ABSTRACT

Average custom rates for eight common farming operations as reported in surveys done in Iowa and Kansas in 1995 were inflated to 2015 values (Iowa) and 2013 values (Kansas) using the Prices Paid indices gathered by the National Agricultural Statistics Service (NASS). The projected rates were generally higher than the average rates reported in surveys completed in the corresponding years, except for planting. Possible explanations for the lag in custom rates include uncertainty about fuel prices, improved fuel efficiency, improved field efficiency, adoption of larger equipment where economies of size exist, and extension of field hours per season.

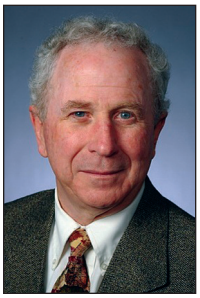
Have Farm Custom Rates Kept Pace with Machinery Costs?

By William M. Edwards

Introduction

Many state universities and statistical reporting services conduct and publish annual surveys of farm custom rates. A common response to these surveys by custom operators is "Why haven't custom rates kept up with my costs?"

This article compares the increases in farm custom rates over the past 20 years to estimated increases in machinery costs over the same time period. Reported custom rates from annual surveys conducted in Iowa and Kansas are used as benchmarks. The annual Prices Paid index values that are calculated and reported by the National Agricultural Statistics Service (NASS) of the United States Department of Agriculture (USDA) are used to track overall machinery costs over time (United State Department of Agriculture National Agricultural Statistics Service, 2015).



William M. Edwards is Professor Emeritus at Iowa State University.

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Custom Rate Data

Iowa State University Extension and Outreach has conducted an annual survey of custom farming rates since the early 1970s (Edwards and Johanns). Each January custom operators, farm managers and farm operators report what rates they expect to pay or charge in the coming year for a long list of custom operations. The following common crop operations were selected for this study: chisel plowing, tandem disking, field cultivating, drilling small grain crops, planting corn, spraying herbicides (broadcast, by a tractor-drawn sprayer), combining corn, and baling hay (large round bales). Average rates reported for each year from 1995 through 2015 are shown in Table 1.

In Kansas, the state Department of Agricultural Statistics Division has conducted similar surveys (Lamprecht). Data from the Kansas surveys for the same custom operations are also analyzed. The Kansas survey was discontinued after 2009 but another survey was completed in 2013, so the comparisons from Kansas are for the crop year 2013 rather than 2015.

Prices Paid Data

NASS has estimated indices for prices paid by farmers for a large number of inputs for many years. The most recent revision of the classes of inputs reported took place in 1995, so the current study covers the time period 1995 through 2015. The Prices Paid categories used are Fuel (diesel), Repairs, Tractors, Self-propelled Machinery, Other Machinery, and Wage Rates. Patterson and Painter used the NASS Prices Paid index values to develop a weighted composite index for adjusting farm custom rates in Idaho (Patterson and Painter). They used the Machinery (itself a composite of the Tractor, Self-propelled Machinery, and Other Machinery indices), Repairs, Fuel, Wage Rates, and Interest categories.

Kansas State University agricultural economists have also used price index data to estimate farm custom rates for the years in which no surveys were taken in that state, only they used historical data for diesel fuel prices and the personal consumption expenditure (PCE) index, only (Dhuyvetter).

NASS collects machinery prices from machinery dealers in their annual "Prices Paid for New Tractors and Farm Machinery" survey. They ask for the average prices paid for 86 commonly sold types of new farm machinery with typical accessories, including any discounts or rebates given, but excluding trade-in allowances and sales taxes (United State Department of Agriculture National Agricultural Statistics Service, 2014). Thus, the price indices reflect the same basic machines over time, but do take into account new technology and accessories as they become "standard." Machine sizes are held constant to maintain comparability over time. Table 2 shows descriptions for the machines included in the Prices Paid index calculations that correspond to the custom services analyzed in this study. The Self-propelled Machinery price index includes cotton pickers and windrowers as well as combines. The Other Machinery price index includes a wide array of tillage, planting, and harvesting items.

For purposes of this study, each Prices Paid value for 1995-2014 was normalized by dividing it by the corresponding 1995 index value, so each price series used in this study starts with an index value of 100. Later index values show the price of each input in that year as a percent of the price of the same input in 1995. Table 3 summarizes the normalized index values for each machinery cost component from 1995 through 2014.

Figure 1 shows the Prices Paid indices for fuel, wages, tractor purchase prices, self-propelled machinery

purchase prices, and repairs. Index values for the purchase price of other machinery are not shown, for clarity, but were similar to those for tractor purchase prices.

