## MAKING CAPITAL INVESTMENT DECISIONS ON A COTTON FARM

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The cotton farmer manages large amounts of capital in his operation and these amounts are getting larger every year. He needs to use modern tools of decision-making, just as a manufacturing concern, whether the decision concerns replacing machinery or increasing the size of his operations.

Modern industry uses a method for capital investment decisions called "Discounted Cash Flow." This method brings into the analysis the farmer's income tax bracket as well as the cost of using money for this purpose instead of for another use.

Discounted Cash Flow for capital investment decisions will be demonstrated in the following example of a farmer deciding whether he should buy a new cotton picker. The principle used in capital investment decision analysis is that a dollar today is worth more than a dollar a year from now, and more a year from now than two years from now. How much more is dependent on what it will earn at its most profitable alternative use. A good method of estimating the percentage it will earn in an alternative use is to estimate the percentage return on investment realized from the total investment during the previous one to three years, adjusted to changes expected the next year.

Let us consider a farmer in a 20-percent income-tax bracket considering trading an old cotton picker for a new one. Let us assume further that he has been earning 10 percent on his investment each of the past two years, and that he has budgeted out the added income resulting from the new cotton picker for decreased labor, decreased repairs, and faster harvesting of his crop at an additional $2,500 per year over the ten-year life of the new cotton picker.

The new cotton picker will cost $20,000, less trade-in of the old cotton picker of $3,000 for a cash outlay of $17,000. Let us assume there is $4,000 depreciation remaining on the books of the old cotton picker and that it is set up on a straight-line depreciation schedule of $500 per year to zero salvage.

Let us assume further that this farmer will be paying more income tax than the 7 percent allowable investment credit advantage of such a purchase so he can effectively use the full 7 percent investment credit as an advantage in this purchase.

The analysis for making this decision revolves around the problem of comparing the cash investment today to the present value of the added cash inflow resulting from purchasing the new machine. The present value of cash inflows is found by using a discount table for the ten years we expect the savings of the new machine, compared to the old machine, to take place.

Depreciation in any cash budget is a source of cash when compared with an alternative with less depreciation. The following illustration shows the method of comparing the net cash investment to the present value of the net cash inflows resulting from purchasing the new cotton picker.

CASH COSTS - NEW MACHINE

| | | | |
|---|---|---|---|
| List Price - New Machine | | $20,000 | |
| Trade in Old Machine | | $ 3,000 | |
| Cash Cost New Machine | | | $17,000 |
| Less 7% Investment Credit Savings | 7% x $20,000 = | $ 1,400 | |
| Net Cash Cost of Investment | | | $15,600* |

NET CASH INFLOW OF NEW MACHINE
IN 20% TAX BRACKET

| | | |
|---|---|---|
| A. | Increased Income & Decreased Cost of New Machine each year times Benefits after Taxes | $2,500 x 80% = $2,000 |
| B. | Present Value of Annual Flow of Income Discounted for 10 years at 10% | *6.1446 x $2,000 = $12,289 |
| C. | Cash Saved by 20% 1st year Depreciation in 20% Tax Bracket = | 20% x $17,000 x 20% = $680 |
| D. | Depreciation Base of New Machine is Cash Cost After 20% 1st year Depreciation plus Undepreciated (Book) Value of Old Machine | $17,000 - $3,400 + $4,000 = $17,600 |
| E. | Cash Saved in 10 years due to Depreciation to Zero Salvage Value in 20% Tax Bracket | $17,600 x 20% = $3,520 |
| F. | Present Value of Tax Shield using Sum-of-Years Digits Depreciation for 10 years at 10% | $3,520 x .701(**) = $2,468 |
| G. | Less Loss in Depreciation of old Machine of $500/year for 8 years Remaining Book Life in 20% Tax Bracket | $500 x 20% = $100 |
| H. | Present Value of Depreciation Lost by Trading in Old Machine at 10% | $100 x *5.3349 = $ -533 |
| I. | Present Value of Net Inflows of Cash by Purchasing New Machine | $14,904* |

* From Table 1.

