0	0	0	0	0	0
7	0	0		0	0	0	0	0	0	0	0	0	0
8	0	0		0	0	0	0	0	0	0	0	0	0
9	0	0		0	0	0	0	0	0	0	0	0	0
10	0	0		0	0	0	0	0	0	0	0	0	0
TOTALS	120000	38045	114000		152045	54000			201955	42921		41899	62146

(LEASE)	LEASE PAYMENT	SALVAGE INCOME	INCOME INCREASE	NEW TAXABLE INCOME	NEW TAX PAYMENT	TAX SAVINGS	CASH OUT AFTER TAX	PURCHASE N.P.V. CASH OUT:
0	27143						27143	59061
1	27143	0	0	32857	5361	9203	17940	
2	27143	0	0	32857	5361	9203	17940	
3	27143	0	0	32857	5361	9203	17940	
4	27143	0	0	32857	5361	9203	17940	
5	0	42000	0	74857	20614	-6050	-35950	
6	0	0	0	0	0	0	0	
7	0	0	0	0	0	0	0	
8	0	0	0	0	0	0	0	
9	0	0	0	0	0	0	0	
10	0	0	0	0	0	0	0	
TOTALS	135715	42000	0	206285	42058	30762	62953	

0.11 LEASE N.P.V. CASH OUT: 61466

Figure 2. Financial Details

purchase of the combine was also going to increase your taxable income through better efficiency, this amount could be entered in the model as well. Note that we have left the "B.T. income change" as zero in Figure 1.

Given a taxable income and a tax status, the model looks up 1986 tax tables and uses them to calculate tax payments for each year. Any investment credit not usable in the initial year is carried forward to the next year or years. (The model does not allow for carry backs.)

The tax advantages (or disadvantages) of your decision are detailed under the heading of Tax Savings. Tax savings is the difference between the tax payment made in any year and the tax that would have been paid with the beginning taxable income.

The final column in the detailed analysis indicates the cash out after taxes. This is the sum of principal and interest payments less any tax savings or salvage income. The after tax cash outlays are discounted to net present value and summed, resulting in a total of \$59,061 in our example. This is indicated as the "N.P.V. cash out" in Figure 2.

Lease Options Details (Range A46...I63)

The financial details for the lease are also indicated in Figure 2. Since the lease payments are deductible, the original taxable income is decreased by the amount of the lease payment to give the new taxable income each year. Given the new taxable income and the tax filings status, a tax payment is calculated which, when deducted from the

original tax obligation without the investment, yields the tax savings. In this example the tax savings is \$9,203 in each of the first four years.

The after tax cash outlay for leasing consists of the lease payment less the tax savings and any salvage income in a year. The after tax cash outlays are discounted to net present value and summed in the final calculation. In our example this is \$61,466.²

The Final Decision

In our example the net present value of cash out is greater for leasing the combine (\$61,466) than for purchasing it (\$59,061), therefore, the model would indicate that purchasing is the desirable decision. But we noted earlier there may be other considerations like agribusiness size, machinery obsolescence, and cash flows which influence your final decision.

The ranges of the spreadsheet data for input, purchase and lease options are indicated next to each heading to facilitate printing out various parts of the model. (Follow the printing instructions in the Lotus manual to accommodate this.)

Modifying the Model

LVB is designed to calculate principal, interest, accelerated depreciation (ACRS), and investment tax credit (ITC) automatically, however, tax laws may change or there may be cases in which you wish to use a different approach. Those might include using straight line depreciation instead of ACRS, the elimination from the tax code of ITC,

or using constant principal payments. You can modify the model by unprotecting cells and inputting your own data. For example, unprotecting (F33...F42) and inserting zeros would eliminate the ITC calculation and the model would function accordingly. However, because you are overwriting the original formulas, remember to save the altered file under a new name or you will permanently change the original LVB program.

The model is based upon 1986 tax tables and calculates income taxes accordingly. While the model is accurate to the best of our knowledge we make no implicit guarantee and take no responsibility for its use.

