

The Case of the Wheel Tractor

*by Gayle S. Willett and Robert N. Penland**

Traditionally, farmers have owned most of their machinery. In recent years, however, an increasing number of farmers have been looking closer at such nonownership alternatives as leasing, renting, and custom hiring. Several economic developments are responsible for this greater interest. Perhaps the most important are: (1) rising capital investments needed to own machinery, (2) heavy capital demands in other areas of the farm business, and (3) a high rate of machinery obsolescence. Machinery dealers have generally increased their inventories of leased and rented machinery in response to a growing farmer demand for hired machinery. Consequently, Arizona farmers today commonly have several alternatives to consider in acquiring essential machinery services.

In recognition that an accurate comparison of lease, lease-buy, rent, custom hire, and purchase deals can be difficult, a study was conducted to develop information helpful to farmers in making sound economic machinery control decisions. This article will briefly review the major economic considerations in selecting the best machinery control alternative. In addition, an analysis of four control alternatives for a 100 horsepower wheel tractor will be presented. The analysis is based on summer, 1973 surveys of several Arizona machinery dealers and major agricultural lending institutions.

Basic Economic Considerations

Some confusion can be avoided by clarifying the difference between machinery leasing and renting. A lease is an agreement between the lessor (e.g., machinery dealer) and the lessee (farmer), whereby the lessee in exchange for payment of a fee to the lessor, obtains the right of machinery possession for a period exceeding one year. The lessor retains ownership rights throughout this period. A rental arrangement differs only in the length of time the lessee has possession, i.e., renting implies less than one year of lessee possession. In other words, leasing and renting are long and short term arrangements, respectively.

One of the basic differences between ownership and nonownership alternatives lies with how control is financed. Machinery purchased without the use of credit involves an immediate cash outlay by the farmer equalling the negotiated machinery price. In contrast, lease, rental, and custom hire fees will be spread over the entire period for which machinery services are acquired. It follows that the initial cash outflow for machinery purchased without the use of credit will exceed that associated with the nonownership alternatives. A similar conclusion may apply for credit pur-

chases, depending on the terms of the loan and the length of the ownership period. The lower initial capital outflows often inherent with hiring machinery gives these alternatives a financing advantage — the extent of which depends on the profitability of the use to which the freed capital is diverted.

Since there is normally a closer parallel between machine use and cash outflows with leased, rented, and custom hired machinery, additional financing is obtained by use of these alternatives. Accordingly, farmers unable to purchase machinery because of inadequate equity capital to either buy machinery outright or make the necessary down payment, may be able to pay the smaller, initial machine hire fees, thus obtaining machinery previously unavailable. Subsequent fees can then be financed directly out of the returns generated by the machinery.

Additional financing, however, will likely be forthcoming only at a greater cost. Contained in machine hire fees will be a finance charge reflecting the amount of capital the lessee is using (i.e., the machinery) and the greater lessor risk associated with additional financing. Therefore, it is quite possible that while the *distribution* of cash outflows over time will be more favorable with nonownership alternatives, the *absolute size* of total cash outflows will be larger than with a credit or outright cash purchase.

Another important determinant of the size of cash outflows is the extent

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Table 1. Projected cash flow for a credit purchase of a 100 horsepower, diesel, wheel tractor.

<i>Date</i>	<i>Down Payment or Principal</i>	<i>Interest at 9½%</i>	<i>Depreciation</i>	<i>Investment Credit</i>	<i>Total Tax Credit*</i>	<i>Salvage Value</i>	<i>After-Tax Cash Cost**</i>
January, 1974	\$ 3,960.00	—	—	—	—	—	\$3,960.00
January, 1975	3,080.00	\$ 877.80	\$1,692.90	\$308.00	\$1,130.62	—	\$2,827.18
January, 1976	3,080.00	585.20	1,692.90	—	728.99	—	2,936.21
January, 1977	3,080.00	292.60	1,692.90	—	635.36	—	2,737.24
January, 1978	—	—	1,692.90	—	541.73	\$6,428.00	-6,969.73
Total	\$13,200.00	\$1,755.60	\$6,771.60	\$308.00	\$3,036.70	\$6,428.00	\$5,490.90

*Equals .32 (marginal tax rate) times sum of tax deductible expenses (i.e., interest and depreciation) plus investment credit.

