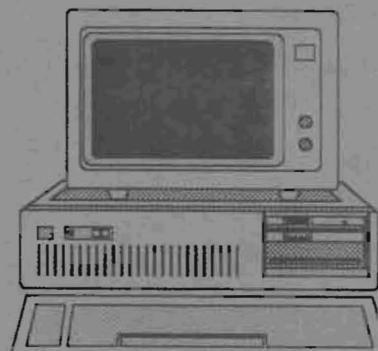
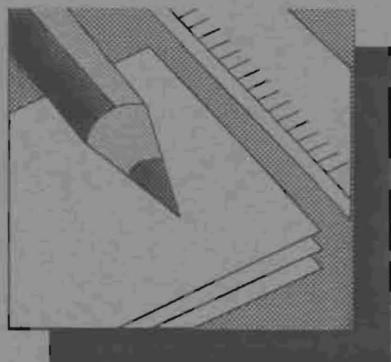


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# ANNUAL COST of INVESTMENT in a DURABLE ASSET USING PRESENT VALUE ANALYSIS



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## **FOREWORD**

There are a number of publications and sources of information concerning present value analysis as applied to investments. Hence, this is not a unique nor an original contribution. The tool, however, is an important and useful procedure in helping one decide whether to make an investment--and just as important--what the data needs are to analyze the decision. Present value analysis has not been utilized consistent with its potential. The purpose of this presentation is to provide an additional explanation with examples. My hope is that this additional emphasis will help some readers be more confident in its application and lead to more use of the tool by extension agents, students and farm operators.

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# **ANNUAL COST OF INVESTMENT IN A DURABLE ASSET USING PRESENT VALUE ANALYSIS**

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One often wishes to analyze a potential investment with costs and/or returns lasting several years. That is to say, the investment includes assets--land, and durables such as buildings, equipment, and breeding and dairy livestock--which will provide services over more than one year. In short, the potential investment is a capital investment.

Analysis of capital investments, whether evaluating the profitability of a single investment or comparing two or more investments, includes a number of factors. For example, annual ownership costs include depreciation, interest, repairs, (property) taxes and insurance (the classic DIRTI five). The cost of storage or housing may also be appropriate if the machine requires housing. Traditional methods for approximating these annual costs may not be very accurate, and the methods typically don't include some important facets such as income tax rates, inflation effects and the timing of actual receipts or cash outlays.

The use of present value techniques in evaluating investments permits a more complete and more accurate analysis of costs and benefits. All costs and returns are evaluated in a time dimension and on an after-tax basis. These present and future costs and benefits are then added together in present value equivalents. The result shows whether income exceeds costs, i.e., whether the investment is profitable. If desired, the present value of costs, returns or both can be converted to an annual amount. For example, the present value of net outlays can be converted to an annual capital recovery cost. That figure could then be compared directly to an annual income or saving.

## **An Example**

At this point it might be useful to demonstrate the procedure. The following example illustrates how an analysis is done using present value tools. (The numbers presented in the "problem" have no implied accuracy for real situations--they are just convenient numbers to illustrate the approach.)

Suppose a farmer raises about 1000 acres of corn each year. He has rented an anhydrous applicator in the past at a cost of \$2 per acre. He finds he can purchase a new applicator for \$15,000. Should he buy or rent the applicator? He supplies the following data for the analysis:

28% marginal Federal tax, 7.5% marginal state tax bracket, 12% nominal before-tax interest rate.

MACRS 7 year straight line depreciation.

10 year expected economic life.

\$2,000 terminal value in today's prices.

Repairs \$100 first year, \$200 each year thereafter in today's prices.

4% rate of inflation (on repairs and machine terminal value).

No personal property taxes and no housing required.

### **Step 1: Calculate appropriate discount (interest) rates.**

The discount rate represents an opportunity cost of capital appropriate to the decision at hand. Its derivation can be rather complex. For now, approach the decision based on borrowing rates, but a more complete discussion is included later.