What If Analysis

One of the advantages of using a model like this is its ability to give you "what if" situations. In other words, you can change any one or more of the original pieces of information in the model, recalculate the model and see how it impacts the final decision. As an example, if all of the assumptions were held constant in our combine example except taxable income (TI), and we varied TI from 0 to \$240,000, we could choose the best lease or purchase option by comparing their NPV's. We have graphed this example in Figure 3.³

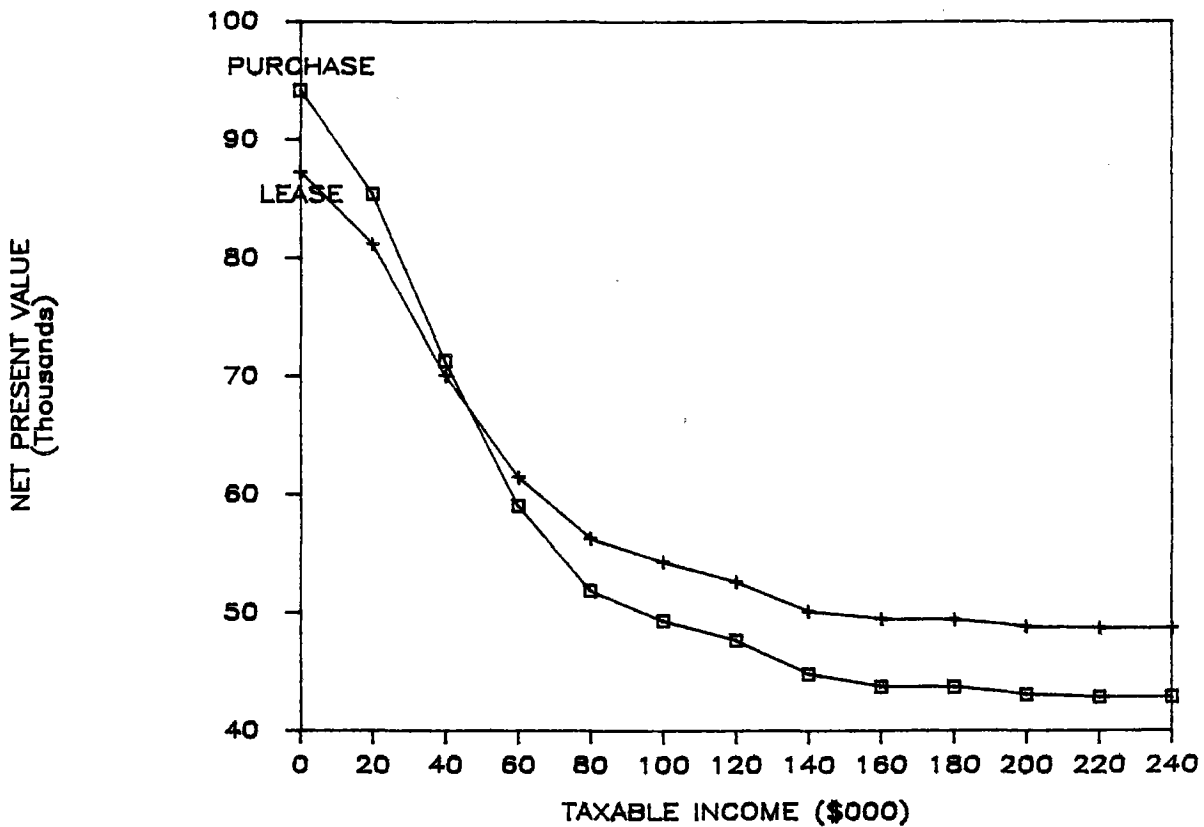


Figure 3. Example of various income assumptions and their impact on the decision.

This "what if" analysis indicates that we might be fairly indifferent between leasing or purchasing the combine if our taxable income were approximately \$45,000. However, at taxable incomes below this indifference point we would be better off to lease the combine and conversely at taxable incomes above \$45,000 we are better off to purchase the combine.

Using a "what if" approach allows you to compare many lease and purchase options.

REFERENCES

- Internal Revenue Service, Farmers Tax Guide, Washington, D.C., U.S. Government Printing Office, Publication 225, 1984.
- Lins, D.A. Lease Versus Purchase of Depreciable Farm Assets, Cooperative Extension Service, University of Illinois-Urbana Farm Economics Facts and Opinions 84-11, September 1984.

ENDNOTES

1. LVB is set up to use the full investment credit and adjusts the basis for depreciation accordingly. The alternative calculation of reduced credit with no basis adjustment is not possible in this model. The model uses either three or five year ACRS depreciation and must be altered to use straight line depreciation which is discussed later in this paper.
2. In this example the salvage value (market value) is higher than the specified lease buy out price. This is allowable with "limited use" property, however, as a general rule the salvage value and lease buy out price should be the same. Check with your accountant if you are unsure how to classify your lease property.
3. Consult your users manual regarding the construction of "what if" data tables and graph construction.

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