**Equals down payment or principal plus interest minus total tax credit minus salvage value.

of machine use. Specifically, the costs of rented and custom hired machinery will increase with the size of the business, since fees for these alternatives are dependent on the amount of work performed.

The equity interest an owner has in his machinery will often represent an advantage vis-a-vis hired alternatives in that part of the investment is recaptured when the machinery is sold or traded. However, with those lease arrangements where the lessor recognizes a salvage value in determining lease rates, the ownership equity interest advantage is at least partially offset.

Another possible difference between machinery control alternatives lies with the size of the tax shield. Purchased machinery must be depreciated (depreciation, of course, is a tax deductible expense). This contrasts with hired machinery in that lease, rental, and custom hire fees are deductible in their entirety for the period in which the cost is incurred. A possible exception may occur with some lease-buy agreements. When a farmer initially leases and then buys a piece of machinery for a price that appears to have been related to the

lease payments, the Internal Revenue Service may interpret the deal as a conditional sale. If interpreted as such, the machinery must be depreciated and lease payments are not deductible.

Under current tax laws, investment credit can be claimed on investments in new or used machinery with a useful life of at least three years. Therefore, most farmers will be entitled to investment credit when they purchase machinery. Since lessors are the legal owners of leased and rented machinery, they are entitled to the investment credit; however, they may choose to pass the credit along to the lessee.

In addition to comparing the size of the tax shield, farmers should also note differences in the distribution of tax savings over time. The sooner a tax saving is realized, the greater the advantage since this money can be invested at an earlier point in time. Typically, lease payments will exceed depreciation claims during the initial phases of the machine's life, thus leasing has a tax credit timing advantage over ownership. However, this advantage can be diminished through the use of accelerated depreciation on owned machinery.

An Example Comparison of Wheel Tractor Control Alternatives

Survey data was used to construct four alternatives for acquiring control of a 100 horsepower, diesel, wheel tractor over a four year period. An analysis identifying the optimal alternative under different business situations is presented below. The control alternatives to be analyzed are as follows:

1. Credit Purchase

The tractor has a list price of \$13,200 and is financed with a 30 per cent down payment and a \$9,240 loan. The principal is repaid in three, equal annual installments. Accumulated interest, calculated at a 9½ per cent annual rate on the remaining balance, is due with each principal payment. It is anticipated that at the end of four years the tractor will have a salvage value of approximately \$6,428. Investment credit is claimed for the year of purchase and straight line depreciation is used.

2. Lease-Buy

Under this arrangement the tractor will be leased for two years and then purchased. Lease payments of

Table 2. Projected cash flow for lease-buy of a 100 horsepower, diesel, wheel tractor.

<i>Date</i>	<i>Lease Payment</i>	<i>Down Pay- ment or Principal</i>	<i>Interest at 9½%</i>	<i>Depreciation</i>	<i>Total Tax Credit*</i>	<i>Salvage Value</i>	<i>After-Tax Cash Cost**</i>
January, 1974	\$5,046.36	—	—	—	—	—	\$5,046.36
January, 1975	5,046.36	—	—	—	\$1,614.84	—	3,431.52
January, 1976	—	\$1,234.96	—	—	\$1,614.84	—	-379.88
January, 1977	—	1,440.80	\$ 273.75	\$181.13	145.56	—	1,568.99
January, 1978	—	1,440.80	136.88	181.13	-383.99***	\$6,478.00	-4,466.33
Total	\$10,092.72	\$4,116.56	\$ 410.63	\$362.26	\$3,375.24	\$6,428.00	\$5,200.66

*Equals .32 (marginal tax rate) times sum of tax deductible expenses (i.e., lease payments, interest, and depreciation).

**Equals lease payment, down payment, or principal plus interest minus total tax credit minus salvage value.

***Equals depreciation recapture [.32 (\$362.26)] plus capital gains liability [.16 (\$6,428.00 - \$4,116.56)] minus tax credit for deductible interest and depreciation.

Table 3. Projected cash flows for leased and rented 100 horsepower, diesel, wheel tractor.

