ECONOMIC DEPRECIATION: EVIDENCE OF CHANGE FROM HIGH MARGIN TO LOW MARGIN PERIODS

Subtheme: Knowledge & Information

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Abstract:

Strong returns for US Midwestern field crops from 2006 to 2012 together with favorable tax incentives (bonus depreciation and Section 179 expensing) led to strong demand for new and used farm machinery and equipment over this period. The subsequent period (2013 to present) of lower crop prices and profit margins has led to relatively weaker demand and lower market values for used farm machinery and equipment. These lower market values for farm machinery and equipment sales and trade-ins have created a higher rate of effective economic depreciation for this machinery and equipment compared to the previous high profit period.

An analysis of farm machinery and equipment sales data from the online used farm equipment sales platform, Machinery Pete, allows us to examine the change in resale prices of used farm equipment over the period of profit margin change from 2002 through 2015. Change in resale price per unit and price per-hour-of-use of eight tractor models over this time series shows a change in economic depreciation. Farm machinery and equipment were found to have a lower resale value per unit and per-hour-of-use and therefore higher effective economic depreciation in the period of lower profit margins from 2013 through 2015.

Keywords: *depreciation, economic, machinery, per hour, change*

Introduction

Deterioration in profit margins for major US Midwestern field crops over the last four years has created a different environment with respect to farm machinery and equipment investment. Strong returns for US Midwestern field crops from 2006 to 2012 together with favorable tax incentives (bonus depreciation and Section 179 expensing) led to strong demand for new and used farm machinery and equipment over this period. The subsequent period (2013 to present) of lower crop prices and profit margins has led to relatively weaker demand and lower market values for used farm machinery and equipment. Weaker secondary farm machinery market values for farm machinery and equipment sales and trade-ins has created a higher rate of effective economic depreciation for this machinery and equipment compared to the previous high profit period. The low margin environment in much of the farm sector has led to more intense scrutiny by growers of all production costs including machinery and equipment depreciation.

An analysis of farm machinery and equipment sales data from the online used farm equipment sales platform, Machinery Pete, allows us to examine the change in resale prices of used farm equipment over the period of US Midwest grain farm profit margin change from 2002 through 2015. Change in resale price per unit and price per-hour-of-use of eight tractor models over this period reveals a change in effective economic depreciation. Farm machinery and equipment were found to have a lower resale value per unit and per-hour-of-use and therefore higher effective economic depreciation in the period of lower profit margins from 2002 through 2006 and 2013 through 2015.

Asset depreciation is an important cost to consider when operating a farm business. Economic depreciation normally focuses on the annual loss in value of durable assets due to use, wear, tear, age, and obsolescence. Use is a critical component when calculating depreciation for equipment with engines (powered equipment). Hours of engine use/separator use are key considerations in determining value of used equipment. Equipment trade-in or sales values are the equivalent of salvage value to an operator. The trade-in or sales price of equipment for business usage is the effective salvage value in determining actual economic depreciation of assets. The current low margin environment and corresponding weak secondary machinery and equipment markets have led to lower prices for these assets. The weaker markets and lower prices cause assets to have a higher effective economic

depreciation. This study will attempt to show whether economic cycles can be another determinant in economic depreciation.

Methods

Sales data was collected from the online Machinery Pete used farm equipment sales platform. This popular online sales platform provides an opportunity to collect sufficient sales data to conduct reliable analyses and seek significant findings. High horsepower tractors were targeted to focus the study on conditions prevalent with commercial farm operations. Sales data was analyzed for tractor makes and models on the Machinery Pete platform to determine the quantity and quality of sales data to determine which tractor makes and models would allow for a reliable analyses. Eight makes/models were selected to study based on the quantity and quality of data available. The models include the John Deere 7810 series, John Deere 8000 series, John Deere 8300 series, John Deere 8400 series, Case IH 7220 series, Case IH 7230 series, Case IH 7240 series and the Case IH 7250 series. When the model being tracked ceased to be manufactured, the replacement model with similar horsepower, capabilities and features was included in the time series. Data analysis required original purchase price of each model and secondary market sales price (used equipment sales price) of each used tractor along with hours of use.