Operating Costs

Fuel, repairs, and wages are annual operating costs, so year-to-year changes in their prices will show up very quickly in machinery costs. The indices for repairs and wages increased at a gradual rate throughout the past two decades, but the diesel fuel price index was highly variable (Figure 1). Starting in 2005 it rose sharply for three years, declined in 2009, and then rose again for two more years before leveling off.

Ownership Costs

By contrast, changes in purchase prices for new machinery do not impact custom operators' costs until they acquire a new model. In a recent survey, custom harvesters in Iowa (Edwards and Clarahan) reported the average age of their combines to be about three years, so it was assumed in this study that a new combine would be acquired every five years. Consequently, the price indices for self-propelled machinery were modified to reflect a 5-year moving average rather than the purchase price index for each year. In other words, a custom operator's machinery ownership costs in a given year reflect machinery purchases made over the past five years. Although no age data for tractors and other machinery were available, the same assumption of a 5-year ownership life was applied to them. Results were also calculated assuming a 10-year ownership period for machinery, but they did not differ significantly from the 5-year ownership results.

Ownership costs include depreciation and interest expense. A change in machinery purchase prices will translate directly into a change in depreciation cost, given a constant ownership life and salvage value, so the 5-year average index values for machinery purchases were used for tracking depreciation expense. The 2014 index value for tractor prices was 194 percent, for example, meaning that new tractors cost 94 percent more in 2014 than in 1995, on average. The corresponding values for self-propelled machinery and other machinery were 242 percent and 192 percent, indicating increases of 142 percent and 92 percent, respectively, so depreciation costs were assumed to have increased by the same percent.

Interest expense, on the other hand, depends not only on the price of the machine when it is purchased but also on the interest rate at that time. Interest rates have declined steadily since 1995 (Table 3). The average farm operating loan interest rate as reported by the Federal Reserve Bank of Chicago in 1995 was 10.15 percent, but by 2014 it was only 4.89 percent, less than half the 1995 value (The Federal Reserve Bank of Chicago). The interest rates reported for 1995-2014 were divided by the 1995 interest rate to create a normalized index value for each year (see Figure 1). The downward trend in interest rates resulted in an index value of 48 percent for 2014. Annual interest *cost* is the product of the interest rate and the investment made in a new machine, however, so the indices for interest cost were calculated by multiplying each 1995-2014 machinery purchase price index by the interest rate index for the same year. For example, the 2014 tractor price index value of 194 percent multiplied by the interest rate index value of 48 percent gives an interest cost index value of 94 percent. Complete price indices for depreciation and interest are shown in Table 4.

Weighting the Cost Components

The next step was to combine the cost indices for the five cost components (fuel, repairs, labor, depreciation, and interest) into one overall index value. This was done by weighting each one by the percent of total machinery costs accounted for by that component. These weights varied not only by the type of operation being performed, but also from year to year as the costs of some components changed more than others.

A data set that is used to generate typical machinery costs each year for use in the standard crop budgets published by Iowa State University (AgDM file A1-20) was used to estimate the relative share of total costs contributed by each component in each year. These estimates are based on the data and procedures published by the University of Minnesota (Lazarus) each year, using standard formulas adopted by the American Society of Agricultural and Biological Engineers (ASABE). The Minnesota data base is modified slightly to fit Iowa conditions. Weights were derived for each cost component for each year from 2003 through 2014 using the budget data sets. Machinery cost estimates prior to 2003 were not available, so the 2003 weights were used for the years 1995 through 2002. The main factor that caused the shares of total machinery costs accounted for by each component to vary from year to year was the price of diesel fuel, and this value was relatively stable before 2003. The percent of total machinery cost accounted for by each cost component in 2014 is shown in Table 5. In the earlier years of this study fuel accounted for a smaller portion of total costs (less than 10%) and repairs accounted for a higher portion than in 2014. Table 6 shows the overall total cost index values for each year and each operation. Costs for chisel plowing increased the most by 2014, at 251 percent of 1995 levels. However, even the operations with the lowest increases saw costs nearly double from 1995 to 2014.

Projected Custom Rates

Finally, the reported average custom rate in 1995 for each operation included in the study was multiplied by its total cost index value for each year through 2014, to estimate what the custom rate for the following year would be if operators adjusted their rates by exactly the amount needed to allow for changes in machinery costs that year. The Iowa custom rate survey is conducted in January each year, so it was assumed that custom operators, as well as those respondents who hired custom work done, would base their expected rates on changes observed in the costs of fuel, repairs, labor, depreciation and interest during the previous year. Example 1 shows how the series of calculations was carried out for combining corn. Figures 2 and 3 show how the reported rates and the projected rates for planting corn and combining corn, respectively, changed over 20 years. Trends for other operations were similar.