Lease					Rent*			
Date	Lease Payment	Investment Credit	Total Tax Credit**	After-Tax Cash Cost***	Date	Rental Payment	Total Tax Credit**	After-Tax Cash Cost***
January, 1974	\$4,043.16	—	—	\$ 4,043.16	1974	\$ 3,300.00	—	\$3,300.00
January, 1975	4,043.16	\$308.00	\$1,601.81	2,441.35	1975	3,300.00	\$1,056.00	2,244.00
January, 1976	4,043.16	—	1,293.81	2,749.35	1976	3,300.00	1,056.00	2,244.00
January, 1977	4,043.16	—	1,293.81	2,749.35	1977	3,300.00	1,056.00	2,244.00
January, 1978	—	—	1,293.81	-1,293.81	1978	—	1,056.00	-1,056.00
Total	\$16,172.64	\$308.00	\$5,483.24	\$10,689.40	Total	\$13,200.00	\$4,224.00	\$8,976.00

*Assumes tractor is rented 5 months per year.
**Equals .32 (marginal tax rate) times lease and rental payments.
***Equals lease or rent payment minus total tax credit.

\$5,046.36 are due at the time of initial possession and at the beginning of the second year. Insurance, property taxes, housing, and all operating costs are the lessee's responsibility during the lease period.

At the end of the second year the tractor is purchased for \$4,116.56. A 30 per cent down payment is made and the remainder (\$2,881.60) is financed at 9½ percent interest, calculated on the remaining balance. The repayment schedule is set up so that two, equal annual principal payments (and accumulated interest) are made at the end of year three and four. No investment credit can be claimed and depreciation is calculated on a straight line basis. The salvage value is the same as indicated for the credit purchase.

3. Lease
If the tractor is leased, four annual lease payments of \$4,043.16 each must be made. The first payment is deposited at the time of initial possession. Remaining installments are due at the beginning of each of the three remaining years. Investment credit is passed through to the lessee. All operating expenses, insurance, property taxes, and housing are paid for by the lessee. The tractor is returned to the lessor at the end of the fourth year.

4. Rent
The tractor can be rented on a monthly basis for \$660 per month. Payments are due at the beginning of each month. Rental periods of three, five, and seven months will be considered. The lessee is liable for all operating expenses, property taxes, insurance, and housing.

The tractor control problem can be solved by identifying the present value of the after-tax cash costs for

each alternative and then selecting the one with the lowest cost. To analyze the problem in this manner, it is necessary to first project all relevant cash flows, including tax credits, over time. Because of the time value of money, the tax-adjusted cash costs must then be discounted to obtain their present values. Money realized

or paid in future time periods has a lower value than money realized or paid today. The reason for this fact is that by having money on hand, one has the opportunity to immediately invest it in an alternative productive use, thus realizing additional returns. The premium given to current over
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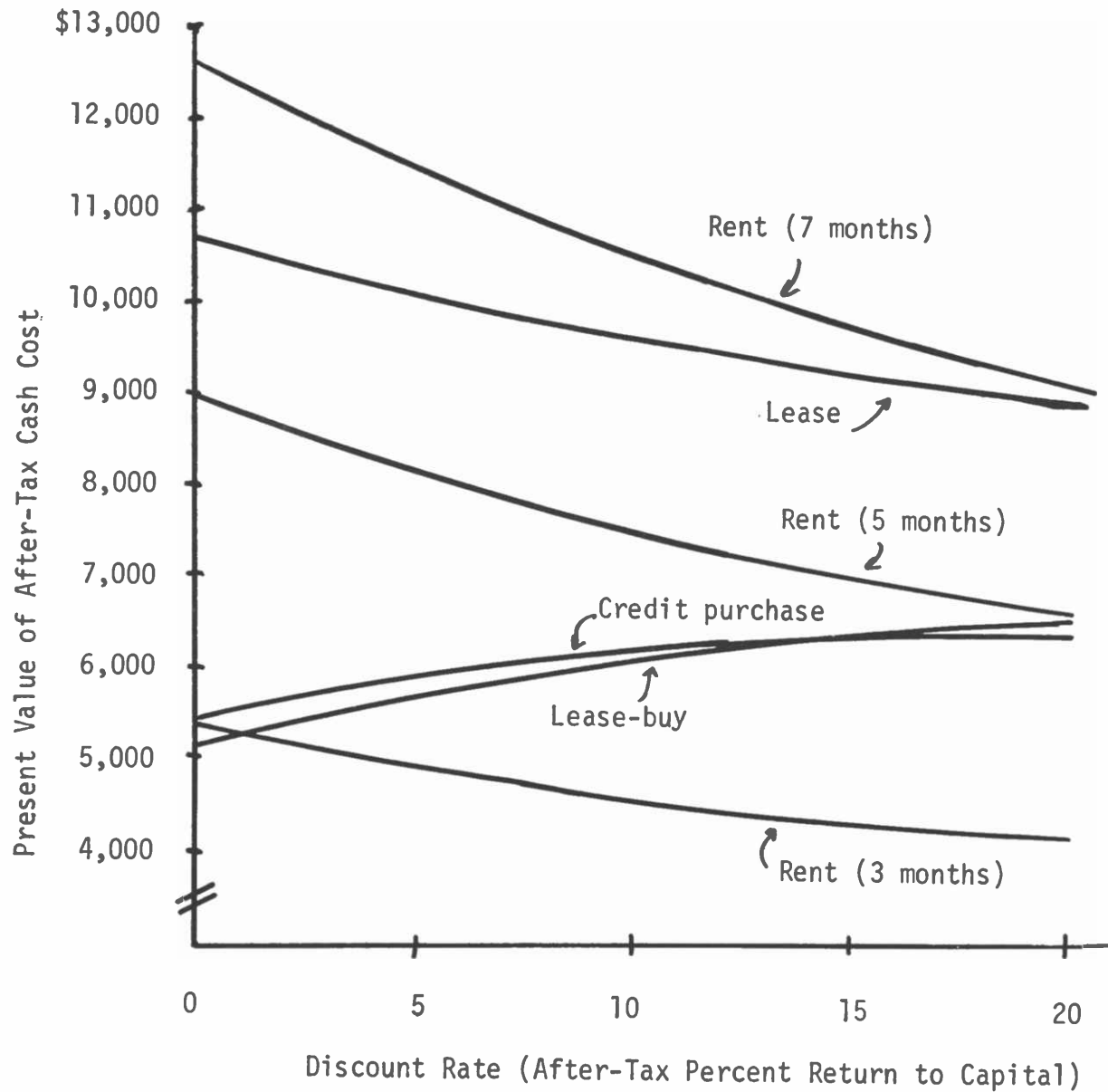


