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LEAP
Lease Analysis Program
A Computer Program For Economic Analysis of Capital Leases

by
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LEAP
Lease Analysis Program

A Computer Program For Economic Analysis of Capital Leases

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Eddy L. LaDue[1]

Financial leases are becoming increasingly important as a method for farmers to obtain control of farm business assets. A variety of leasing alternatives are being offered for an array of buildings, machinery and livestock. Thus, many farmers and farm advisors are faced with the need to compare leasing to purchase with borrowed funds. Because many of the basic characteristics of leasing are different from loans, this analysis is usually more complex than a comparison of alternate loan proposals. This publication is a users manual for the LEAP computer program, designed to be used in assessing leasing alternatives.

The LEAP computer program is a LOTUS 1-2-3 spreadsheet designed to conduct an after-tax, economic analysis of capital leases using the procedures outlined in LaDue, E. L., "Analyzing Capital Leases".[2] Those procedures provide an appropriate present value analysis of the economic advantage or disadvantage of a capital lease compared to a purchase with financing alternative.

A basic assumption of this analysis is that the lease is compared to purchase of the asset with borrowed funds. Thus, it calculates the present value of costs for the lease option and for the purchase with financing option to determine which alternative is less costly. Any analysis has two parts: (1) the present value of costs with leasing and (2) the present value of costs with purchase of the asset with borrowed funds. The difference between these two parts is the net loss or advantage with leasing.

Appropriate analysis requires that the two parts of the analysis use the same period of analysis. Two methods can be used to make the analysis periods identical. The program allows the user to select which method is used. With the first method, the asset is purchased at the end of the lease period and held long enough that the total lease period plus the residual purchase period is the same as the period that the asset would be owned if it were purchased. This method is referred to as "Buy". The second method involves selling the asset that is purchased under the purchase-with-financing alternative at the end of the lease period. Thus, the period of ownership is the same with the purchase with financing alternative as the term of the lease. This method is referred to as "Sell".

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[1] Professor of Agricultural Finance, Department of Agricultural Resource and Managerial Economics, Cornell University. Thanks go to Wayne Knoblauch for his review of an earlier draft.

[2] Cornell University, Department of Agricultural, Resource and Managerial Economics, Extension Bulletin 97-16, September 1997.

THE COMPUTER PROGRAM

The program is a LOTUS 1-2-3 Release 4 for Windows spreadsheet. It is menu driven and required data for analysis are input through an input form (screen), so that knowledge of LOTUS is not required to operate the program. A series of print options are available for printing out analysis results.

Menus

Movement around the program and use of the various macros are facilitated by the use of menus. The main LEAP menu can be obtained by pressing control/M (holding down control and pressing M). That menu has the following entries:

Input — Selection of **Input** moves you to the input form (screen) for entry of the data needed for the analysis. The program automatically places the input data in the analysis screens, so that once the input form is completed, the analysis is finished.

Analysis — Selection of **Analysis** moves you to the analysis tables, where the calculations to assess the lease and purchase options are accomplished. There are two sets of two analysis tables:

The **Buy** analysis tables evaluate the situation where the asset is purchased at the end of the lease period.

The **Sell** analysis tables evaluate the situation where the purchase option being compared to the lease assumes that the asset would be sold at the end of the period of the lease.

Results — Selecting **Results** takes you to a summarized statement of the results of the analysis that has been conducted.

Buy indicates the results for the Buy analysis.

Sell indicates the results for the Sell analysis.

Print — Selecting **Print** gives you options to print that part of the data for which you want a hard copy. The print options are:

Data prints out a copy of the input data used in the analysis.

Analysis prints out the analysis table for the analysis. You must indicate whether you are doing a buy or sell analysis.

Results prints out the summarized results of the analysis. You must indicate whether you are doing a buy or sell analysis.

Buy prints out the results, input form and analysis tables for a buy analysis.

Sell prints out the results, input form and analysis tables for a sell analysis.

Clear — Selecting **Clear** erases all of the data on the input form. Since accidentally erasing data could cause consternation, you must confirm that the data are to be erased. It is suggested that **Clear** be used whenever a new analysis is being conducted, so that existing data do not contaminate the new analysis.

THE EXAMPLE

To illustrate use of the LEAP program a Farmer Brown example is used. Farmer Brown is considering leasing a tractor that he could purchase for $100,000. The lease calls for monthly payments of $1,800 for three years with the first payment due upon delivery of the tractor. The tractor is expected to have a market value of $65,000 at the end of the three year period (residual value). Based on recent taxable income levels, Farmer Brown's marginal tax rates are 6.85 percent on state taxes, 28 percent on federal taxes and 2.9 percent on self-employment taxes (Medicare only). Brown's current borrowing rate is 10 percent, so his opportunity cost of capital is 10 percent.

If he buys the tractor instead of leasing it, he would finance the purchase over three years at 10 percent interest with monthly payments. If the tractor were purchased, he expects he would keep it seven years and it would have a terminal value at the end of the seven years of $15,000. The tractor would qualify for four percent state investment credit, if it is purchased.

THE INPUT FORM

The analysis is conducted by completing the input form. The data are automatically entered on the analysis tables from the input form. The example input form on page 5 is completed for Farmer Brown. To illustrate use of the input form, data are entered for both the buy and sell options. Most lease analyses would require completion of only the buy or sell sections at the bottom of the form.

Yearly values are used even when monthly payments are made to make the analysis easier to follow and conduct. This simplification is unlikely to alter the relative results. Years are defined as 12 month intervals following the initial date of the lease. If the lease were initiated on May 1, each year runs from May 1 through April 30 of the following calendar year. Another way to think about this is to assume that the item would

be leased or purchased on January 1. In most cases, the exact date of lease or purchase is unknown at the time of the analysis. The results will be basically the same regardless of the exact date of lease or purchase. The advance column refers to values paid at the time the lease is initiated or the asset is delivered.