It should be noted that the 2015 projected rates are not an attempt to estimated actual machinery costs. Rather, the comparison assumes that average custom rates in 1995 covered the operator's costs and provided a reasonable margin of profit, and inflates those rates to equivalent 2015 levels, based on cost increases.

Results

Table 7 shows the reported average custom rate from the 2015 Iowa survey for each operation and the corresponding projected custom rate based on the changes in machinery costs since 1995. The third column shows the survey rate as a percent of the projected rate. For operations with a percentage exceeding 100 percent

the actual rate more than kept up with increases in costs, while those with values less than 100 percent failed to keep up with costs. Reported rates for combining corn and chisel plowing lagged the furthest behind the projected rates, at 67 and 70 percent, respectively. Rates for the other operations, except for planting corn, were from 85 to 96 percent of the cost-adjusted rates. The reported custom rate for planting corn was actually higher than the projected rate based on increases in costs, at 110 percent.

Table 8 shows the same comparison for Kansas custom farming rates. While custom rates per acre are generally lower in Kansas than in Iowa, when 1995 Kansas rates were adjusted for changes in machinery costs the actual survey rates in 2013 as a percent of the projected rates were very similar to those for Iowa for the same year, with chisel plowing and corn combining lagging the furthest behind projected costs.

Fuel Costs

Figures 2 and 3 show that large changes in diesel fuel prices caused the projected rates for corn combining and corn planting to increase sharply in 2008 and 2009, and again in 2012 and 2013. Rates for other operations showed similar patterns. Reported rates responded less quickly than the projected rates, probably because custom operators had no way to know if the fuel price increases were permanent or simply a spike. However, because the survey (at least in Iowa) asked what people expected to charge or pay in the coming year, it is possible that actual rates charged were adjusted later in the year to reflect increases in diesel fuel price that were beyond expectations. Such "fuel surcharges" would not have shown up in the current year's survey, but could have influenced replies from respondents to the following year's survey.

There is evidence that operations for which fuel accounted for the highest percent of total cost were also those for which reported rates most failed to keep up with the projected rates. Figure 4 illustrates this relationship. Combining corn was the one exception to this trend. Excluding corn combining, there was a correlation coefficient of -0.66 between the fuel cost as a percent of total cost, and the reported custom rate as a percent of the projected rate based on machinery cost increases. It could be concluded that custom operators have not given sufficient importance to higher fuel prices when setting their rates each year, and the "fuel-intensive" operations lag behind the most.

Another hypothesis is that tractors have become more fuel efficient in the past 20 years. This article assumes that fuel costs per acre have changed in direct proportion to diesel prices, and the gallons used per acre has been constant, but some specialists argue that more efficient engines have actually reduced fuel consumption per hour by as much as one percent per year over time (Grisso, et al.). Innovations such as continuously variable transmissions, auto-steer controls and front-wheel assist have reduced the amount of fuel needed to provide the same amount of pulling power or cover the same number of acres (Hanna and Petersen). This could lead to over-estimation of the effect that higher fuel prices have had on overall custom operating costs.

Combining

The fact that custom combining rates have not kept up with projected increases in costs may also be related to changes in technology. Grain throughput and field speeds have increased during the past two decades. In addition, the increased use of grain carts and semi-trailer trucks has improved field efficiency by reducing the time the combine is stopped in the field. Both of these may have

allowed corn combines to cover more area in a harvesting season, spreading depreciation and interest costs over more acres and slowing the increase in total cost per acre. The Idaho study suggested that "Cost efficiencies from using larger equipment and covering more acres have helped some custom operators deal with this cost-price squeeze..." (Patterson and Painter, p. 9).

Custom rates used in this study do not include extra charges for nonstandard harvesting heads or collection of GPS-based field data. The most recent Iowa custom rate survey showed added charges of $2 to $6 per acre for chopper heads (corn) and air reels or draper heads (soybeans). Also, an average charge of nearly $3 per acre was reported for supplying the crop owner with GPS-based data. Therefore, actual rates charged for combining may sometimes be higher than the rate used in this study.

Efficiencies of Size

The adoption of larger equipment over time may have affected labor, depreciation and interest costs per acre. Lazarus in his most recent machinery cost estimates (Table 9) shows a decreasing cost per acre for chisel plowing, field cultivating, and drilling as the size of the implement and the tractor needed to pull it increase. Because the Prices Paid indices are based on constant machine sizes over time, they would not reflect cost efficiencies gained from moving to larger scale machinery, and the projected cost increases by 2014 could be overestimated. An exception is the total cost per acre for row crop planters, which actually increases with planter width (Table 9). This is primarily due to a large increase in the purchase cost of planters going from an 8-row to a 12-row model. In this case, a trend toward larger planters over time would cause custom operators' costs to increase faster than the Prices Paid indices. This is consistent with the reported custom rates for planting corn from the surveys being more than 100 percent of the projected rates. The data set from Lazarus did not include enough different sizes of sprayers, tandem disks or balers to compare costs by machine size.