Figure 1. Present value of cash costs for a 100 horsepower, diesel, wheel tractor; selected control alternatives, various discount rates, and a 32 percent marginal tax rate.

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future dollars (i.e., the rate at which future dollars are discounted to derive their present values) should reflect the after-tax rate of return obtainable from the best alternative investment. By utilizing discounting techniques, one can take into account differences between machinery control alternatives in the distribution of cash flows over time.

Elimination of those elements of the cash flows that are common to all control alternatives will simplify the analysis. For the case at hand, common elements include tractor returns, fuel, lubrication, repairs, property taxes, insurance, housing, and labor costs. Relevant cash flows are pro-

jected for the various control alternatives in Tables 1-3.

Figure I presents the present value of the after-tax cash costs for the tractor alternatives at discount rates ranging from zero to 20 percent. A 32 percent marginal tax rate (the rate at which an additional dollar of income is taxed) has been assumed in these calculations. As indicated, the optimal alternative depends on the discount rate and the extent of tractor use.

Assuming the tractor is used only three months per year, renting is optimal, except at a very low discount rate where lease-buy is best. Depending on the discount rate, credit pur-

chase and lease-buy are the least-cost alternatives when the tractor is used five months or more annually. Lease-buy has a slight advantage for discount rates below 12 percent, while the advantage shifts to a credit purchase for rates above this level. The lease and seven month rental alternatives are considerably more costly than the other options at all discount rates.

The impact of varying the farm's tax bracket at a 10 percent discount rate is noted in Figure II. Those alternatives with the largest tax deductible expenses will improve relative to the others as higher tax brackets are considered. However, as Figure II demonstrates, the tax effect is not significant enough in any tax bracket to alter the rankings from those noted in Figure I (at a 10 percent discount rate). Consequently, it can be concluded that non-tax-related elements of the cash flows are the dominant factors in determining the optimal tractor control alternative.

It should be noted that the results of the tractor analysis are strictly dependent on the assumptions outlined. While these assumptions are based on survey findings, there will be considerable variation in the terms under which farmers can lease, rent, and purchase their tractors. Different terms could lead to results quite different from those indicated in this article.

Summary and Conclusions

Farmers have characteristically owned most of their machinery. However, several emerging economic forces are largely responsible for a growing realization by farmers that machine use, not ownership, is essential to profit making. Paralleling this realization is an expanding farm machinery hire market. Today Arizona farmers will frequently find that they have several alternatives for acquiring machinery.