Input entries are described below. The first set of entries are required of all leases.

Lease analyzed. Enter the type of lease being considered. If more than one alternative is being considered, use this space to label each analysis differently. For example, analysis of three different sources of leases for a tractor might be labeled: (1) tractor - John Deere, (2) tractor - Telmark and (3) tractor - Farm Credit. Or, alternate sources of loan financing might be labeled: (1) tractor - Castile Bank or (2) tractor - Key Bank.

Analysis conducted for: Enter the name of the person or firm for whom the analysis is being conducted.

Lease payment. Enter the total lease payments for each year. The advance lease payment is the amount required at the time the lease is initiated or delivered. Farmer Brown's initial payment is $1,800. Since the first payment is made in advance, only 11 payments will be made in year 3 (11 x $1,800 + 19,800).

Costs saved (-), added (+) due to the lease. Enter any operating costs that would be saved with the lease that would be paid if the asset were purchased. Or, enter additional costs incurred because of the lease. Cost savings would include such things as insurance and repair costs that the lessor is paying so it results in reduced costs to the farmer. Added costs would include costs that the lessor required the farmer to pay, such as added insurance or preventive maintenance. Farmer Brown's operating costs will not be changed by leasing.

Other ownership costs due to purchase. Enter any other operating or capital costs that are connected with ownership of the asset that are expected to be different for owning compared to leasing the asset. For example, with a cattle lease where replacements are provided by the lessor, purchased or raised replacements would be an added cost of ownership. Farmer Brown had no other costs.

Marginal state tax rate. Enter the rate of state taxation that would be paid on one dollar more or less of income.

Marginal federal tax rate. Enter the rate of federal taxation that would be paid on one dollar more or less of income.

Input Data for Lease Analysis

Lease Analyzed - - - - Tractor
Analysis conducted for: Farmer Brown

Year	Lease Payment	Costs saved or added due to the lease	Other Ownership costs due to purchase
advance	1800		
1	21600		
2	21600		
3	19800		
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Marginal state tax rate - - - - - - - - - 6.85
Marginal federal tax rate - - - - - - - 28
Marginal self employment tax rate - 2.9

Marginal tax (%) rate is 36

Before tax discount rate or
opportunity cost of capital - - - 10

After tax discount rate is 6

Depreciation period (years) - - - - - - - - - - - - - - 7

Section 179 expense deduction
taken on purchase 0

Down payment on loan for purchase option - - - -
Purchase cost of asset (including down payment 100000

Refundable deposit required with lease - - - - - -

Investment tax credit with purchase - - - - - - - - - 4000

If the analysis is to assume purchase of leased asset at the end of the lease period **(BUY)**

Term of the lease (years) - 3
Number of years to be analyzed - - - - - - - - - - - - - - - - - - - 7
Residual value of the asset at the end of the lease period - - - 65000
Terminal value of the asset at the end of analysis period - - - 15000

Credit terms for:	Purchase at end of lease	Purchase analysis
Term (years)	3	3
Interest rate (percent)	10	10
Payment per year	12	12

Purchase at end of lease period: Investment tax credit 2600
Section 179 expense deduction (depr.) 0

If the analysis is to assume sale of the purchased asset at the end of the lease period**(SELL)**

Term of the lease (number of years) - - - - - - - - - - - - - - - - 3
Residual value of the asset at the end of the lease period - - - 65000

Credit terms for purchase of asset
Term (years) - 3
Interest rate (percent) - - - - - - - - - - - - - - - - - - - 10
Payments per year - 12

Marginal self employment tax rate. Enter the level of self employment tax that would be paid on one dollar more or less of income. This would be either the total self employment tax rate or the Medicare rate depending on the level of earned income.

Depreciation period. Enter the number of years over which the asset would be depreciated, if it were purchased. This would normally be the MACRS life for most assets. For example, three years for hogs; five years for breeding livestock, computers, light trucks and automobiles; seven years for machinery, storage bins and silos, 10 years for dairy and hog barns and 20 years for general purpose barns.

Section 179 expense deduction taken on purchase. Enter the amount of Section 179 expense deduction (depreciation) that will be available if this asset is purchased instead of leased. Include only the amount available for use with this asset.

Down Payment on loan for purchase option. Enter any down payment required for the loan under the purchase with financing alternative.

Purchase cost of the asset (including down payment). Enter the total cost of the asset. The amount of the down payment will be subtracted from this number to obtain the amount of the loan under the purchase with loan alternative.

Refundable deposit required with lease. Enter any deposit required at the initiation of the lease that will be returned at the end of the lease period. Do not include any deposit that will be applied toward payments.

Investment tax credit with purchase. Enter the state investment tax credit earned by the investment, if it is purchased rather than leased. The program will automatically calculate recapture if the asset is sold before full investment tax credit is earned.

The following items should be entered if the analysis is to assume purchase of the leased asset at the end of the lease period. This is what has been called the "Buy" option.

Term of the lease in years. Enter the number of years in which lease payments will be made, not counting the advance period as a year. Maximum number of years is 15.

Number of years to be analyzed. Enter the total number of years the asset will be held. This is usually set at the period of time the asset is expected to be kept if it is purchased. This could be set at the maximum of the lease period or the loan period, but a more accurate analysis is often obtained if it is set at the life of the asset on this farm. The maximum analysis period with the LEAP program is 15 years.

Residual value of the asset at the end of the lease period. Enter the residual value of the asset. This may be specified by the lease or it may be estimated. In some cases, this number can be very important in assessing a lease. If the number is estimated, be sure the number is approximately correct, or do some sensitivity analysis using alternate values.

Terminal value of the asset at the end of the analysis period. Enter the estimated value of the asset at the end of the number of years to be analyzed. This is often referred to as the salvage value of the asset at the end of its useful life on the farm when the number of years to be analyzed is equal to the useful life of the asset.