A summary of data obtained from custom combine operators by Kansas State University (Dhuyvetter and Kastens) showed that the average number of wheat acres harvested per hour increased from 9.51 in 1997 to 13.92 in 2014, which could have resulted from a shift to larger-capacity combines.

Baling Hay

Net wrapping of large round bales is a technology that has been heavily adopted in the past two decades. This speeds up the baling process, and allows a custom baler to cover more acres in the same number of field days, which in turn reduces fixed costs per acre. Research done at the University of Wisconsin by Shinners, as reported in Agriculture.com, concluded that 32 percent more bales were formed in an hour using net wrap compared to twine. The custom rates for baling hay used in this study did not include net wrapping. In the 2015 Iowa survey, net wrapping of bales added $1.60 per bale to the average custom rate. However, the same article estimated that the wrapping material would cost $1.00 to $1.25 per bale, which would offset most of the higher custom charge.

Increased Field Hours

The adoption of tracks on tractors may improve traction and allow operators to perform field work in wetter conditions without increasing soil compaction, thus extending the number of days and hours they can operate in the spring. Automatic steering controls can

increase field efficiency, reduce operator fatigue, and allow longer work days. Both of these innovations tend to reduce total machinery costs by spreading fixed costs over more acres, which would not be captured by the Prices Paid index values. However, land owners who hire custom work done may not be willing to pay higher rates for options that provide little direct benefit to them.

Summary and Conclusions

Comparison of farm custom rates reported in surveys from Iowa and Kansas compared to projected rates estimated by inflating 1995 survey rates by the rate of increase in the costs of fuel, repairs, wages, interest, and depreciation imply that custom rates for some operations have come close to keeping up with costs. Reported rates for tandem disking, drilling small grain, planting corn, and spraying herbicide were within ten percent or less of the projected rates that would have been needed to keep up with cost increases since 1995.

Operations for which custom rates have not kept up were chisel plowing, field cultivating, baling hay, and combining corn. The first two operations are the most fuel-intensive operations analyzed, with 30 percent or more of their total costs coming from fuel and lubrication. Custom operators may not be giving sufficient weight to higher fuel costs when setting their rates, or improvements in tractor fuel efficiency may have caused the increases in fuel costs to be less than estimated. Actual costs per acre may be lower than estimated due to more acres being covered in a season.

Reported rates for combining corn were only two-thirds to three-fourths of the levels necessary to keep up with increased costs. However, increases in combining costs may be lower than estimated in this study due to economies of scale achieved by purchasing larger units, and improved efficiencies in harvesting systems that result in fixed machinery costs being spread over more harvested acres.

Current farm custom rates represent very efficient use of machinery and labor resources. By the same token, it is essential that custom operators accurately measure their costs and set their rates accordingly.

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Table 1. Average reported custom rates from Iowa surveys, $ per acre.

Year	Chisel plowing	Tandem disking	Field cultivating	Drilling small grain	Planting corn	Spraying	Combining corn	Baling hay, $/bale
1995	9.60	6.85	6.75	7.55	9.00	3.85	23.10	6.60
1996	9.55	7.05	6.85	8.15	9.70	3.90	22.90	6.80
1997	9.60	7.15	7.10	8.65	9.80	3.95	23.35	7.00
1998	9.65	7.25	6.95	8.90	9.95	4.00	23.40	7.20
1999	9.95	7.35	7.15	8.60	10.15	4.25	23.90	7.25
2000	9.85	7.50	7.30	8.75	10.50	4.30	24.05	7.25
2001	10.00	7.75	7.55	9.25	11.00	4.60	24.25	7.55
2002	10.45	7.90	7.70	9.35	11.35	4.70	23.85	7.35
2003	10.55	7.95	7.85	9.50	11.35	4.60	24.50	7.45
2004	10.70	8.10	7.60	9.65	11.60	4.75	24.15	7.75
2005	11.05	8.45	7.15	10.15	12.15	4.95	24.60	8.00
2006	11.80	9.05	8.45	9.95	12.60	4.90	25.70	8.35
2007	12.30	9.45	7.75	10.50	13.05	5.15	26.60	8.50
2008	13.70	10.20	10.10	12.00	14.60	5.60	28.10	9.20
2009	13.70	11.40	10.70	13.10	14.70	6.00	29.70	9.70
2010	13.30	11.60	10.85	13.00	14.70	6.10	29.90	9.80
2011	13.70	11.80	11.45	13.55	15.70	6.05	30.90	9.95
2012	14.90	12.55	12.30	14.50	17.70	6.35	31.85	10.85
2013	15.20	13.60	13.35	14.90	18.45	6.65	32.90	10.95
2014	16.15	14.20	13.80	15.30	19.25	6.90	34.15	11.05
2015	16.90	14.65	14.05	15.90	19.90	7.40	35.35	11.25
2015 as % of 1995	176%	214%	208%	211%	221%	192%	153%	170%

Source: Edwards and Johanns, 1995-2015

Table 2. Types of farm machinery included in the NASS-USDA prices paid survey indices.

