How to Estimate Custom Machinery Rates

By Gregg Ibendahl and Greg Halich

Abstract

Specialization in agriculture, along with larger farm sizes and bigger equipment, has resulted in more custom machinery work being conducted on farms. Often, there is limited data about the current custom rate. The Mississippi State Budget Generator (MSBG) is a tool that uses a cost approach to allocating machinery cost on a per acre basis and can be used in situations where custom rates are not well known. When compared to actual custom work surveys, the MSBG provides rates that are lower than the survey results. One explanation is that the MSBG does not include any built-in profit.

Specialization in production agriculture has followed at least two tracks. First, farmers are undertaking fewer enterprises. In many cases this has resulted in livestock-grain farms specializing in either livestock or grain. However, it could mean that a grain farm only grows a limited number of crops.

The other track of specialization is that farmers do not themselves undertake all the required operations necessary for a crop or livestock enterprise. For example, a corn farmer may not spray herbicides with his or her own equipment. A third party is used by the farmer to take care of this operation. Custom combining is another example.

Specializing in only some of the enterprise operations has several advantages for farmers. First, equipment investments are reduced. Many pieces of equipment have gotten bigger and more expensive so that it is no longer profitable for farmers to own the equipment themselves where it may be underutilized. In addition, as this newer equipment becomes more complex, farmers may not want to take the time to master its use. With bigger farm sizes, farmers may not have the time to do everything themselves anyway.

This specialization of enterprise operations presents two problems for farmers. First, how much should a farmer pay for a particular custom operation. Second, for the equipment a farmer does purchase, the increased capacity in the newer larger equipment means that a farmer often has excess capacity that could be utilized by undertaking custom work. Thus, these farmers would like to know how much to charge to cover expenses and still earn a reasonable profit. This paper examines a method of how a farmer can determine what is a fair custom rate for when someone else is performing an operation for them or if the farmer is doing custom work for someone else.

Dr. Ibendahl is an associate Extension professor at Mississippi State University specializing in farm management and agricultural finance. He grew up on a grain and beef farm in southern Illinois.

Greg Halich is an Assistant Extension Professor in the Department of Agricultural Economics at the University of Kentucky. He works in the general area of farm management economics, but has specific emphasis in the areas of forages, livestock, grains, biofuels, and forest management. A current focus is the economic evaluation of grazing systems including grass-finished beef production.

Difficulties determining custom rates

The main difficulty with pricing custom work is lack of knowledge. This is especially true when farmers perform custom work on the side. Machinery operations are specialized so comparable prices are difficult to find. Also, machinery is a depreciable asset that makes it difficult to allocate costs back to a per acre basis.

Arriving at an acceptable custom rate between the user of custom work and the provider of custom work is often not an easy process. Many custom operations are negotiated with limited knowledge of what others are charging. In the ideal situation, information would be available about the rate others are using for different soil types, machine sizes, and fuel prices in the same geographical area. If a custom operation market was competitive, users of custom work could be reasonably assured they were being offered services at a price where providers were not earning excessive profits. Providers of custom work would also know the rate was probably high enough to at least cover their costs.

There has been some work aimed at publicizing custom machinery rates. Halich (2009) has collected surveys from the states of Ohio, Indiana, Missouri, Iowa, Wisconsin, and Kansas and then adjusted these for current fuel prices and wage rates so that farmers have a reasonable idea of what they might have to pay for custom field operations on their farm. Some of these survey custom rates are shown in column three of Table 1.

These custom rate surveys are somewhat limiting because the machinery size is not fully specified and the surveys are not conducted every year. While adjustments were made for fuel and labor, machinery cost changes and improvements in efficiency could affect the rates over time. The survey assumes an average size piece of equipment but does not differentiate for smaller or larger than normal equipment.

Mississippi State Budget Generator

Another approach to developing custom rates is to use the Mississippi State Budget Generator (MSBG). Using the MSBG to develop custom operation rates is like using the cost approach for real estate appraisal work. The MSBG uses the cost of the machines, fuel cost, labor cost, and field capacity to calculate a cost per acre for performing a field operation. The MSBG allocates the machinery cost over time based on a standard number of hours use per year, the purchase price, the salvage value, and the expected repair and maintenance costs. Time value of money techniques are part of the calculation. The field capacity is a critical part of the calculation for determining not only fixed costs but also the variable costs of labor and fuel per acre.

Other tools are available and include a machinery cost publication and spreadsheet from the University of Minnesota and a spreadsheet tool from Farmdoc at the University of Illinois. The MSBG and the University of Minnesota tool appear to update machinery costs every year while the Farmdoc tool does not. The MSBG appears to have the largest database of equipment and tractors.

The MSBG is a complete budget generating package that several state including Mississippi, Arkansas, Texas, Alabama, and Louisiana use to help generate crop production budgets for the respective state. The machinery cost generation is only one part of its function. The MSBG works by the user selecting a machine or implement size and type. If the implement needs a tractor, then the user can select an appropriate sized tractor from a drop down list. Users can change almost any of the parameters needed to produce the cost per acre including fuel use, field efficiency, labor rate, repair and maintenance, salvage value of the equipment, typical hours of use per year, etc. However, all the machines have pre-determined values including the appropriate sized tractor for a pull-behind implement.

Calculations within the MSBG are fairly straight forward and can be seen in detail in the MSBG users guide. The MSBG is basically using time value of money concepts to allocate the cost of the machine over each year of its life. The hours of use per year and the field efficiency then help to determine the cost per acre. Repair and maintenance is calculated as a percentage of purchase price and is allocated in a similar fashion to the cost of the machine. Fuel and labor cost to operate the machine are easier to calculate as these are already on a per gallon or per hour basis and can easily be converted to a per acre basis once the field efficiency is known.