First, let's recognize that interest rates and tax rates are critical to an appropriate analysis. Hence, at this point some interest rate and tax definitions are necessary. These are

**TABLE 1.****INTEREST RATE AND TAX DEFINITIONS**

Term	Relationship	Definition
i	Given	Nominal interest rate per period before taxes, usually a rate per year
$i^*$	Given $[(1+i)/(1+I) - 1]$	The (expected) rate of inflation per year
$i^*$	$[(1+i)/(1+I) - 1]$	Real before tax interest rate per period; i.e., the nominal interest rate corrected for inflation
m	$[1-(1-s)(1-f)]$	Marginal income tax rate of investor-- depends on marginal state/Federal rates
r	$i(1-m)$	The nominal after tax interest rate
$r^*$	$[(1+r)/(1+I) - 1]$	The real after tax interest rate; i.e., the after tax interest rate corrected for inflation.
f	Given	Marginal Federal income tax rate
s	Given	Marginal state income tax rate

given in Table 1. The relationships aren't as formidable as they might seem at first glance. The point is, interest rates are usually thought of in nominal terms--as given by lenders or as paid by borrowers. The nominal rates need to be adjusted for inflation to maintain purchasing power of the interest, and they need to be adjusted for income taxes since the interest is tax deductible. And, since state taxes are deductible on Federal income taxes, both state and Federal tax rates must be considered. Later, we suggest how these relationships can be incorporated into a spreadsheet so that their calculation is automatic.

For the example given;  $i = .12$ ,  $I = .04$ ,  $s = .075$ , and  $f = .28$ ; so  $i^* = [(1.12/1.04) - 1] = .076923$  (i.e., 7.6923%).  $m = 1 - (1-.075)(1-.28) = .334$ ; so  $r = .12(1-.334) = .07992$ ; and  $r^* = [(1.07992)/(1.04) - 1] = .038385$  (i.e., 3.8385%). The calculations must be done in the sequence shown -- first calculate  $r$  and then  $r^*$ .

**Step 2:** Set up a table to help with the analysis.

Sequence: a) List all before-tax cost items, b) show time relationships, c) calculate after-tax amounts, and d) calculate present value equivalents. Table 2 presents the information. Calculations and the explanations follow.

**TABLE 2.****PRESENT VALUE OF INVESTMENT COSTS**

Item	Pre-tax Amount	After-tax Amount	Time	PV factor	Present value Equivalent
Purchase	\$-15,000	\$-15,000	0	1.0	\$-15,000
Depr. (yr 1)	1,071	358	1	.92599	331
Depr. (2-7)	2,144	716	2-7	4.28180	3,066
Depr. (8)	1,072	358	8	.54059	194
Repairs (1)	-100	-67	1*	.96303	- 64
Repairs (2-10)	-200	-144	2-10*	7.21347	- 961
Term. val.	2,960	1,971	10	.46354	<u>914</u>
Net present value (negative values are costs)					\$-11,520

For line 1, the purchase of the applicator would occur immediately; so the present value factor is 1.0, giving a net outflow of \$-15,000. For line 2, the first year's depreciation under the MACRS modified straight line method is 7.14% (.0714) of the purchase price. While depreciation is not a cash expense, use of depreciation as a tax shield on the tax return reduces taxes so that the after-tax amount is saved at time of tax filing and becomes a cash saving or inflow. The tax saving from depreciation decreases the net cost of the machine, but the value of the tax saving depends on when it is received. The sooner it is received, the greater its present value. Next, since the net income tax rate is 33.4%, the after-tax is 33.4% of the pre-tax depreciation, \$358. That is to say, depreciation saves the tax rate not the after-tax rate. This saving is realized when the tax return is filed--assumed to be a year from now. (If the purchase is late in the year, a present value factor nearer 1.0 could be used.) The two right hand columns are explained later.

