Machinery Ownership versus Custom Harvest*

EXTENSION

September 2020

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One of the most helpful practices the farm manager adopts is planning for the future, particularly an uncertain one. Planning includes taking an inventory of resources, considering alternative uses for resources, estimating costs and returns associated with the alternate uses of resources, and choosing the "best" alternative. The manager can organize financial and physical plans by budgeting.

Changes that do not require a complete reorganization of the business are frequent on a farm or ranch business. The manager uses resources in more than one way when responding to changes in product price levels and cropping patterns. Partial budgets are useful in evaluating changes such as expanding an enterprise, adding a new enterprise, changing production practices, and buying new machinery.

Principles of Partial Budgeting

Partial budgets estimate the economic effect of minor adjustments in some aspect of the farm business. With partial budgeting, the manager assumes that many aspects of the business are fixed in the short-term. He or she uses partial budgets to evaluate changes in resources that are not fixed. Partial budgeting is based on the principle that a small change in the organization of a farm business will eliminate or reduce some costs and returns, add costs, and/or add revenues. The net economic effect of a change will be the sum of the positive economic effects minus the sum of the negative effects.

Machinery Ownership versus Custom Harvest

Table 1 uses partial budgeting to estimate the economic impact of buying and operating a self-propelled combine to harvest 1,000 acres of dryland wheat currently being harvested by custom operators. The data in this analysis are representative of current prices for used combines and current rates of custom operators. The prices and rates presented may not be applicable to all areas, but the procedure will be the same. A summary of information needed for the partial budget follows:

Custom combining rate, dryland wheat = $24 per acre plus $.24 per bushel over 21 bushels

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Purchase price of used 40-foot width self-propelled combine (diesel-powered) = $238,000
Depreciation period = 10 years
Salvage value (expected price at the end of 10 years) = $68,750
Average investment in machinery = (purchase price + salvage value) ÷ 2 = ($238,000 + $68,750) ÷ 2 = $153,375
Fuel cost (diesel) = $2.87 per acre
Repairs (average for 10 years) = $5.17 per acre
Labor rate = $20.00 per hour and 0.07 hours/acre for harvesting or $1.46 per acre
Annual property taxes on combine = $1,615
Annual insurance cost for combine = $1,304
35 bushel yield expected

Components of the Partial Budget

The typical partial budget consists of these components: additional costs, reduced returns, additional returns, reduced costs, totals of the first two and the second two and the net difference. These categories are used to estimate the effects of a proposed change in business organization. In the left column, negative economic effects resulting from the proposed change are estimated; in the right column, positive economic effects are summarized.

Additional costs are those that will occur if the change takes place. However, this does not include costs that are common to both the present and proposed business operation (any cost that does not change will not be included in the partial budget). In our example, the additional costs category includes the fixed and operating costs of owning the combine (Table 1). The fixed costs include such things as depreciation, taxes, interest on the average investment, and insurance. Operating costs include fuel, oil, repairs and labor. Estimates of annual fixed costs are calculated as:

Annual economic depreciation expense (using straight-line method) = [(purchase price − salvage value) ÷ years of life] = ($238,000 − $68,750) ÷ 10 = $16,925 per year
Interest rate = 5.75%
Annual interest expense = Interest rate x average investment in machinery = 0.0575 x $153,375 = $8,819

Reduced returns are the returns that would not be received under the proposed change. In the example, no reduced

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Table 1. Partial Budget, Machinery for Harvest (ownership vs. custom)

Situation: Purchase and operate a combine for harvesting 1,000 acres of wheat per year.

Additional Costs		Additional Returns	
Annual Fixed Costs		Custom work	???
Depreciation	$ 16,925	Combining other crops	???
Interest	8,819		
Taxes	1,615		
Insurance	1,304		
Operating Costs			
Fuel: 1,000 acres x $2.87/acre	2,870		
Repairs: 1,000 acres x $5.17/acre	5,170		
Labor: 1,000 acres x $1.46/acre	1,460		
Reduced Returns		**Reduced Costs**	
Reduced field loss	???	Custom combining:	
Timeliness factor	???	1,000 acres x [$24/acre + (.24/bu. x 14 bu.)]	$ 27,360
Total annual additional costs		Total annual additional returns	
and reduced returns	$38,163 (A)	and reduced costs	$27,360 (B)
			- $38,163 (A)
		Net change in income (B - A)	**- $10,803**

returns are specified since the return is assumed identical regardless of the method of harvesting. However, two elements that might be included in this analysis are difficult to value in dollar terms: timeliness of harvest and reduced field losses. First, the owner-operator may be ready to begin the harvest on the first day, whereas the manager who depends on custom harvest may have to wait for the custom operator. Second, the owner-operator may be more careful and skillful during the harvest and, thus, save a greater percentage of the grain produced. These elements are quite important but are not included here since their dollar values vary from farm to farm. The total of additional costs and reduced returns is an estimate of the total negative economic effects of the proposed change.

The positive economic effects of the proposed change are estimated in the column on the right. Additional returns are the added receipts that will be received if the alternative plan is adopted. The additional returns analysis assumes that the combine will be used only to combine one wheat crop per year. If custom harvesting could be done for other producers, additional returns from ownership would be gained. For this analysis, these possible returns are not included because of the variation between business and operators. Reduced costs are those that will no longer be incurred if the change is initiated. In our example, reduced costs include the costs of custom combining not incurred, here $24 per acre plus $.24 per bushel on 14 bushels. If the farm raises other crops such as grain sorghum or soybeans, the combine can be used for these, further reducing costs associated with paying for custom harvesting.