The original purchase price of each make and model was collected from the Hot Line Farm Equipment Guide. The Manufacturers Suggested Retail Price (MSRP) was collected for each make and model analyzed.

The Machinery Pete data set included secondary market sales price (used market sales data) for U.S. markets with the majority of the sales data from states in the Midwest U.S. Data collected included the sales price, date of sale and hours of use at the point of sale. Useable data points totaled 286 for the John Deere 7810 series, 349 for the John Deere 8000 series, 444 for the John Deere 8300 series, 516 for the John Deere 8400 series, 184 for the Case IH 7220 series, 102 for the Case IH 7230 series, 230 for the Case IH 7240 series and 183 for the Case IH 7250 series.

The secondary market sales price was subtracted from the original purchase price to determine the value loss during the ownership period. This value loss can be understood as the effective economic depreciation of the asset. In this study, the tractors value loss shows

us the effective economic depreciation over the period from purchase to sale in the secondary market. By dividing the calculated economic depreciation by the hours of use we arrive at the economic depreciation per hour of use.

(MSRP – Sale Price) / Hours = Economic Depreciation per Hour

The economic depreciation per hour was averaged for each make/model from the data collected for each year to arrive at an average annual economic depreciation. This average annual economic depreciation per hour of use was then grouped into various sub-periods to compare how economic depreciation may change based on the economic conditions in the sector. Lastly, annual economic depreciation per hour of use for all makes/models in this study were averaged for each year. This allowed us to see the average change in economic depreciation from period to period for all tractors studied in a given year. We then grouped these averages into periods based on known high or low margin periods to see the effects of these margin environments on economic depreciation. This study spanning the 2002 through 2015 period allowed us to examine a period with large swings in margins, particularly for grain producers. The sub-periods identified for this study were 2007-2012, pre 2007 and post 2012. The periods were identified as a high margin period (2007-2012) and two lower margin periods (pre 2007 and post 2012). These periods were identified by examining both USDA data for Net Farm Income (Figure 1) and Returns to Land for Ohio field crops (Figure 2).