It is difficult to generalize as to which control alternative is best. As demonstrated by the tractor analysis, the optimal method will depend on several factors, including: (1) machinery hire rates, (2) size of investment if purchased, (3) terms under which debt and equity capital can be obtained by the farm business, (4) profitability of alternative uses for capital, (5) extent of machine use, and (6) possibly the farm's tax bracket.

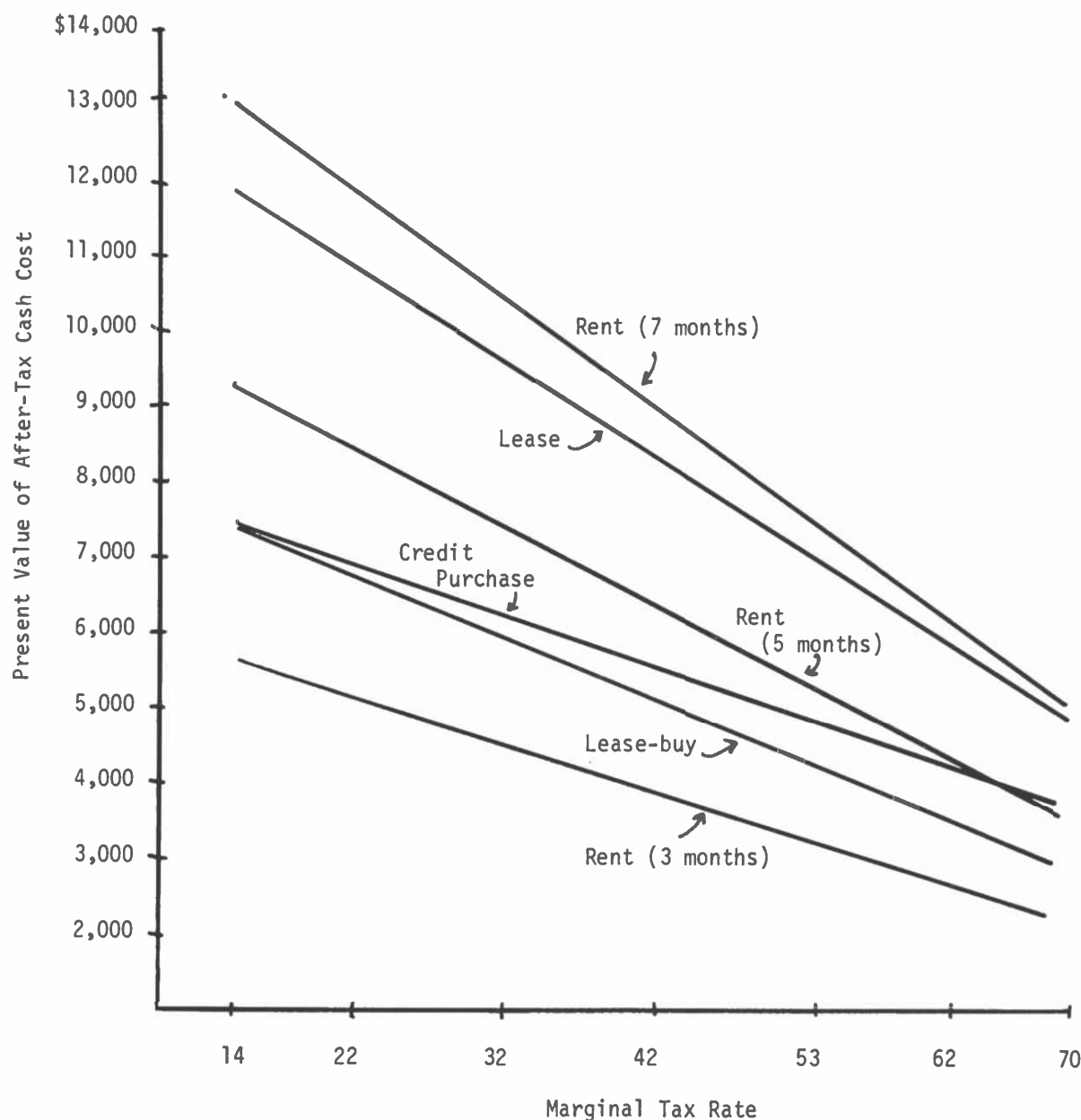


Figure 2. Present value of cash costs for a 100 horsepower, diesel, wheel tractor; selected control alternatives, various marginal tax rates, and a 10 percent discount rate.