Additional returns and reduced costs are totaled at the bottom of the column. The net difference between positive and negative economic effects is an estimate of the net effect of making the proposed change. A positive net difference indicates the potential increase in net returns if the change is made. A negative net change in income is an estimate of the reduction in net returns if the change is adopted.

The total of column A is $38,163 per year. This is the cost of owning the combine and operating it for one year. The column B total is $27,360. This is the cost of custom combining that would not be incurred. The net figure, subtracting column A from column B, is a negative $10,803. This means that owning and operating a new combine would cost the owner $10,803 per year above the cost of having the wheat crop harvested by custom operators.

The question may arise as to how any individual producer could afford to buy their own combine. To answer this question, consider the different factors that went into this analysis. First, this situation considered only 1,000 acres of wheat. Any additional acres harvested would incur no additional fixed costs, only operating costs. Here, the operating cost per acre ($2.87 for fuel + $5.17 for repairs + $1.46 for labor, or a total of $9.50 per acre) is less than the custom combining rate; therefore, each additional acre would reduce the net difference.

For planning purposes, the producer may want to estimate how many acres are needed to economically justify the purchase of the combine. Acreage at which annual fixed ownership and operating costs would equal the custom charge assuming a 35-bushel yield:

$$N = \frac{\text{Annual Fixed Cost of Ownership}}{(\text{Custom rate per acre} - \text{operating cost per acre})} = \frac{(16{,}925 + 8{,}819 + 1{,}615 + 1{,}304}{[27.36 - (2.87 + 5.17 + 11.46)]}$$

$$= \frac{\$28{,}663}{(27.36 - 9.50)} = \frac{\$28{,}663}{17.86} = 1{,}605$$

In this example, it would require a minimum of 1,605 acres to justify the combine purchase.

Similarly, this analysis does not include any considerations for custom harvesting by the farmer once they purchase the combine. Any custom work would be an additional return and would again reduce the net difference. For example, suppose in this example that the producer combines their own 1,000

acres and also custom harvests another 500 acres. The additional returns would be $13,680 for custom work and would be recorded as such in the partial budget. However, additional operating costs also will be incurred and these additional costs would also be noted in the partial budget. With enough acres, the net difference becomes positive, making the purchase and operation economically justified.

Partial Budgeting Process

The success of the partial budget depends on the accuracy of the information and estimates it contains. The farm manager must collect pertinent, factual data about the proposed change and provide reasonable estimates of future prices, yields, gains, etc. Factual information includes current production costs, costs of capital, current prices for products such as grain or livestock, etc.

Estimating future unknowns such as price is more difficult. The manager must estimate yields and prices to determine the returns given up and received. Yield estimates may be obtained from several sources. The best source is an individual's farm records. The farm records will show the history of production. This, combined with an assessment of current crop conditions, should closely predict future yields, given normal weather and other conditions. Other sources of yield estimates are neighboring farm histories, OSU research reports showing average yields and the farm manager's previous experience. A combination of these sources should provide a close estimate of projected yields.

Future product prices are difficult to predict. Agricultural economists, USDA statisticians, and futures markets all provide information as to the trend of prices and national crop conditions. However, it will be unusual to find a predicted price for a product on a particular day. Using information published by the above sources as well as the manager's intuition will provide the best estimate of future prices for products. Using a range of prices – low, medium, and high – to evaluate changes reveals the price sensitivity of the projected change.

The partial budget is ready to be developed after all pertinent data are assembled. The cost of the proposed change is calculated for each of the categories. Only the costs and returns that will change by adopting the alternate plan are analyzed in the partial budget. The unit used to analyze the change may be any size, for example, the whole crop, one acre of the crop, one head of cattle or the entire herd. The column totals show the negative and positive economic aspects of the proposed change. Subtract the left column total from the right column total to obtain a net amount that reflects the change in net farm income if the proposed alternative is adopted.

A positive net change says that it would be economically beneficial to proceed with the alternate plan. A negative amount implies that it would not be economically profitable to proceed with the change. Two notes of caution: 1) The value of this analysis using partial budgeting is only as accurate as the data used. 2) The partial budget does not necessarily include "cash flow" tied to capital purchases (machinery). Cash flow is addressed in OSU Extension Fact Sheet AGEC-751. After the analysis has been performed, the result should be multiplied as necessary to show the economic impact on the entire farm situation.

Conclusions

This partial budget fact sheet presents a simplified procedure to aid producers in everyday decision-making. This design is not for total farm planning, but rather to estimate the economic consequences of making a change in some phase of the farm operation. Partial budgeting is a step-by-step process for identifying all the costs and returns that change due to alterations in the production process. Once these costs and returns are identified, they are weighed against each other to estimate the economic consequences of the change. The results can only be as good as the data used. Therefore, care should be taken when estimating values for the various categories. In addition, sensitivity test for values such as yields and prices should be developed to highlight their effect on the ultimate outcome.

Worksheet. Partial Budget Form
Situation:

Additional Costs

Additional Returns

Reduced Returns

Reduced Costs

Total annual additional costs
and reduced returns _____ (A)

Total annual additional returns
and reduced costs _____ (B)
- _____ (A)

Net change in income (B - A) _____

Originally adapted from OSU Extension Fact Sheet F-142 (*Partial Budgeting in Farm Management*, Kuhlman, Casey and Jobes, Jan. 1978) by Damona Doye and Nikki Coe, former student assistant.

AGEC-240-4