Credit terms for purchase at end of lease. Enter the loan terms that would be expected for financing the residual value when the asset is purchased at the end of the lease period. Enter the period of the loan in years. The loan period can extend beyond the number of years to be analyzed. Enter the interest rate as a percent, i.e. enter 8.5, not .085. Enter the number of payments per year.

Credit terms for purchase analysis. Enter the loan terms that would be expected for financing the purchase of the asset, rather than leasing it at the outset. These credit terms will often differ from those described above for purchase of the residual value, because a (usually) new asset is being purchased, rather than a used asset. Enter the period of the loan in years. The loan period can extend beyond the number of years to be analyzed. Enter the interest rate as a percent, i.e. enter 8.5, not .085. Enter the number of payments per year.

Investment tax credit on purchase at the end of the lease period. Enter the investment tax credit that would be earned if the asset were purchased at the residual value listed above. The program will automatically calculate recapture if the asset is sold before full investment tax credit is earned.

Section 179 expense deduction with purchase at end of lease period. Enter the amount of Section 179 expense deduction (depreciation) that will be available for use on this asset in the year that the leased item would be purchased (after the lease period ends). Include only the amount available for use with this asset.

The following items should be entered if the analysis is to assume sale of the purchased asset at the end of the lease period. This is what has been called the "Sell" option.

Term of the lease in years. Enter the number of years in which lease payments will be made, not counting the advance period as a year. Maximum number of years is 15.

Residual value of the asset at the end of the lease period. Enter the residual value of the asset. This may be specified by the lease or it may be estimated. In some cases, this number can be very important in assessing a lease. If the number is estimated, be sure the number is approximately correct, or do some sensitivity analysis using alternate values .

Credit terms for purchase of the asset. Enter the loan terms that would be expected for financing the purchase of the asset, rather than leasing it at the outset. Enter the period of the loan in years. The loan period can extend beyond the period of the lease. Enter the interest rate as a percent, i.e. enter 8.5, not .085. Enter the number of payments per year.

DESCRIPTION OF ANALYSIS

The two types of analysis that can be conducted are labeled "buy" and "sell". The major difference between these is that the "sell" analysis assumes sale of the asset at the end of the lease period as a part of the financing analysis. Thus, the period of analysis is the lease term. For the "buy" analysis, it is assumed that the leased item is purchased at the end of the lease period and the period of analysis is the life of asset on the farm or the term of the loan on the purchase. For each analysis there are two tables. One table calculates the present value of costs connected with the lease. The other calculates the present value of costs with purchase of the asset with loan financing.

"Buy" analysis
(purchase of asset at end of lease period)

The "buy" analysis assumes that the asset is purchased at the end of the lease period and held to the end of the analysis period. The analysis is in two parts, each involving a table of calculations.

Lease cost analysis (table A)

a. Lease payment. Lease payments are entered directly from the input form.

b. Costs saved (-), added (+). These costs are taken directly from the input form.

c. Net costs. This is the net before tax cost of leasing the asset.

d. Loan payment on residual. Loan payments are calculated based on the credit terms for purchase at the end of the lease using the residual value of the asset at the end of the lease as the principal. Payments are calculated based on the number of payments per year and then aggregated for each year.

Lease cost analysis with purchase of the leased asset at the end of the lease

(Purchase of the asset at the end of the lease period is part of lease analysis)

LEASE COST ANALYSIS (TABLE A)

Item	Advance	Year 1	2	3	4	5	6	7
a. Lease payment	1800	21600	21600	19800	0	0	0	0
b. Costs saved (-), added (+)	0	0	0	0	0	0	0	0
c. Net lease costs	1800	21600	21600	19800	0	0	0	0
d. Loan payment on residual		0	0	0	25168	25168	25168	0
e. Interest proportion (Table 1)		0	0	0	0.22	0.14	0.05	0
f. Interest (d x e)		0	0	0	5537	3524	1258	0
g. Depreciation (Table 2 x cost)		0	0	0	6962	12435	9770	7963
h. Other Ownership costs	0	0	0	0	0	0	0	0
i. Deductible ownership cost (f + g + h)	0	0	0	0	12499	15959	11028	7963
Terminal value (end of purchase life)								
j. Total		0	0	0	0	0	0	15000
k. Undepreciated balance		0	0	0	0	0	0	27870
l. Taxable income	0	0	0	0	0	0	0	-12870
m. Unpaid loan principal		0	0	0	0	0	0	0
n. Net tax deductible costs (c + i - l)	1800	21600	21600	19800	12499	15959	11028	20833
o. Tax rate (decimal form)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
p. Tax benefit (n x o)	648	7776	7776	7128	4500	5745	3970	7500
q. Before tax costs (c + d + h - j + m)	1800	21600	21600	19800	25168	25168	25168	-15000
r. Net after tax cost (q - p)	1152	13824	13824	12672	20668	19423	21198	-22500
s. Refundable deposit	0	0	0	0	0	0	0	0
t. Investment tax credit		0	0	0	2600	0	0	0
u. Investment tax credit recapture		0	0	0	0	0	0	520
v. Total costs (r + s - t + u)	1152	13824	13824	12672	18068	19423	21198	-21980
w. P.V. factor (after tax - Table 3)	1	0.94	0.89	0.84	0.79	0.75	0.7	0.67
x. Net present value	1152	12995	12303	10644	14274	14567	14839	-14727
y. Total net present value of costs			66047					

PURCHASE WITH FINANCING ANALYSIS (TABLE B)