Figure 1

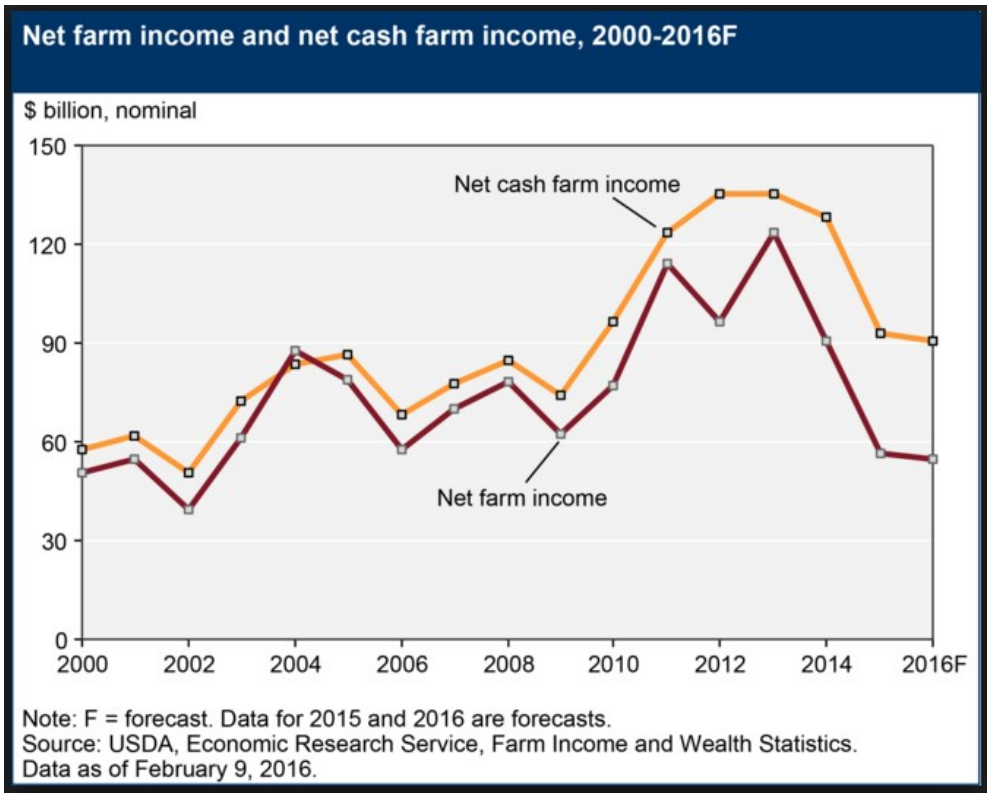
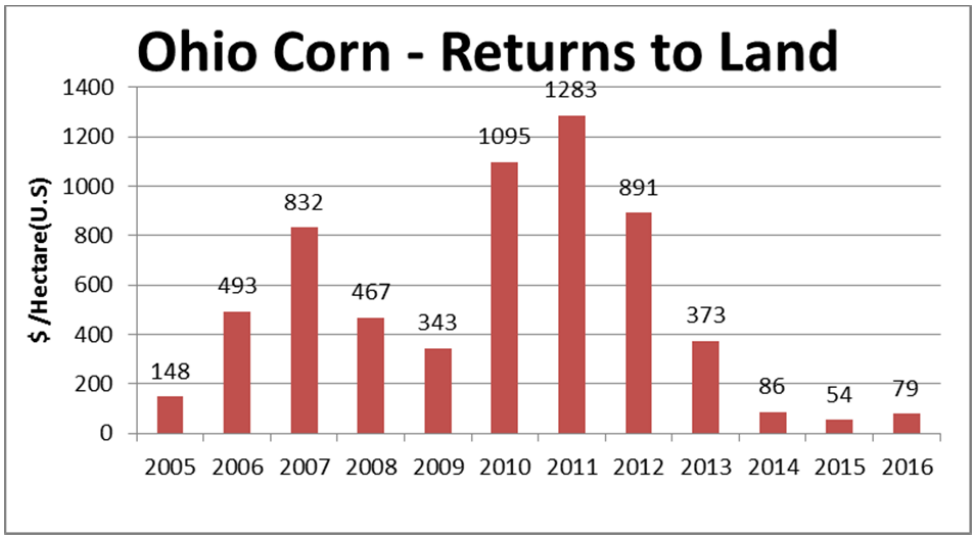


Figure 2



Results

An analysis of farm machinery and equipment sales data from the online used farm equipment sales platform, Machinery Pete, allowed us to examine the change in effective economic depreciation of used farm equipment from 2002 through 2015. This period was identified as one in which there was significant variation in profit margin for the primary customers/users of the farm machinery studied.

By dividing the calculated economic depreciation by the hours of use we arrive at the economic depreciation per hour of use.

(MSRP – Sale Price) / Hours = Economic Depreciation per Hour

The economic depreciation per hour was averaged for each make/model from the data collected for each year to arrive at an average annual economic depreciation.

Results from each make and model are displayed in Figures 3, 4 and 5. The data show a general trend lower from 2002 through 2012 for economic depreciation per hour of use for each tractor make and model studied followed by an uptrend post-2012.