Line 3 is the depreciation for years 2 through 7. Depreciation is the same each year (so years can be combined). That depreciation is 14.29% (.1429) of the purchase price each year, \$2143.50, for years 2 through 7. Given the 33.4% tax rate, the after tax each year is \$716. Line 4 is the remaining depreciation, 7.15% (.0715), of the purchase price or \$1072.50; and of course, the after-tax, i.e. 33.4%, is \$358 and is realized 8 years from now.

Repairs, in lines 5 and 6, require adjustments because we assume that repairs increase with inflation. An adjustment for inflation can be made in two ways--either by compounding the repair cost by the inflation rate or by adjusting the discount rate to a real discount (interest) rate. Since 9 lines would be needed for repairs in years 2-10 by the first method, the second method is easier. So list repairs in today's dollars as given--\$100 the first year, and \$200 in future years. Since repairs are tax deductible, the after-tax cost of repairs is (1-m), or 66.6%, of the before-tax amount. (Let's put an \* after the time dimension for repairs as a reminder to us to adjust for inflation.)

Similarly, the terminal value in line 7 needs to be adjusted for inflation since the estimated value is in today's dollars. Again, one could either inflate the terminal value by the compounded inflation rate or use an inflation-adjusted interest rate in the present value calculations. In this instance, let's adjust the \$2000 expected terminal value in today's dollars to its inflation equivalent. That is,  $\$2000(1.04)^{10} = \$2960.49$ . Since the equipment would be fully depreciated, the terminal value would have a tax rate of 33.4% applied, and the after-tax amount would be \$1971. Of course, if there were long term capital gains benefits, the rate would be different than the ordinary income tax rate. Also, if the applicator had some undepreciated value left, the after-tax amount would need to take that fact into account. The terminal value is not received until the end of the 10 years.

### **Step 3: Calculate the remaining present value factors.**

If the reader is not familiar with present value factors, it might be useful to find a reference on financial calculations. There are three present value factors used in the analysis: present value of a future amount, present value of an annuity, and the amortization factor (an annuity whose present value is 1.0). Formulas are presented below as each is discussed.

The first year's after-tax depreciation is received one year from now when taxes are filed. The formula for present value of a future amount is  $1/(1+r)^n$ , where r is the interest rate and n is number of years. Hence, the factor for one year from now is  $1/(1.07992) = .92599$ , where .07992 is the after-tax discount rate. The present value of the first year's depreciation is  $\$358(.92599) = \$331$ . (After-tax dollars from depreciation are nominal dollars not real dollars, so r not r\* is used as the discount rate.) One could use either a financial table or a calculator to obtain present value factors; but since interest rates are not generally "even" rates, it may be easier to use a calculator and a formula, or better yet, a computer spreadsheet.

The factor for years 2-7 is not quite so simple. The factor is a 7 year annuity with the first year missing. Hence, calculate the figure for a 7 year annuity at an interest rate of 7.992% and then subtract from it the factor just calculated for an amount received one year from now. The present value of an annuity formula is  $(1-(1+r)^{-n})/r$ . Hence,  
 $(1-(1.07992)^{-7})/.07992 = 5.20779$ ; and  $5.20779 \cdot .92599 = 4.28180$ . For the 8th year's depreciation, one discounts for an amount received in 8 years; i.e., the factor is  $1/(1.07992)^8 = .54059$ .

The same procedures are applied for the two lines of repairs except that an after tax real rate of interest is used, i.e.,  $r^*$ . Note that  $r^*$  was calculated earlier--3.8385%. So, an amount received in one year in real dollars would have a PV factor of  $1/(1.038385) = .96303$ . And, the factor for years 2-10 would be the factor for a 10 year annuity minus the factor that was just calculated for the first year. For the problem at hand:

$(1-(1.038385)^{-10})/.038385 = 8.1765$ , the factor for a 10 year annuity. Subtract the factor for an amount received in 1 year, .96303, and the factor for years 2-10 is  $8.1765 - .96303 = 7.21347$ . This factor provides the present value equivalent for an amount received in years 2-10 that is growing at 4% per year.