Type	Description and Size
Tractor	2 wheel drive 50-59 PTO HP; 2 wheel drive 110-129 PTO HP; 2 wheel drive 140-159 PTO HP; 4 wheel drive 200-280 PTO HP
Combine	Self-propelled with grain head, large
Hay baler	Round, 1200-1500 pound bale
Chisel plow	16-20 feet
Disk harrow, tandem	Drawn, 18-20 feet
Field cultivator	Flexible, 20-25 feet
Grain drill	With fertilizers, 20-24 openers
Planter	Conservation/no till, with fertilizers, 12-row

Source: NASS-USDA, Price Program (Chapter 3)

Table 3. Price indices for machinery cost components, %, normalized to 1995=100%.

Year	Fuel, diesel	Repairs	Wage rates	Tractors	Self-propelled machinery	Other machinery	Interest rate
1995	100	100	100	100	100	100	100
1996	114	103	102	104	105	104	95
1997	114	106	107	108	109	109	96
1998	89	108	110	112	114	114	93
1999	101	109	113	116	117	120	91
2000	147	111	117	120	120	125	99
2001	138	115	121	123	122	130	82
2002	130	118	126	126	126	136	70
2003	156	121	127	128	130	142	63
2004	188	125	135	131	136	146	64
2005	264	130	145	134	143	151	74
2006	294	133	153	139	152	156	85
2007	323	137	161	144	161	161	83
2008	427	139	181	150	172	166	66
2009	265	142	194	157	183	171	61
2010	341	144	199	164	194	176	59
2011	450	150	208	172	206	180	56
2012	461	155	218	180	220	184	51
2013	447	156	224	188	232	189	49
2014	427	159	232	194	242	192	48

Table 4. Price indices for depreciation and interest, %, normalized to 1995=100%.

Year	Depreciation, tractors	Depreciation, self-propelled	Depreciation, other machinery	Interest, tractors	Interest, self-propelled	Interest, other machinery
1995	100	100	100	100	100	100
1996	104	105	104	99	100	99
1997	108	109	109	103	104	104
1998	112	114	114	104	105	106
1999	116	117	120	105	106	109
2000	120	120	125	119	119	124
2001	123	122	130	101	100	107
2002	126	126	136	88	88	96
2003	128	130	142	81	82	90
2004	131	136	146	84	87	94
2005	134	143	151	99	106	112
2006	139	152	156	118	129	133
2007	144	161	161	118	133	133
2008	150	172	166	99	113	109
2009	157	183	171	96	112	105
2010	164	194	176	98	116	105
2011	172	206	180	97	116	101
2012	180	220	184	93	113	95
2013	188	232	189	92	113	92
2014	194	242	192	94	117	93

Table 5. Share of total machinery cost accounted for by component (2014), %.

	Fuel	Repairs	Labor	Depreciation	Interest
Chisel Plowing	32	16	14	24	14
Tandem Disking	22	18	13	30	18
Field Cultivating	30	17	12	25	15
Drilling small grain	21	21	15	27	16
Planting corn	14	28	10	31	18
Spraying herbicide	14	29	12	28	17
Combining corn	18	16	10	36	20
Baling hay	12	22	15	32	19

Table 6. Overall cost index values by custom operation.

Year	Chisel plowing	Tandem disking	Field cultivating	Drilling small grain	Planting corn	Spraying	Combining corn	Baling hay
1995	100	100	100	100	100	100	100	100
1996	103	103	103	103	103	103	103	103
1997	107	107	107	107	107	107	106	107
1998	107	108	108	108	108	107	106	107
1999	111	111	111	112	111	110	109	110
2000	120	120	120	120	120	119	117	119
2001	118	118	118	118	118	118	116	118
2002	118	118	118	119	119	117	116	118
2003	121	121	121	121	121	121	119	122
2004	128	128	128	128	128	125	129	129
2005	164	164	165	160	158	158	165	163
2006	173	169	181	165	163	157	167	155
2007	192	185	202	180	177	170	194	166
2008	239	227	255	217	211	203	233	193
2009	178	171	182	169	164	168	180	163
2010	193	184	199	179	173	178	193	171
2011	235	209	233	207	188	200	212	187
2012	260	231	259	228	204	209	229	201
2013	258	230	256	227	204	209	229	201
2014	251	223	246	223	200	202	228	199

Table 7. Reported and projected Iowa average custom rates for 2015.