Item	Down pmt.	Year 1	2	3	4	5	6	7
a. Loan payment	0	38721	38721	38721	0	0	0	0
b. Interest proportion (Table 1)		0.22	0.14	0.05	0	0	0	0
c. Interest		8519	5421	1936	0	0	0	0
d. Depreciation (Table 2 x cost)		10710	19130	15030	12250	12250	12250	12250
e. Other Ownership costs	0	0	0	0	0	0	0	0
f. Deductible ownership cost (c + d + e)	0	19229	24551	16966	12250	12250	12250	12250
g. Terminal value								
Total		0	0	0	0	0	0	15000
h. Undepreciated balance		0	0	0	0	0	0	6130
i. Taxable income		0	0	0	0	0	0	8870
j. Unpaid loan principal		0	0	0	0	0	0	0
k. Net tax deductible costs (f - i)	0	19229	24551	16966	12250	12250	12250	3380
l. Tax rate (decimal form)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
m. Tax benefit (k x l)	0	6922	8838	6108	4410	4410	4410	1217
n. Net after tax cost (a + e - g + j - m)	0	31799	29883	32613	-4410	-4410	-4410	-16217
o. Investment tax credit		4000						
p. Investment credit recapture		0	0	0	0	0		
q. Total cost (n - o + p)	0	27799	29883	32613	-4410	-4410	-4410	-16217
r. P.V. factor (after tax - Table 3)	1	0.94	0.89	0.84	0.79	0.75	0.7	0.67
s. Net present value (q x r)	0	26131	26596	27395	-3484	-3308	-3087	-10865
t. Total net present value of costs			59378					

e. Interest portion. The proportion of payments that are interest are taken from table 1 using the interest rate on the loan.

f. Interest. Interest is the estimated amount of the payments that is interest, and, thus, tax deductible. It is calculated as line d times line e.

g. Depreciation. Depreciation is taken from table 2 based on the depreciation period, the residual value entered in the input and the amount of Section 179 expense deduction to be used with purchase at the end of the lease period. Table 2 assumes 150% declining balance depreciation. Although there are slower depreciation methods, most people who might find leasing more profitable will be using the fastest depreciation method available, which for farmers is 150% declining balance. Since the leased asset is not depreciated by the farmer lessee, depreciation will be zero for years when the asset is leased. If Section 179 expense deduction is available, it is counted as depreciation in the year purchase takes place and the portion of the purchase price that is not expensed is depreciated over the depreciation period.

h. Other Ownership costs. These are taken directly from the input form.

i. Deductible ownership costs. This represents the total tax deductible costs connected with leasing and owning the asset.

j. Total terminal value (end of period). The terminal value is taken from the input and placed in the last year of the analysis.

k. Undepreciated balance. Undepreciated balance is the amount paid for the asset (residual value) minus the depreciation taken prior to sale (as indicated in line g).

l. Taxable income. This indicates the taxable income generated by sale of the asset at the end of the period. If the value is negative, it represents costs that can be deducted for tax purposes.

m. Unpaid loan principal. This is the outstanding principal on the loan obtained to purchase the asset at the end of the lease period. It is calculated as (1) the amount borrowed to buy the asset minus (2) the total payments made on the loan (line d) minus the amount of those payments that were interest (line f).

n. Net tax deductible costs. This is the total costs that can be deducted as expenses for tax purposes.

o. Tax rate (decimal form). This is the marginal tax rate as calculated from the tax data entered on the input form, and presented on the input form.

p. Tax benefit. This represents the taxes that would not have to be paid as a result of leasing and then owning the asset.

q. Before tax costs. This is the total before tax costs of leasing and then owning the asset for the analysis period.

r. Net after tax costs. This is the after tax cost of leasing and then owning the asset exclusive of any required deposit or investment tax credit.

s. Refundable deposit. The amount of the deposit from the input form is entered as a positive number in the advance column. The same value is entered as a negative number in the year that the lease ends.

t. Investment tax credit. The investment tax credit on the residual taken from the input form is entered in the year the asset is purchased (at the beginning of the year following the end of the lease).

u. Investment tax credit recapture. If the analysis period ends before the full investment tax credit is earned, recapture is calculated. If the asset is depreciated over three years and the asset is sold in the year following purchase, one third of the credit will be recaptured. If the asset is depreciated over more than three years, recapture will be three fifths, two fifths and one fifth, if sold in the second, third and fourth year after purchase, respectively.

v. Total costs. This represents the total after tax costs.

w. PV factor. Present value factors are taken from table 3 using the after tax discount rate, as calculated on the input form, as the interest rate.

x. Net present values. This is the present value of the costs for each year.

y. Total net present value of all costs. This indicates the present value of the net costs of leasing and then owning the asset over the analysis period. It is calculated as the sum of entries on line x.

Purchase with financing analysis (Table B)

The purchase with financing analysis entries are defined identically to those described above for the lease analysis except that (1) the amount financed is the purchase cost minus the down payment, (2) the credit terms are those for the purchase analysis, (3) the investment tax credit is the amount on the whole purchase cost of the asset, and (4) the Section 179 expense deduction occurs in the year the purchase takes place.

The lowest cost alternative is the one with the lowest total present value of costs. The difference between these two numbers is the advantage of the preferred alternative in terms of today's dollars.

"Sell" analysis
(Sale of purchased asset at end of the lease period)

This analysis makes the periods of analysis for the lease and the purchase with financing alternatives equal by assuming sale of the asset at the end of the lease period as part of the purchase with financing analysis.

Lease cost analysis (Table C)

The entries in the lease cost analysis table are defined identically to those with the same name in the lease cost analysis as described above for the "buy" option (table A). The major difference is that the leased item is not purchased at the end of the lease period and the period of analysis is the lease term.