Now, consider the terminal value factor. Since the inflation rate has already been incorporated, use  $r$  rather than  $r^*$  to calculate the factor for an amount received in 10 years. The factor is  $1/(1.07992)^{10} = .46354$ . (As noted earlier, one would get the same answer using \$2000 terminal value and an interest rate of 3.8385% in the formula. One reason for the approach used in the table is the possible need to calculate an after-tax amount when the machine is not fully depreciated. That calculation should be based on taxable terminal dollars received rather than dollars in today's prices.)

#### **Step 4:** Complete the present value column.

This step is simply the multiplication of the after-tax column figures by the present value column figures with a + or - sign for direction of flow. The first row has already been completed. Since the purchase is an outflow (negative) with a present value factor of 1.0, the present value is a \$15,000 outflow. Depreciation, however, is a tax saving so the depreciation lines are inflows or positive numbers. Line 2 is  $\$358(.92599) = \$331$ ; line 3 is  $\$716(4.2818) = \$3066$ . The rest of the table is completed remembering that repairs are outflows (negative) and the terminal value is an inflow (positive). Adding the figures in the present value column gives a total net present value equivalent of all present and future cost items,  $-\$11,520$ .

#### **Step 5:** Convert net present value to annual capital recovery cost.

For some analyses, net present value is as far as one may wish to go. After all, net present value, if receipts are included in the analysis, indicates the profit or loss over the lifetime of the investment. (In the analysis above, receipts were not included.) It is often useful, however, to convert a net present value (or the present value of all costs) for an entire investment life to an annual basis. Call these costs of owning the machine (depreciation, interest, repairs, property taxes, insurance, etc.) the capital costs; then the annual capital recovery cost is the amortized equivalent of all capital costs over the life of the investment in real, after-tax dollars. Given the present value of costs calculated above, one can easily derive an annual capital recovery cost. The procedure is to convert net present value to an amortized annual equivalent. For this purpose, use the amortization factor formula which is the reciprocal of the PV factor formula used above: Amortization factor =  $[r^*/(1-(1+r^*)^{-n})]$ .

Hence, for the problem at hand, the amortization factor =  $.038385/(1-(1.038385)^{-10}) = .122302$ ; and the annual (after-tax) capital recovery cost is  $.122302(\$11520) = \$1408.92$ . That is, the cost of the machine is \$1408.92 per year after-taxes. This figure could then be compared with the after-tax cost of renting to see which is the more economical. The after-tax capital recovery cost comparison, however may not be as convenient as a before-tax capital recovery cost. Before-tax figures would permit a direct comparison with expected annual income or expected annual savings from using the machine. To convert the \$1408.92 to a before-tax annual capital recovery cost, simply divide by the after-tax rate, (1-.334). That is,  $\$1408.92/.666 = \$2115.49$ .

In short, it would not pay to own the applicator under these conditions since the (before-tax) cost to rent an applicator is \$2,000 per year (1000 acres @ \$2 per acre) and the annual before-tax capital recovery cost is \$2115.49.

One could, of course, ask some interesting questions at this point. For example, if one can't get the rental applicator exactly when it's desired, how much improvement in per acre returns would be needed to justify owning the applicator? The answer is  $\$115.49/1000$  or \$.115 per acre. Or, how much of an increase in yield would be needed to justify owning the applicator? If corn price is \$2.25 per bushel, the answer is  $.\text{115}/\$2.25$ , or .05 bushels per acre. Or, is the convenience of having one's own machine worth \$115 per year?