Results

Columns 1 and 2 of Table 1 list the field operation and equipment size being analyzed. Column 3 lists the modified custom survey rate for that operation although the survey does not specify a specific equipment size. Column 4 lists the calculation from the MSBG for the same sample of field operations reported from the surveys but with a specific equipment size. This equipment size from the MSBG is larger than the average equipment size available in the database. Since custom operators tend to have larger equipment, this use of a

larger size from the MSBG database helps keep comparions on more equal footing.

The last four columns of Table 1 show how the survey results compare to calculating results from the MSBG. Column 5 is the dollar difference and Column 6 is the MSBG cost divided by the survey cost and expressed as a percentage. The average dollar difference is nearly $5 per acre with the custom rate always higher than the MSBG rate. This result is entirely expected as the MSBG makes no effort to account for profitability in the calculation. Dollar differences range from $1.08 to $8.75. Since the machine size was not specified in the survey, a larger than average machine was chosen from the MSBG available machine sizes under the assumption that most custom work would use bigger than average farm equipment.

From the percentage calculation in column six of the table, the MSBG rate averaged 62 percent of the survey rate. The percentages varied from 36 to 88 percent. The last two columns of the table look at how a farmer would adjust either the custom survey rate or the MSBG calculation to match. Unlike Column 5 which is looking at the differences on a dollar basis, the last two columns are looking at differences on a percentage basis. Column 7 shows the markup that farmers would need over the MSBG calculation to match the survey results. This markup can be anywhere from 14 to 175 percent but averages to 74 percent. Column 8 shows the markdown that would occur before the survey results would match the MSBG result. This column is mainly shown for comparison purposes as most farmers would probably be looking to determine a custom rate based on the MSBG result. The average from Column 8 is 35 percent.

Another point to consider is that full time custom operators will likely have the largest, most efficient equipment, and will use this equipment on more acres per year than a typical farmer. Thus, these operators can charge a lower rate per acre and still earn a profit when compared to a farmer looking to earn additional income from performing custom work on the side. Although the comparisons made using the MSBG incorporated larger than average equipment sizes, the hours of total use during a year are likely to be below that of a full time custom operator. Therefore, farmers looking to do custom work in addition to their normal operations might want to consider the dollar or additional markups given in the table as starting points for rate negotiation.

Conclusions

In a perfect world, there would be lots of observations about custom rates and the whole process of a farmer hiring a custom operation would be very straight forward. As this data is often sparse, another approach is to use the MSBG and develop a bottom up estimate of how much a custom operation should cost. Readers should keep in mind though that the cost approach calculation lacks any profit for the provider of the custom operation and this should be factored into the negotiated rate. In general, adding $5 per acre to the MSBG calculation or taking the MSBG result and adding 75 percent will give a value close to what actual custom operators are charging.

Some farmers might only be interested in charging enough to cover variable expenses or base the fee on some markup of variable expenses. The MSBG can be used here too as the results from the tool are broken out by category.

Farmers who want to offer custom work to others can also use this as a guide as well. In many cases, farmers who only do occasional custom work may be the least knowledgeable about what to charge.

References

Farmdoc. "Machinery Estimates." http://www.farmdoc.illinois.edu/pubs/FASTtool.asp?category=farm. February 2007.

Halich, G. "Custom Machinery Rates Applicable to Kentucky (2009)." University of Kentucky - College of Agriculture. AEC 2009-04. March 2009.

Lazarus, W. "Machinery Cost Estimates." University of Minnesota Extension. http://www.apec.umn.edu/faculty/wlazarus/documents/machdata.pdf. June 2009.

Mississippi State Budget Generator. Mississippi State University. http://www.agecon.msstate.edu/what/farm/generator/. December 2009.

Table 1. Comparison of custom rates to MSBG calculated rates

Operation	Equipment Size	Ave Survey Rate	MSBG Rate	Survey difference	MSBG/ Survey	% Increase from MSBG	% Decrease from survey
Chiesel plowing	32 foot	$14.00	$5.95	$8.05	43%	135%	58%
Disking - tandem	28 foot	$12.00	$7.15	$4.85	60%	68%	40%
Field cultivation	32 foot	$10.00	$4.66	$5.34	47%	115%	53%
Harrowing	40 foot	$7.50	$2.72	$4.78	36%	176%	64%
Subsoiling	4 shank	$16.00	$12.02	$3.98	75%	33%	25%
Chopping cornstalks	20 foot	$10.00	$7.28	$2.72	73%	37%	27%
Planting (conventional) - corn	24 row - 30 inch	$14.00	$6.68	$7.32	48%	110%	52%
Planting (conventional) - soybeans	24 row - 15 inch	$15.00	$11.31	$3.69	75%	33%	25%
Planting (no-till) - corn	24 row - 30 inch	$15.00	$7.39	$7.61	49%	103%	51%
Planting (no-till) - soybeans	24 row - 15 inch	$15.00	$12.65	$2.35	84%	19%	16%
Small grains drilled (no-till)	24 foot	$15.00	$12.69	$2.31	85%	18%	15%
Fertilizer application - liquid knife	12 row - 30 inch	$9.00	$7.92	$1.08	88%	14%	12%
Spraying (pull-type)	50 foot broadcast	$6.00	$2.31	$3.69	39%	160%	62%
Combine small grains	30 foot header	$25.00	$16.25	$8.75	65%	54%	35%
Combine corn	12 row - 30 inch	$26.00	$18.45	$7.55	71%	41%	29%
			AVERAGE	$4.94	62%	74%	38%