** From Table 2.

Table 1. Present value of $1 to be received at the end of each year for 1-25 years. Discounted at each of the following rates of interest.

| N Years | 4% | 6% | 8% | 10% | 12% | 14% | 16% | 18% | 20% | 22% | 24% | 26% | 28% | 30% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.962 | 0.943 | 0.926 | 0.909 | 0.893 | 0.877 | 0.862 | 0.847 | 0.833 | 0.820 | 0.806 | 0.794 | 0.781 | 0.769 |
| 2 | 1.886 | 1.833 | 1.783 | 1.736 | 1.690 | 1.647 | 1.605 | 1.566 | 1.528 | 1.492 | 1.457 | 1.424 | 1.392 | 1.361 |
| 3 | 2.775 | 2.673 | 2.577 | 2.487 | 2.402 | 2.322 | 2.246 | 2.174 | 2.106 | 2.042 | 1.981 | 1.923 | 1.868 | 1.816 |
| 4 | 3.630 | 3.465 | 3.312 | 3.170 | 3.037 | 2.914 | 2.798 | 2.690 | 2.589 | 2.494 | 2.404 | 2.320 | 2.241 | 2.166 |
| 5 | 4.452 | 4.212 | 3.993 | 3.791 | 3.605 | 3.433 | 3.274 | 3.127 | 2.991 | 2.864 | 2.745 | 2.635 | 2.532 | 2.436 |
| 6 | 5.242 | 4.917 | 4.623 | 4.355 | 4.111 | 3.889 | 3.685 | 3.498 | 3.326 | 3.167 | 3.020 | 2.885 | 2.759 | 2.643 |
| 7 | 6.002 | 5.582 | 5.206 | 4.868 | 4.564 | 4.288 | 4.039 | 3.812 | 3.605 | 3.416 | 3.242 | 3.083 | 2.937 | 2.802 |
| 8 | 6.733 | 6.210 | 5.747 | 5.335 | 4.968 | 4.639 | 4.344 | 4.079 | 3.837 | 3.619 | 3.421 | 3.241 | 3.076 | 2.925 |
| 9 | 7.435 | 6.802 | 6.247 | 5.759 | 5.328 | 4.946 | 4.607 | 4.303 | 4.031 | 3.786 | 3.566 | 3.366 | 3.184 | 3.019 |
| 10 | 8.111 | 7.360 | 6.710 | 6.145 | 5.650 | 5.216 | 4.833 | 4.494 | 4.192 | 3.923 | 3.682 | 3.465 | 3.269 | 3.092 |
| 11 | 8.760 | 7.887 | 7.139 | 6.495 | 5.938 | 5.453 | 5.029 | 4.656 | 4.327 | 4.035 | 3.776 | 3.544 | 3.335 | 3.147 |
| 12 | 9.385 | 8.384 | 7.536 | 6.814 | 6.194 | 5.660 | 5.196 | 4.793 | 4.439 | 4.127 | 3.851 | 3.606 | 3.387 | 3.190 |
| 13 | 9.986 | 8.853 | 7.904 | 7.103 | 6.424 | 5.842 | 5.342 | 4.910 | 4.533 | 4.203 | 3.912 | 3.656 | 3.427 | 3.223 |
| 14 | 10.563 | 9.295 | 8.244 | 7.367 | 6.628 | 6.002 | 5.468 | 5.008 | 4.611 | 4.265 | 3.962 | 3.695 | 3.459 | 3.249 |
| 15 | 11.118 | 9.712 | 8.559 | 7.606 | 6.811 | 6.142 | 5.575 | 5.092 | 4.675 | 4.315 | 4.001 | 3.726 | 3.483 | 3.268 |
| 16 | 11.652 | 10.106 | 8.851 | 7.824 | 6.974 | 6.265 | 5.669 | 5.162 | 4.730 | 4.357 | 4.033 | 3.751 | 3.503 | 3.283 |
| 17 | 12.166 | 10.477 | 9.122 | 8.022 | 7.120 | 6.373 | 5.749 | 5.222 | 4.775 | 4.391 | 4.059 | 3.771 | 3.518 | 3.295 |
| 18 | 12.659 | 10.828 | 9.372 | 8.201 | 7.250 | 6.467 | 5.818 | 5.273 | 4.812 | 4.419 | 4.080 | 3.786 | 3.529 | 3.304 |
| 19 | 13.134 | 11.158 | 9.604 | 8.365 | 7.366 | 6.550 | 5.877 | 5.316 | 4.844 | 4.442 | 4.097 | 3.799 | 3.539 | 3.311 |
| 20 | 13.590 | 11.470 | 9.818 | 8.514 | 7.469 | 6.623 | 5.929 | 5.353 | 4.870 | 4.460 | 4.110 | 3.808 | 3.546 | 3.316 |
| 21 | 14.029 | 11.764 | 10.017 | 8.649 | 7.562 | 6.687 | 5.973 | 5.384 | 4.891 | 4.476 | 4.121 | 3.816 | 3.551 | 3.320 |
| 22 | 14.451 | 12.042 | 10.201 | 8.772 | 7.645 | 6.743 | 6.011 | 5.410 | 4.909 | 4.488 | 4.130 | 3.822 | 3.556 | 3.323 |
| 23 | 14.857 | 12.303 | 10.371 | 8.883 | 7.718 | 6.792 | 6.044 | 5.432 | 4.925 | 4.499 | 4.137 | 3.827 | 3.559 | 3.325 |
| 24 | 15.247 | 12.550 | 10.529 | 8.985 | 7.784 | 6.835 | 6.073 | 5.451 | 4.937 | 4.507 | 4.143 | 3.831 | 3.562 | 3.327 |
| 25 | 15.622 | 12.703 | 10.675 | 9.077 | 7.843 | 6.873 | 6.097 | 5.467 | 4.948 | 4.514 | 4.147 | 3.834 | 3.564 | 3.329 |