#### Choice of Discount Rate

One aspect of the capital investment analysis approach deserves further discussion. That is the choice of the appropriate discount (interest) rate to use. Some analysts argue that the investor should specify a rate consistent with his/her weighted average cost of capital, WACC. The WACC would represent a combination of the cost of equity and the average interest rate on debt, weighted respectively, by the proportions of equity and debt in the business over the life of the investment. In other words, the new investment alternative should be analyzed with the same rate of interest the business is now earning (paying). An alternative approach might assume that the firm would likely expand from its present situation using primarily debt in which case the appropriate interest rate is that paid on new debt. Further, if one does not invest, the present debt could be paid down, saving the interest rate. Arguments about the appropriate interest rate or rates become rather messy depending on one's assumptions. Our suggestion is to use a rate slightly higher than the borrowing rate because of equity risk and/or because reinvestment opportunities may earn more. For any business analysis, however, remember to convert the interest rate to an after-tax rate and/or an after-tax real rate.

#### Another Example

Capital investment analysis may be applied as well to personal investments in which there is no tax deduction for interest or depreciation. There is still the question of appropriate interest rate--whether one should use the borrowing rate or the borrowing rate plus some additional charge for the extra risk or for returns foregone from other potential uses of funds. Consider the following example:

A family wishes to add a second car. The question is whether they should buy or lease the car. Based on a recent advertisement, the information on the two alternatives follows.

To own:

Cost of car is \$14,043 after discount from \$15,052 sticker.

Down payment required is 20% = \$2809.

The balance, \$11,234, can be financed over 36 months at 14% interest; i.e., \$383.95 per month.

The family's state/Federal combined marginal tax bracket is .334.

Insurance, gasoline, repairs and other costs are the same as leasing.

To lease:

\$275 deposit up front (returned at end of lease).

Lease payments of \$259 per month for 36 months starting immediately (first payment at delivery).

Lessee can purchase car at end of 3 years for \$7510.

Lessee pays \$.10 per mile for mileage over 45,000.

Insurance, gasoline, repairs and other costs are the same as owning.

The family can earn 7% on its savings and investments.

First, set up a table as before except that no column is necessary for after-tax because it's a personal (not tax deductible) rather than a business investment. Calculate costs under each alternative and compare present values to see which has the lowest present value of costs. To make a "fair" comparison, the family would either have to sell the car at the end of 36 months under the purchase alternative or else buy the car at the end of 36 months under the lease alternative.

**TABLE 3. COMPARISON OF CAR LEASE VS. OWNING ALTERNATIVE**

Item	Amount	Time	PV Factor	Present Value
<u>To own:</u>				
Purchase D.P.	\$- 2809	0	1.0	\$- 2,809
Monthly payments	-383.95	1-36	33.53524	<u>-12,876</u>
Net present value of ownership costs				\$-15,685
<u>To lease:</u>				
Lease deposit	-275	0	1.0	- 275
Lease payments	-259	0-35	33.66552	- 8,460
Terminal value purchase	-7510	36	.869716	- 6,532
Return of deposit	275	36	.869716	<u>239</u>
Net present value of leasing costs				\$-15,028

While a 14% pre-tax nominal interest rate was used to calculate loan payments, suppose the lessor's "opportunities" to earn are only 7% on his or her investments. But the investor would still have to pay taxes on that 7% interest earned. So the 7% discount rate must be adjusted to an after tax rate for calculating present value factors. An additional amount could have been added for risk if desired. Also, it is necessary in this type of problem to convert the annual interest rate to a monthly basis consistent with the monthly loan and lease payments. Hence, 7% per year before taxes amounts to a rate of  $.07 \times .666 = 4.662\%$  after taxes which, in turn, converts to .3885% per month ( $.04662/12\%$ ). The financial formulas provided earlier can be used for monthly payments as long as the interest rate is a monthly

rate and n becomes total number of months rather than years. The present value factor for 36 monthly payments and an interest rate of .3885% per month is  $(1-(1.003885)^{-36})/.003885 = 33.53524$ . This factor is used to calculate the present value of the 36 monthly payments. Remember that the payment amount is based on a 14% borrowing rate; but, since the individual would earn less than 5% on savings/investments, the present value of the loan is greater than the actual loan amount!