	Average custom rate from 2015 Iowa survey, $ per acre	Projected custom rate based on NASS Prices Paid indices, $ per acre	Survey rate as a % of the projected rate
Chisel plowing	16.90	24.10	70
Tandem disking	14.65	15.29	96
Field cultivating	14.05	16.57	85
Drilling small grain	15.90	16.84	94
Planting corn	19.90	18.01	111
Spraying herbicide	7.40	7.77	95
Combining corn	35.35	52.74	67
Baling hay (per round bale)	11.25	13.12	86

Source: Plastina, Johanns and Weets, 2015.

Table 8. Reported and projected Kansas average custom rates for 2013.

	Average custom rate from 2013 Kansas survey, $ per acre	Projected custom rate based on NASS Prices Paid indices, $ per acre	Survey rate as a % of the projected rate, 2013	
			Kansas	Iowa
Chisel plowing	12.71	17.65	72	61
Tandem disking	11.31	12.97	87	86
Field cultivating	10.40	13.42	77	76
Drilling small grain	13.58	12.65	107	86
Planting corn	14.71	13.99	105	101
Spraying herbicide	5.44	6.81	80	83
Combining corn	30.02	40.74	74	62
Baling hay (per round bale)	11.47	12.74	90	83

Source: Lamprecht, 2013.

Table 9. Estimated total cost per acre by size of machine.

Chisel plowing		Field cultivating		Drilling		Planting		Combining corn	
Size	Cost/ac.	Size	Cost/ac.	Size	Cost/ac.	Size	Cost/ac.	Size	Cost/ac.
15 ft.	$11.16	18 ft.	$6.85	16 ft.	$14.62	6 row	$13.24	6 row	$23.42
23 ft.	$11.07	47 ft.	$6.38	20 ft.	$13.83	8 row	$12.89	8 row	$20.58
37 ft.	$ 9.65	60 ft.	$5.28	25 ft.	$13.69	12 row	$16.02	12 row	$19.19
57 ft.	$ 8.64			30 ft.	$13.50	16 row	$17.67		
						24 row	$16.75		

Source: Lazarus, 2015.

Example 1. Combining corn, Iowa, 2015.

Reported average custom rate in 1995, $ per acre				$23.10
Prices Paid indices (NASS)			Index,	
Cost component	1995	2014	2014/1995	% of total cost
Fuel, diesel	88	376	427%	18%
Repairs	112	178	159%	16%
Labor	122	283	232%	10%
Self-propelled machinery (5-year moving average)	90	287	242%	
Other machinery (corn head) (5-year moving average)	91	175	192%	
Total depreciation (weighted average of SP and other)			232%	36%
Interest rate	10.15%	4.8875%	48%	
Combined interest expense			111%	20%
Total cost index, weighted by % of each cost component as % of total cost				228.3%
Projected corn combining rate for 2015 = $23.10 x 228.3%				$52.74
Reported corn combining rate for 2015 from survey				$35.35
Reported rate as % of projected rate = $35.35 / $52.74				67%

Figure 1. Prices paid indices normalized to 1995=100%.