Table 2. Present Value of Sum-of-Years' Digit Depreciation

| Years of Useful Life | 2% | 4% | 6% | 8% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 22% | 24% | 26% | 28% | 30% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3... | 0.968 | 0.937 | 0.908 | 0.881 | 0.855 | 0.831 | 0.808 | 0.796 | 0.786 | 0.764 | 0.745 | 0.726 | 0.707 | 0.690 | 0.674 | 0.658 |
| 4... | 0.961 | 0.925 | 0.891 | 0.860 | 0.830 | 0.802 | 0.776 | 0.763 | 0.751 | 0.728 | 0.706 | 0.685 | 0.665 | 0.646 | 0.628 | 0.611 |
| 5... | 0.955 | 0.914 | 0.875 | 0.839 | 0.806 | 0.775 | 0.746 | 0.732 | 0.719 | 0.694 | 0.670 | 0.647 | 0.262 | 0.606 | 0.588 | 0.570 |
| 6... | 0.949 | 0.902 | 0.859 | 0.820 | 0.783 | 0.749 | 0.718 | 0.703 | 0.689 | 0.662 | 0.637 | 0.613 | 0.591 | 0.570 | 0.551 | 0.533 |
| 7... | 0.943 | 0.891 | 0.844 | 0.801 | 0.761 | 0.725 | 0.692 | 0.676 | 0.661 | 0.633 | 0.606 | 0.582 | 0.559 | 0.538 | 0.518 | 0.500 |
| 8... | 0.937 | 0.880 | 0.829 | 0.782 | 0.740 | 0.702 | 0.667 | 0.650 | 0.635 | 0.605 | 0.578 | 0.553 | 0.530 | 0.508 | 0.488 | 0.470 |
| 9... | 0.931 | 0.869 | 0.814 | 0.765 | 0.720 | 0.680 | 0.643 | 0.626 | 0.610 | 0.580 | 0.552 | 0.527 | 0.503 | 0.482 | 0.462 | 0.443 |
| 10... | 0.925 | 0.859 | 0.800 | 0.748 | 0.701 | 0.659 | 0.621 | 0.604 | 0.587 | 0.556 | 0.528 | 0.502 | 0.479 | 0.457 | 0.437 | 0.419 |
| 11... | 0.919 | 0.848 | 0.786 | 0.731 | 0.682 | 0.639 | 0.600 | 0.582 | 0.565 | 0.534 | 0.506 | 0.480 | 0.456 | 0.434 | 0.415 | 0.397 |
| 12... | 0.913 | 0.838 | 0.773 | 0.715 | 0.665 | 0.620 | 0.580 | 0.562 | 0.545 | 0.513 | 0.485 | 0.459 | 0.435 | 0.414 | 0.394 | 0.376 |
| 13... | 0.907 | 0.828 | 0.760 | 0.700 | 0.648 | 0.602 | 0.562 | 0.543 | 0.526 | 0.494 | 0.465 | 0.439 | 0.416 | 0.395 | 0.376 | 0.358 |
| 14... | 0.902 | 0.818 | 0.747 | 0.685 | 0.632 | 0.585 | 0.544 | 0.525 | 0.508 | 0.476 | 0.447 | 0.421 | 0.398 | 0.377 | 0.358 | 0.341 |
| 15... | 0.896 | 0.809 | 0.734 | 0.671 | 0.616 | 0.569 | 0.527 | 0.508 | 0.491 | 0.459 | 0.430 | 0.405 | 0.382 | 0.361 | 0.343 | 0.326 |
| 16... | 0.890 | 0.799 | 0.722 | 0.657 | 0.601 | 0.553 | 0.511 | 0.492 | 0.475 | 0.443 | 0.414 | 0.389 | 0.367 | 0.346 | 0.328 | 0.312 |
| 17... | 0.885 | 0.790 | 0.710 | 0.644 | 0.587 | 0.538 | 0.496 | 0.477 | 0.460 | 0.428 | 0.400 | 0.375 | 0.352 | 0.332 | 0.315 | 0.298 |
| 18... | 0.880 | 0.781 | 0.699 | 0.631 | 0.573 | 0.524 | 0.482 | 0.463 | 0.445 | 0.413 | 0.386 | 0.361 | 0.339 | 0.320 | 0.302 | 0.286 |
| 19... | 0.874 | 0.772 | 0.688 | 0.618 | 0.560 | 0.510 | 0.468 | 0.449 | 0.432 | 0.400 | 0.372 | 0.348 | 0.327 | 0.308 | 0.291 | 0.275 |
| 20... | 0.869 | 0.763 | 0.677 | 0.606 | 0.547 | 0.497 | 0.455 | 0.436 | 0.419 | 0.387 | 0.360 | 0.336 | 0.315 | 0.296 | 0.280 | 0.265 |
| 21... | 0.863 | 0.754 | 0.666 | 0.594 | 0.535 | 0.485 | 0.442 | 0.424 | 0.406 | 0.376 | 0.349 | 0.325 | 0.304 | 0.286 | 0.270 | 0.255 |
| 22... | 0.858 | 0.746 | 0.656 | 0.583 | 0.523 | 0.473 | 0.431 | 0.412 | 0.395 | 0.364 | 0.338 | 0.315 | 0.294 | 0.276 | 0.260 | 0.246 |
| 23... | 0.853 | 0.738 | 0.646 | 0.572 | 0.511 | 0.461 | 0.419 | 0.401 | 0.384 | 0.354 | 0.327 | 0.305 | 0.285 | 0.267 | 0.252 | 0.238 |
| 24... | 0.848 | 0.729 | 0.636 | 0.561 | 0.500 | 0.450 | 0.409 | 0.390 | 0.373 | 0.344 | 0.318 | 0.295 | 0.276 | 0.258 | 0.243 | 0.230 |
| 25... | 0.842 | 0.721 | 0.626 | 0.551 | 0.490 | 0.440 | 0.398 | 0.380 | 0.364 | 0.334 | 0.308 | 0.286 | 0.267 | 0.250 | 0.236 | 0.222 |
| 30... | 0.818 | 0.683 | 0.582 | 0.504 | 0.442 | 0.393 | 0.353 | 0.336 | 0.320 | 0.292 | 0.269 | 0.249 | 0.232 | 0.216 | 0.203 | 0.191 |
| 35... | 0.794 | 0.648 | 0.542 | 0.463 | 0.402 | 0.355 | 0.317 | 0.300 | 0.286 | 0.260 | 0.238 | 0.220 | 0.204 | 0.190 | 0.178 | 0.168 |
| 40... | 0.771 | 0.616 | 0.507 | 0.428 | 0.368 | 0.323 | 0.286 | 0.271 | 0.257 | 0.233 | 0.213 | 0.196 | 0.182 | 0.170 | 0.159 | 0.149 |
| 45... | 0.749 | 0.586 | 0.476 | 0.397 | 0.339 | 0.296 | 0.261 | 0.247 | 0.234 | 0.212 | 0.193 | 0.178 | 0.164 | 0.153 | 0.143 | 0.134 |
| 50... | 0.728 | 0.559 | 0.448 | 0.370 | 0.314 | 0.272 | 0.240 | 0.227 | 0.214 | 0.194 | 0.176 | 0.162 | 0.150 | 0.139 | 0.130 | 0.122 |