Lease cost analysis - sale of the purchased asset at the end of the lease period
(Sale of the asset at the end of the lease period is part of the purchase with financing analysis)

LEASE COST ANALYSIS (TABLE C)

Item	Advance	1	2	3
a. Lease payment	1800	21600	21600	19800
b. Costs save (-), added (+)	0	0	0	0
c. Net lease costs	1800	21600	21600	19800
d. Tax rate (decimal form)	0.36	0.36	0.36	0.36
e. Tax benefit (c x d)	648	7776	7776	7128
f. Net after tax cost (c - e)	1152	13824	13824	12672
g. Refundable deposit	0	0	0	0
h. Total costs (f + g)	1152	13824	13824	12672
i. P.V. factor (after tax - Table 3)	1	0.94	0.89	0.84
j. Net present value	1152	12995	12303	10644
k. Total net present value of all costs			37094	

PURCHASE WITH FINANCING ANALYSIS (TABLE D)

Item	Down pmt.	1	2	3
a. Loan payment (Table 4 x cost)	0	38721	38721	38721
b. Interest proportion (Table 1)		0.22	0.14	0.05
c. Interest (a x b)		8519	5421	1936
d. Depreciation (Table 2 x cost)		10710	19130	15030
e. Other Ownership costs	0	0	0	0
f. Deductible ownership cost (c+d+e)	0	19229	24551	16966
g. Residual value				
Total		0	0	65000
h. Undepreciated balance		0	0	55130
i. Taxable income		0	0	9870
j. Unpaid loan principal		0	0	0
k. Net tax deductible costs (f - i)	0	19229	24551	7096
l. Tax rate (decimal form)	0.36	0.36	0.36	0.36
m. Tax benefit (k x l)	0	6922	8838	2555
n. Net after tax cost (a+e+g+j+m)	0	31799	29883	-28834
o. Investment tax credit		400		
p. Investment credit recapture		0	0	1600
q. Total cost (n-o+p)	0	27799	29883	-27234
r. P.V. Factor (after tax - Table 3)	1	0.94	0.89	0.84
s. Net present value (q x r)	0	26131	26596	-22877
t. Total net present value of costs			29850	

Purchase with financing analysis (Table D)

The entries in the purchase with financing analysis table are defined identically to those with the same name in the lease cost analysis as described above for the "buy" option (table A) except that (1) the loan payments refer to purchase of the asset at the purchase cost with the credit terms for purchase of the asset at the beginning of the analysis period, (2) depreciation is based on the purchase cost of the asset and any Section 179 deduction occurring in the year of purchase (3) the asset is assumed to be sold at the end of the analysis period at the residual value, and (4) investment tax credit is based on the purchase cost of the asset.

RESULTS SUMMARIES

Brief summaries of the results are available for each analysis. These summaries provide some of the input data to identify the analysis that was conducted and a summary of the results. The bottom line of the summary indicates which alternative is least costly.

Results Summary (Buy)

Lease analyzed is a Tractor
Analysis conducted for Farmer Brown

This analysis compared leasing the asset for a period of 3 years, followed by purchase of the asset for a residual value of 65,000 dollars financed over 3 years, with an interest at 10 percent.

The results are:	Present value of cost with purchase	$59,378
	Present value of net costs of leasing	$66,047
	Savings (or loss) with leasing	($6,669)

Purchase with financing is less costly than the lease.

Results Summary (Sell)

Lease analyzed is a Tractor
Analysis conducted for Farmer Brown

This analysis compared leasing the asset for a period of 3 years, to purchase the asset for 100,000 dollars, financed over a total of 3 years, with interest at 10 percent, and sale of the asset at the end of a 3 year period for a residual value of $65,000 dollars.

The results are:	Present value of cost with purchase	$29,850
	Present value of net costs of leasing	$37,094
	Savings (or loss) with leasing	($7,244)

Purchase with financing is less costly than the lease.

PROGRAM AVAILABILITY

The LEAP program and users manual are available for a cost of $50 from:

Eddy L. LaDue
Department of Agricultural, Resource, and Managerial Economics
357 Warren Hall
Cornell University
Ithaca, NY 14853

No guarantees, warrantees, or service are provided. However, if errors are detected or there are bonafide lease situations which the program will not correctly analyze, the author would appreciate being informed.

A BUILDING EXAMPLE

The following pages present the results, input and analysis for an assessment of the lease of a building that is being considered by Farmer Black.

Input Data for Lease Analysis

Lease Analyzed - - - - Building
Analysis conducted for: Farmer Black

Year	Lease Payment	Costs saved or added due to the lease	Other Ownership costs due to purchase
advance	3700		
1	44400	-1000	
2	44400	-950	
3	44400	-900	
4	44400	-850	
5	40700	-800	
6		-750	
7		-700	
8		-650	
9		-600	
10		-550	
11		-500	
12		-400	
13		-300	
14		-200	
15		-100	

Marginal state tax rate - - - - - - - - - 6.85
Marginal federal tax rate - - - - - - - 15
Marginal self employment tax rate - 15.3

Marginal tax (%) rate is 35

Before tax discount rate or
opportunity cost of capital - - - 9

After tax discount rate is 5

Depreciation period (years) - - - - - - - - - - - - - - 20

Section 179 expense deduction taken on purchase

Down payment on loan for purchase option - - - - 10000
Purchase cost of asset (including down payment 200000

Refundable deposit required with lease - - - - - -

Investment tax credit with purchase - - - - - - - - - 8000

If the analysis is to assume purchase of leased asset at the end of the lease period **(BUY)**

Term of the lease (years) - 5
Number of years to be analyzed - - - - - - - - - - - - - - - - - - - 15
Residual value of the asset at the end of the lease period - - - 30000
Terminal value of the asset at the end of analysis period - - - 5000

Credit terms for:	Purchase at end of lease	Purchase analysis
Term (years)	5	7
Interest rate (percent)	9	9
Payment per year	12	12

Investment tax credit on purchase at end of lease period
Section 179 expense deduction with purchase at end of lease period

If the analysis is to assume sale of the purchased asset at the end of the lease period**(SELL)**

Term of the lease (number of years) - - - - - - - - - - - - - - - - -
Residual value of the asset at the end of the lease period - - -

Credit terms for purchase of asset
Term (years) -
Interest rate (percent) -
Payments per year -

Results Summary (Buy)

Lease analyzed is a Building
Analysis conducted for Farmer Black

This analysis compared leasing the asset for a period of 5 years, followed by purchase of the asset for a residual value of 30,000 dollars financed over 5 years, with an interest at 9 percent.