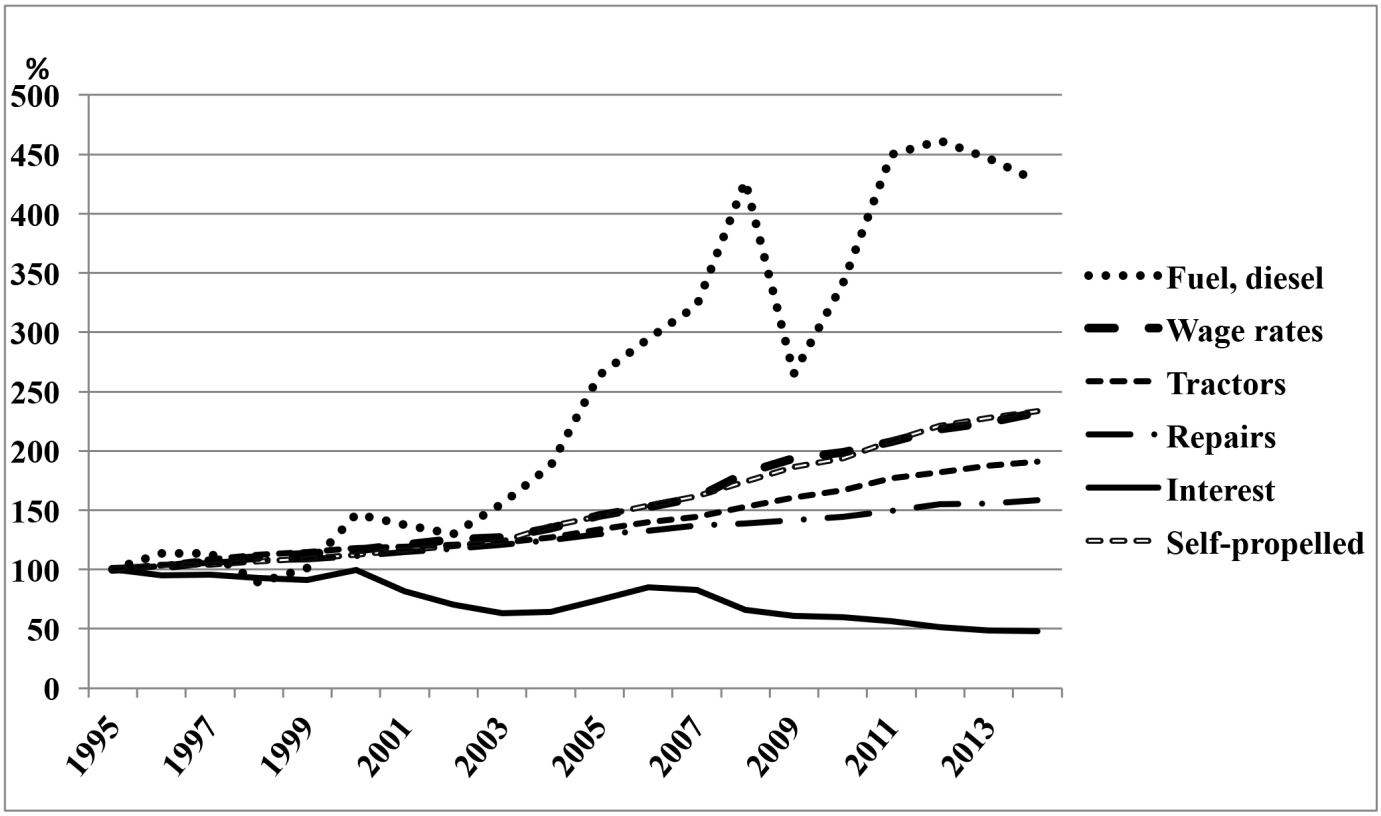

Figure 2. Planting corn: projected versus reported custom rate, $ per acre.

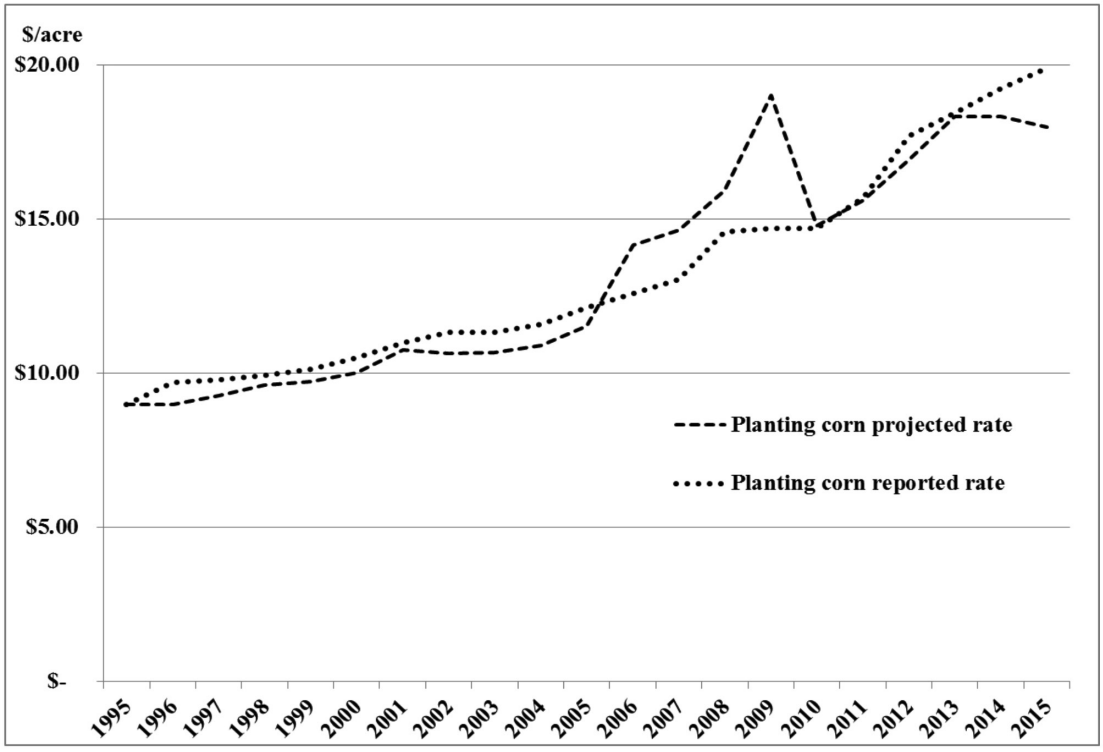

Figure 3. Corn combining: projected versus reported custom rate, $ per acre.