Some explanation may also be needed on the present value factor for the lease payments. Recall that the first lease payment is up front (now). That leaves 35 monthly payments beginning in one month, or a 35 month "annuity". Use the same formula as earlier but with 35 months rather than 36. Then add the value of the first (up front) payment (1.0) to the formula result (32.66552) to get the present value factor, 33.66552.

The lease terminal value is included as a cost of the lease to make the two alternatives comparable. Under the purchase option, one owns the car at the end of the period. Hence, a purchase also needs to occur at the end of the lease period. Otherwise one would be comparing an alternative where one had a car after three years with one not including a car after three years. Also, don't forget to return the deposit on the leased car at the end of the period. Its present value, however, is only \$239. That is, \$239 put on deposit at 4.662% after tax for 36 months would accumulate to \$275.

Given the information provided, it would be less costly to lease the car than to buy the car by \$657. This figure could be put on a monthly basis amortizing \$657 over 36 months at an interest rate of .3885 per month. The cost difference is \$19.59 per month; i.e., leasing is cheaper by \$19.59 per month. There are, of course, other considerations: What if the car would be driven more than 15,000 miles per year? What if the wear and tear at the end of the lease are not "normal". On the other hand, the lease provides flexibility--one doesn't have to buy the car at the end of 36 months. At any rate, under the conditions given, the lease is less costly.

The above procedure could also be used on a "trial and error" basis to estimate how cheaply one would have to borrow before ownership becomes cheaper than leasing. If the lessor's opportunity rate of return (discount rate) is 4.662% after tax as assumed here, then it becomes cheaper to own if the lessor could borrow money for about 10% or less.

### Using a Computer Spreadsheet for PV Analysis

Personal computer spreadsheets are especially well suited to the application of present value analysis. A table can be set up within the spreadsheet similar to table 2. The present value column can then be calculated either by formula or by use of "functions" set up in the spreadsheet. For example, most software spreadsheets have functions that can be used to calculate the present value of an annuity. This function may be shown as @PV(pmt,rate,term). To utilize the function one types the function as shown into a cell replacing pmt with the annual dollar amount, rate with the rate per period, and term with the number of periods. Hence, **@PV(100,.08,10)** typed into a cell in Lotus 123 or Quattro Pro, for example, would result in the present value of a \$100 per year annuity at 8% interest for 10 years.

Let's consider another example and set up the table in a spreadsheet. Suppose we wish to know the annual capital recovery charge for a tractor expected to be used for 15 years. The following additional information is given:

\$80,000 initial cost; straight line MACRS depreciation with 7 year life; 10% per year discount (interest rate); 3% per year inflation expected; 28% marginal federal income tax rate and 7.5% marginal state income tax rate; expected terminal value of \$8000 in today's prices. (The latter figure needs to be converted to year 15 prices through the inflation rate.)

Given the information above, the marginal tax rate is  $[1 - (1 - .075)(1 - .28)] = .334$ . The after-tax interest rate,  $r$ , is  $.10(.666) = .0666$ ; and the after tax real rate,  $r^*$ , is  $[(1.0666/1.03) - 1] = .035534$  or 3.5534%.

The table is set up as before but in a spreadsheet. Cells can be filled in using mathematical notation. Rows have numbers and columns have letters in the spreadsheet, that is, A3, C5, etc. The purchase outlay is on line 4 since the table title and column headings take 3 lines. The item listing is in the A column and pre-tax amounts are in column B. The year 1 depreciation amount, then, is in cell B5. To get the after tax amount for year 1 depreciation, enter **+B5\*.334** in cell C5; for cell C6 it is **+B6\*.334**, etc. To calculate the present value factors, one can use the functions with 1.0 as the payment. The present value factor for year one depreciation is **1/(1.0666)** or **@PV(1,.0666,1)** = .937559. And the present value figure is simply **+C5\*E5**. One can also sum the figures in the present value column with the summation function, **@sum(start..end)**. That is, **@sum(F4..F8)** entered in cell F9 will show the total for cells F4 through F8.