To purchase of the asset for 200,000 dollars, financed over a total of 7 years, with interest at 9 percent. The total analysis period was 15 years.

The results are:	Present value of cost with purchase	$137,161
	Present value of net costs of leasing	$136,880
	Savings (or loss) with leasing	$281

The lease is less costly than purchase with financing.

Lease cost analysis with purchase of the leased asset at the end of the lease
(Purchase of the asset at the end of the lease period is part of the lease analysis)

LEASE COST ANALYSIS (Table A)

Item	Advance	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
a. Lease payment	3700	44400	44400	44400	44400	40700	0	0	0	0	0	0	0	0	0	0
b. Costs saved (-), added (+)	0	-1000	-950	-900	-850	-800	-750	-700	-650	-600	-550	-500	-400	-300	-200	-100
c. Net lease costs	3700	43400	43450	43500	43550	39900	-750	-700	-650	-600	-550	-500	-400	-300	-200	-100
d. Loan payment on residual		0	0	0	0	0	7473	7473	7473	7473	7473	0	0	0	0	0
e. Interest proportion (Table 1)		0	0	0	0	0	0.33	0.27	0.2	0.13	0.05	0	0	0	0	0
f. Interest (d x e)		0	0	0	0	0	2466	2018	1495	971	374	0	0	0	0	0
g. Depreciation (Table 2 x cost)		0	0	0	0	0	1125	2166	2004	1854	1713	1584	1467	1356	1338	1338
h. Other Ownership costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
i. Deductible ownership costs (f + g + h)	0	0	0	0	0	0	3591	4184	3499	2825	2087	1584	1467	1356	1338	1338
Terminal value (end of purchase life)																
j. Total		0	0	0	0	0	0	0	0	0	0	0	0	0	0	5000
k. Undepreciated balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0	14055
l. Taxable Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-9055
m. Unpaid loan principal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
n. Net tax deductible costs (c + i - l)	3700	43400	43450	43500	43550	39900	2841	3484	2849	2225	1537	1084	1067	1056	1138	10293
o. Tax rate (decimal form)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
p. Tax benefit (n x o)	1295	15190	15208	15225	15243	13965	994	1219	997	779	538	379	373	370	398	3603
q. Before tax costs (c + d + h - j + m)	3700	43400	43450	43500	43550	39900	6723	6773	6823	6873	6923	-500	-400	-300	-200	-5100
r. Net after tax cost (q - p)	2405	28210	28242	28275	28307	25935	5729	5554	5826	6094	6385	-879	-773	-670	-598	-8703
s. Refundable deposit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
t. Investment tax credit		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
u. Investment tax credit recapture		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
v. Total costs (r + s - t + u)	2405	28210	28242	28275	28307	25935	5729	5554	5826	6094	6385	-879	-773	-670	-598	-8703
w. P.V. factor (after tax - Table 3)	1	0.95	0.91	0.86	0.82	0.78	0.75	0.71	0.68	0.64	0.61	0.58	0.56	0.53	0.51	0.48
x. Net present value	2405	26800	25700	24317	23212	20229	4297	3943	3962	3900	3895	-510	-433	-355	-305	-4177
y. Total net present value of costs			136880													

PURCHASE WITH FINANCING ANALYSIS (Table B)

Item	Down Pmt.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
a. Loan payment	10000	36683	36683	36683	36683	36683	36683	36683	0	0	0	0	0	0	0	0
b. Interest proportion (Table 1)		0.44	0.39	0.33	0.27	0.2	0.13	0.05	0	0	0	0	0	0	0	0
c. Interest (a x b)		16141	14306	12105	9904	7337	4769	1834	0	0	0	0	0	0	0	0
d. Depreciation (Table 2 x cost)		7500	14440	13360	12360	11420	10560	9780	9040	8920	8920	8920	8920	8920	8920	8920
e. Other Ownership costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
f. Deductible ownership cost (c + d + e)	0	23641	28746	25465	22264	18757	15329	11614	9040	8920	8920	8920	8920	8920	8920	8920
g. Terminal value																
Total		0	0	0	0	0	0	0	0	0	0	0	0	0	0	5000
h. Undepreciated balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0	49100
i. Taxable income		0	0	0	0	0	0	0	0	0	0	0	0	0	0	-44100
j. Unpaid loan principal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
k. Net tax deductible costs (f - i)	0	23641	28746	25465	22264	18757	15329	11614	9040	8920	8920	8920	8920	8920	8920	53020
l. Tax rate (decimal form)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
m. Tax benefit (k x l)	0	8274	10061	8913	7792	6565	5365	4065	3164	3122	3122	3122	3122	3122	3122	18557
n. Net after tax cost (a + e - g + j - m)	10000	28409	26622	27770	28891	30118	31318	32618	-3164	-3122	-3122	-3122	-3122	-3122	-3122	-23557
o. Investment tax credit		8000														
p. Investment credit recapture		0	0	0	0	0										
q. total cost (n - o + p)	10000	20409	26622	27770	28891	30118	31318	32618	-3164	-3122	-3122	-3122	-3122	-3122	-3122	-23557
r. P.V. factor (after tax - Table 3)	1	0.95	0.91	0.86	0.82	0.78	0.75	0.71	0.68	0.64	0.61	0.58	0.56	0.53	0.51	0.48
s. Net present value (q x r)	10000	19389	24226	23882	23691	23492	23489	23159	-2152	-1998	-1904	-1811	-1748	-1655	-1592	-11307
t. Total net present value of costs			137161													

Lease cost analysis with purchase of the leased asset at the end of the lease

(Purchase of the asset at the end of the lease period is part of lease analysis)

LEASE COST ANALYSIS (Table A)