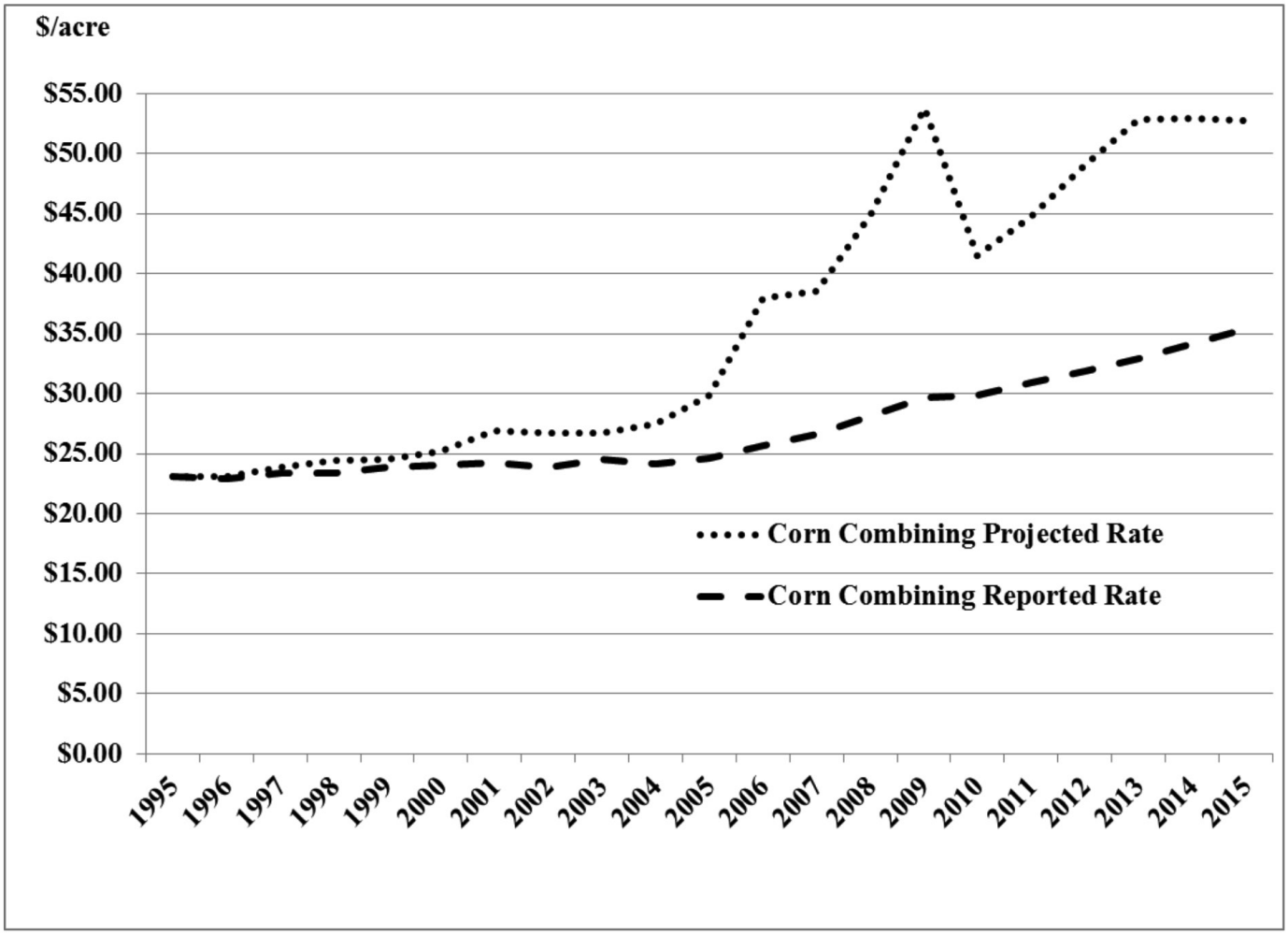

Figure 4. Fuel costs as a percent of total costs versus reported custom rates as a percent of projected rates.