The above analysis shows the first year outflow of cash, if the new cotton picker is purchased, as $15,600. The present value of the inflow of cash resulting from the purchase is only $14,904. Thus, the farmer should not make this investment if this data measures all considerations.

A change in any of the variables, such as income-tax bracket or a different return on investment, could yield a different answer.

Notice the error that would have been made had we just compared the $17,000 cash cost to the total budgeted income, $2,500 x 10 years, or $25,000. Money has value, and thus must have its cost included in any use made of that money.

One other important principle of management is inherent in analyzing alternatives in this manner. The undepreciated value of the old machine is sunk cost. It is relevant to such a decision only as it affects cash saved from income tax resulting from depreciation. It is conceivable that a new machine could be bought to replace a machine only a year or two old if the present value of the future benefits and the net depreciation cash retention is great enough.

## Summary

This method can be used for all capital-investment decisions. For instance, a farmer considering the alternatives of investing in more land, or building a cattle feed lot would budget out the cash flows of future earnings and discount them back to a present value for comparison. If they considered the cattle feed lot more risky than the purchase of more land, adjustment could be made in the calculation by using a higher percentage discount factor, the higher percentage reflecting the estimated added risk of the feed lot over land.

If cotton farmers are to compete in the modern business world, they must use tools of analysis that modern business uses. Good records can help in such analysis. However, even until a farmer gets adequate records, estimated budgets used in the manner illustrated will aid in better decisions than many farmers are able to make at this time.

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