Item	Advance	Year 1	2	3	4	5	6	7
a. Lease payment	1800	21600	21600	19800	0	0	0	0
b. Costs saved (-), added (+)	0	0	0	0	0	0	0	0
c. Net lease costs	1800	21600	21600	19800	0	0	0	0
d. Loan payment on residual		0	0	0	25168	25168	25168	0
e. Interest proportion (Table 1)		0	0	0	0.22	0.14	0.05	0
f. Interest (d x e)		0	0	0	5537	3524	1258	0
g. Depreciation (Table 2 x cost)		0	0	0	6962	12435	9770	7963
h. Other Ownership costs	0	0	0	0	0	0	0	0
i. Deductible ownership costs (f + g + h)	0	0	0	0	12499	15959	11028	7963
Terminal value (end of purchase life)								
j. Total		0	0	0	0	0	0	15000
k. Undepreciated balance		0	0	0	0	0	0	27870
l. Taxable Income	0	0	0	0	0	0	0	-12870
m. Unpaid loan principal		0	0	0	0	0	0	0
n. Net tax deductible costs (c + i - l)	1800	21600	21600	19800	12499	15959	11028	20833
o. Tax rate (decimal form)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
p. Tax benefit (n x o)	648	7776	7776	7128	4500	5745	3970	7500
q. Before tax costs (c + d + h - j + m)	1800	21600	21600	19800	25168	25168	25168	-15000
r. Net after tax cost (q - p)	1152	13824	13824	12672	20668	19423	21198	-22500
s. Refundable deposit	0	0	0	0	0	0	0	0
t. Investment tax credit		0	0	0	2600	0	0	0
u. Investment tax credit recapture		0	0	0	0	0	0	520
v. Total costs (r + s - t + u)	1152	13824	13824	12672	18068	19423	21198	-21980
w. P.V. factor (after tax - Table 3)	1	0.94	0.89	0.84	0.79	0.75	0.7	0.67
x. Net present value	1152	12995	12303	10644	14274	14567	14839	-14727
y. Total net present value of costs			66047					

PURCHASE WITH FINANCING ANALYSIS (Table B)

Item	Down Pmt.	Year 1	2	3	4	5	6	7
a. Loan payment	0	38721	38721	38721	0	0	0	0
b. Interest proportion (Table 1)		0.22	0.14	0.05	0	0	0	0
c. Interest (a x b)		8519	5421	1936	0	0	0	0
d. Depreciation (Table 2 x cost)		10710	19130	15030	12250	12250	12250	12250
e. Other Ownership costs	0	0	0	0	0	0	0	0
f. Deductible ownership cost (c + d + e)	0	19229	24551	16966	12250	12250	12250	12250
g. Terminal value								
Total		0	0	0	0	0	0	15000
h. Undepreciated balance		0	0	0	0	0	0	6130
i. Taxable income		0	0	0	0	0	0	8870
j. Unpaid loan principal		0	0	0	0	0	0	0
k. Net tax deductible costs (f - i)	0	19229	24551	16966	12250	12250	12250	3380
l. Tax rate (decimal form)	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
m. Tax benefit (k x l)	0	6922	8838	6108	4410	4410	4410	1217
n. Net after tax cost (a + e - g + j - m)	0	31799	29883	32613	-4410	-4410	-4410	-16217
o. Investment tax credit		4000						
p. Investment credit recapture		0	0	0	0	0		
q. total cost (n - o + p)	0	27799	29883	32613	-4410	-4410	-4410	-16217
r. P.V. factor (after tax - Table 3)	1	0.94	0.89	0.84	0.79	0.75	0.7	0.67
s. Net present value (q x r)	0	26131	26596	27395	-3484	-3308	-3087	-10865
t. Total net present value of costs			59378					

DATA TABLES

Table 1a. Proportion of Total Annual Payments that are Interest when Payments are Monthly

Interest Rate	15th to last	14th to last	13th to last	12th to last	11th to last	10th to last	9th to last	8th to last
8	0.69	0.66	0.63	0.60	0.57	0.53	0.49	0.45
9	0.73	0.70	0.68	0.64	0.61	0.57	0.53	0.49
10	0.76	0.74	0.71	0.68	0.65	0.61	0.57	0.53
11	0.80	0.77	0.75	0.72	0.68	0.65	0.61	0.56
12	0.82	0.80	0.78	0.75	0.72	0.68	0.64	0.59
13	0.85	0.83	0.80	0.78	0.74	0.71	0.67	0.62
14	0.87	0.85	0.83	0.80	0.77	0.73	0.70	0.65
15	0.89	0.87	0.85	0.82	0.79	0.76	0.72	0.67
16	0.90	0.88	0.86	0.84	0.81	0.78	0.74	0.70

Table 1a. Continued Proportion of Total Annual Payments that are Interest when Payments are Monthly

Interest Rate	7th to last	6th to last	5th to last	4th to last	3rd to last	2nd to last	last year
8	0.41	0.36	0.30	0.25	0.18	0.12	0.04
9	0.44	0.39	0.33	0.27	0.20	0.13	0.05
10	0.48	0.42	0.36	0.30	0.22	0.14	0.05
11	0.51	0.45	0.39	0.32	0.24	0.15	0.06
12	0.54	0.48	0.42	0.34	0.26	0.17	0.06
13	0.57	0.51	0.44	0.37	0.28	0.18	0.07
14	0.60	0.54	0.47	0.39	0.30	0.19	0.07
15	0.62	0.56	0.49	0.41	0.31	0.20	0.08
16	0.65	0.59	0.51	0.43	0.33	0.22	0.08

This table can be used for any loan with a term of one to fifteen years. Use the last "x" columns of the table, where "x" is the term of the loan in years. For example, if a four year loan with a ten percent interest is being used, use the last four columns of the 10 percent row, i.e. in year 1, 0.30 of the payments made will be interest; in year 2, 0.22 of the payments will be interest; in year 3, 0.14 of the payments will be interest and in the last year .05 percent will be interest.