What Table 4 tells us is that the annual tractor ownership costs (i.e., purchase, depreciation, interest) amount to \$6,089 on an after-tax basis and \$9143 on a before income tax basis. Of course, if we could estimate repairs, property taxes (if applicable), insurance and housing costs, those too could be included so that all ownership costs would be taken into account. To justify the tractor on economic grounds, one would need savings or income before taxes in excess of \$9143 per year (plus repairs, insurance and housing).

**(1) TABLE 4. ANNUAL CAPITAL RECOVERY CHARGE CALCULATIONS FOR TRACTOR**

(A) (2) (3) Item	(B) Pre-tax Amount	(C) After-tax Amount	(D) Time	(E) PV Factor	(F) Present Value
(4) Purchase	\$-80,000	\$-80,000	0	--	\$-80,000
(5) Depr. (yr 1)	5,712	1,908	1	a	1,789
(6) Depr. (2-7)	11,432	3,818	2-7	b	17,243
(7) Depr. (8)	5,720	1,910	8	c	1,140
(8) Term. val.	12,464	8,301	15	d	3,156
(9) Present value					\$- 56,672

After tax capital recovery charge, **@PMT = \$6,089<sup>e</sup>**

Before tax capital recovery charge = \$9,143<sup>f</sup>

<sup>a</sup> **@PV(1,.0666,1)** = .937559

<sup>b</sup> **(@PV(1,.0666,7)-@PV(1,.0666,1))** = 4.516206

<sup>c</sup>  $1/(1.0666)^8$  the factor for one dollar received in 8 years. (^ means exponent.)

<sup>d</sup>  $1/(1.0666)^{15}$  the factor for one dollar received in 15 years. (^ means exponent.)

<sup>e</sup> **@PMT (prin., rate, term)**, in this case **@PMT(56672,.0666,15)** = \$6089. This is the amortization formula which tells us that \$6089 per year for 15 years is equivalent to a present value of \$56,672 at an interest rate of 6.666% per year.

<sup>f</sup> To convert an after tax amount (ATA) to before tax, divide ATA by the after tax rate; hence  $\$6089/.666 = \$9143$ .

### Concluding Comments

In summary, the present value approach to analyzing the economics of investment in a durable requires that one take into account all relevant cash flows (purchase cost, depreciation tax shield, repairs, property taxes, insurance, storage or housing, terminal value, etc.) income and/or savings and their timing, the marginal income tax rate and after-tax interest rate of the investor (if it is a tax deductible investment), and the rate of inflation -- if there are components of the problem affected by inflation.

One then organizes the data, calculates present value factors, and ultimately calculates net present value. In some instances, one might not go through the intermediate steps involving annual capital recovery costs since receipts or income could be incorporated directly into the table resulting in a net present value after all costs and returns. In other cases, it is useful to have the annual cost of owning the durable. Note, too, how easily one could incorporate other factors that might be important, such as investment tax credit, into the analysis. For example, investment tax credit would be a cash saving (inflow) realized when the tax return is filed, say one year from the date of analysis.

Hopefully, the description provided in this publication may help the decision maker or analyst to reason through and better understand present value analysis as applied to durable investments. One can develop the analysis building his or her own spreadsheet as described here. Or, an alternative is to use templates already prepared, such as the **CAPVEST** software program (and manual) available through the Department of Agricultural Economics at Cornell University. (Contact Professor G. Casler for price and availability.) Also, for more information or for a more complete discussion of capital budgeting, order "Capital Investment Analysis Using Discounted Cash Flows" from Professor George Casler, Bruce Anderson or Richard Aplin at the Department of Agricultural Economics, Cornell University, Ithaca, NY, 14853-7801.

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