Table 1b. Proportion of Total Annual Payments that are Interest when Payments are Annual

Interest Rate	15th to last	14th to last	13th to last	12th to last	11th to last	10th to last	9th to last	8th to last
8	0.68	0.66	0.63	0.60	0.57	0.54	0.50	0.46
9	0.73	0.70	0.67	0.64	0.61	0.58	0.54	0.50
10	0.76	0.74	0.71	0.68	0.65	0.61	0.58	0.53
11	0.79	0.77	0.74	0.71	0.68	0.65	0.61	0.57
12	0.82	0.80	0.77	0.74	0.71	0.68	0.64	0.60
13	0.84	0.82	0.80	0.77	0.74	0.71	0.67	0.62
14	0.86	0.84	0.82	0.79	0.76	0.73	0.69	0.65
15	0.88	0.86	0.84	0.81	0.79	0.75	0.72	0.67
16	0.89	0.87	0.85	0.83	0.80	0.77	0.74	0.69

Table 1b. Continued Proportion of Total Annual Payments that are Interest when Payments are Annual

Interest Rate	7th to last	6th to last	5th to last	4th to last	3rd to last	2nd to last	last year
8	0.42	0.37	0.32	0.26	0.21	0.14	0.07
9	0.45	0.40	0.35	0.29	0.23	0.16	0.08
10	0.49	0.44	0.38	0.32	0.25	0.17	0.09
11	0.52	0.47	0.41	0.34	0.27	0.19	0.10
12	0.55	0.49	0.43	0.36	0.29	0.20	0.11
13	0.57	0.52	0.46	0.39	0.31	0.22	0.12
14	0.60	0.54	0.48	0.41	0.33	0.23	0.12
15	0.62	0.57	0.50	0.43	0.34	0.24	0.13
16	0.65	0.59	0.52	0.45	0.36	0.26	0.14

This table can be used for any loan with a term of one to fifteen years. Use the last "x" columns of the table, where "x" is the term of the loan in years. For example, if a four year loan with a ten percent interest is being used, use the last four columns of the 10 percent row, i.e. in year 1, 0.32 of the payments made will be interest; in year 2, 0.25 of the payments will be interest; in year 3, 0.17 of the payments will be interest and in the last year .09 percent will be interest.

Table 2
Annual Depreciation (Percent of Original Depreciation Basis)
150% Declining Balance Method

Recovery Year	3-Year Class	5-Year Class	7-Year Class	10-Year Class	15-Year Class	20-Year Class
1	25.00	15.00	10.71	7.50	5.00	3.75
2	37.50	25.50	19.13	13.88	9.50	7.22
3	25.00	17.85	15.03	11.79	8.55	6.68
4	12.50	16.66	12.25	10.02	7.69	6.18
5		16.66	12.25	8.74	6.93	5.71
6		8.33	12.25	8.74	6.23	5.28
7			12.25	8.74	5.90	4.89
8			6.13	8.74	5.90	4.52
9				8.74	5.90	4.46
10				8.74	5.90	4.46
11				4.37	5.90	4.46
12-15					5.90	4.46
16					3.00	4.46
17-20						4.46
21						2.25

Table 3. Present Value of $1

	Interest Rate (percent)													
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.93	0.92	0.91	0.90	0.89	0.88	0.88
2	0.98	0.96	0.94	0.92	0.91	0.89	0.87	0.86	0.84	0.83	0.81	0.80	0.78	0.77
3	0.97	0.94	0.92	0.89	0.86	0.84	0.82	0.79	0.77	0.75	0.73	0.71	0.69	0.67
4	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.74	0.71	0.68	0.66	0.64	0.61	0.59
5	0.95	0.91	0.86	0.82	0.78	0.75	0.71	0.68	0.65	0.62	0.59	0.57	0.54	0.52
6	0.94	0.89	0.84	0.79	0.75	0.70	0.67	0.63	0.60	0.56	0.53	0.51	0.48	0.46
7	0.93	0.87	0.81	0.76	0.71	0.67	0.62	0.58	0.55	0.51	0.48	0.45	0.43	0.40
8	0.92	0.85	0.79	0.73	0.68	0.63	0.58	0.54	0.50	0.47	0.43	0.40	0.38	0.35
9	0.91	0.84	0.77	0.70	0.64	0.59	0.54	0.50	0.46	0.42	0.39	0.36	0.33	0.31
10	0.91	0.82	0.74	0.68	0.61	0.56	0.51	0.46	0.42	0.39	0.35	0.32	0.29	0.27
11	0.90	0.80	0.72	0.65	0.58	0.53	0.48	0.43	0.39	0.35	0.32	0.29	0.26	0.24
12	0.89	0.79	0.70	0.62	0.56	0.50	0.44	0.40	0.36	0.32	0.29	0.26	0.23	0.21
13	0.88	0.77	0.68	0.60	0.53	0.47	0.41	0.37	0.33	0.29	0.26	0.23	0.20	0.18
14	0.87	0.76	0.66	0.58	0.51	0.44	0.39	0.34	0.30	0.26	0.23	0.20	0.18	0.16
15	0.86	0.74	0.64	0.56	0.48	0.42	0.36	0.32	0.27	0.24	0.21	0.18	0.16	0.14
16	0.85	0.73	0.62	0.53	0.46	0.39	0.34	0.29	0.25	0.22	0.19	0.16	0.14	0.12
17	0.84	0.71	0.61	0.51	0.44	0.37	0.32	0.27	0.23	0.20	0.17	0.15	0.13	0.11
18	0.84	0.70	0.59	0.49	0.42	0.35	0.30	0.25	0.21	0.18	0.15	0.13	0.11	0.09
19	0.83	0.69	0.57	0.47	0.40	0.33	0.28	0.23	0.19	0.16	0.14	0.12	0.10	0.08
20	0.82	0.67	0.55	0.46	0.38	0.31	0.26	0.21	0.18	0.15	0.12	0.10	0.09	0.07

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