Figure 3

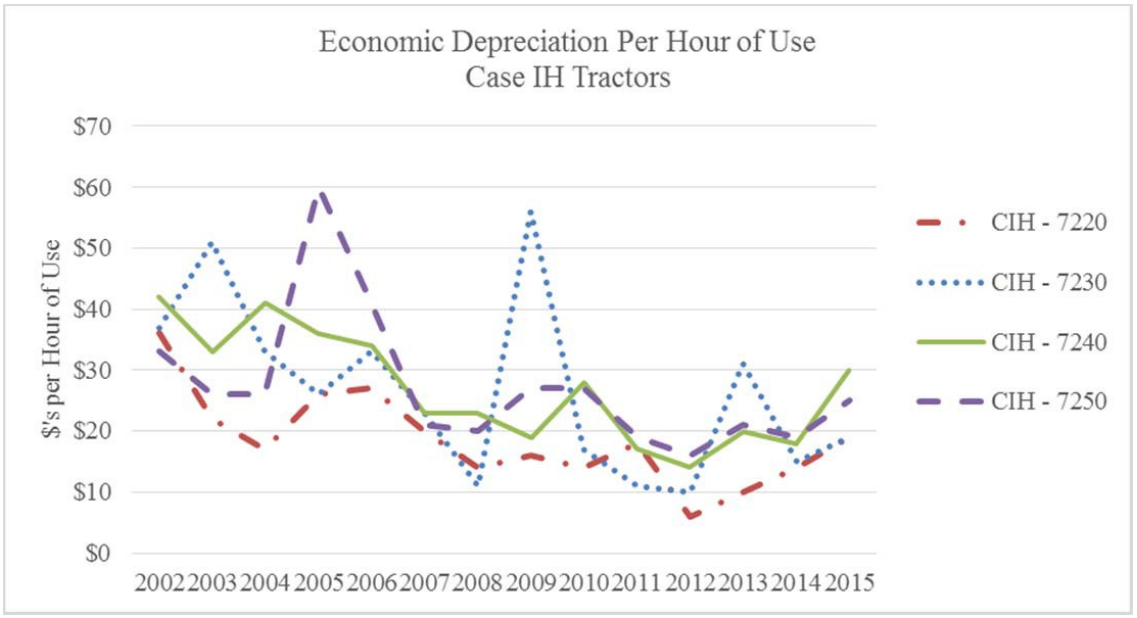
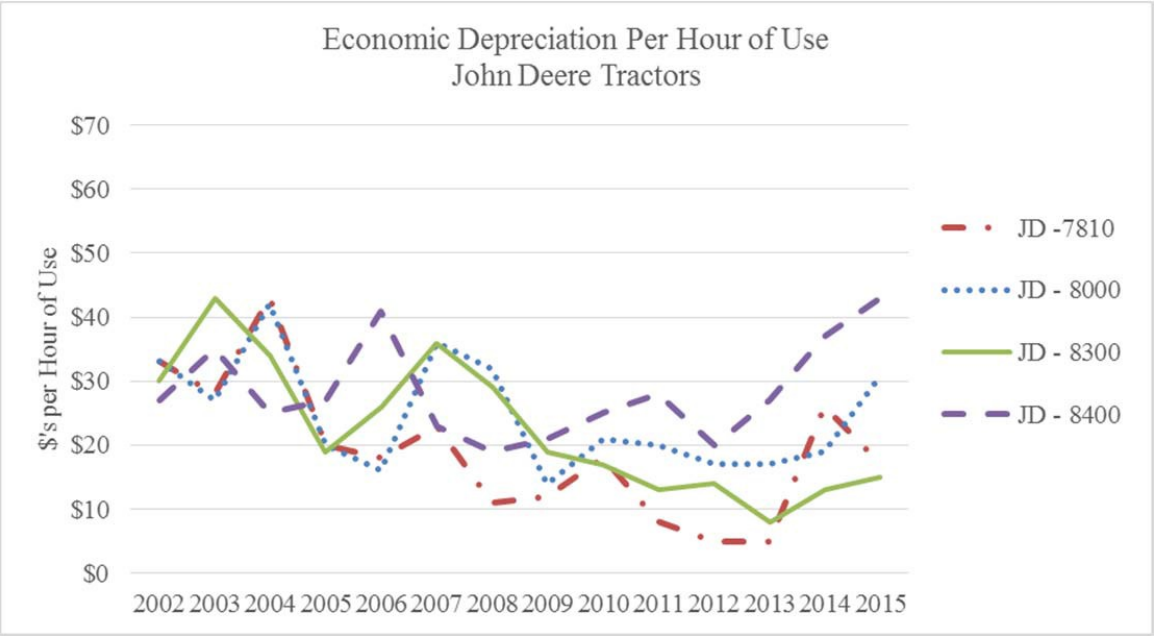


Figure 4

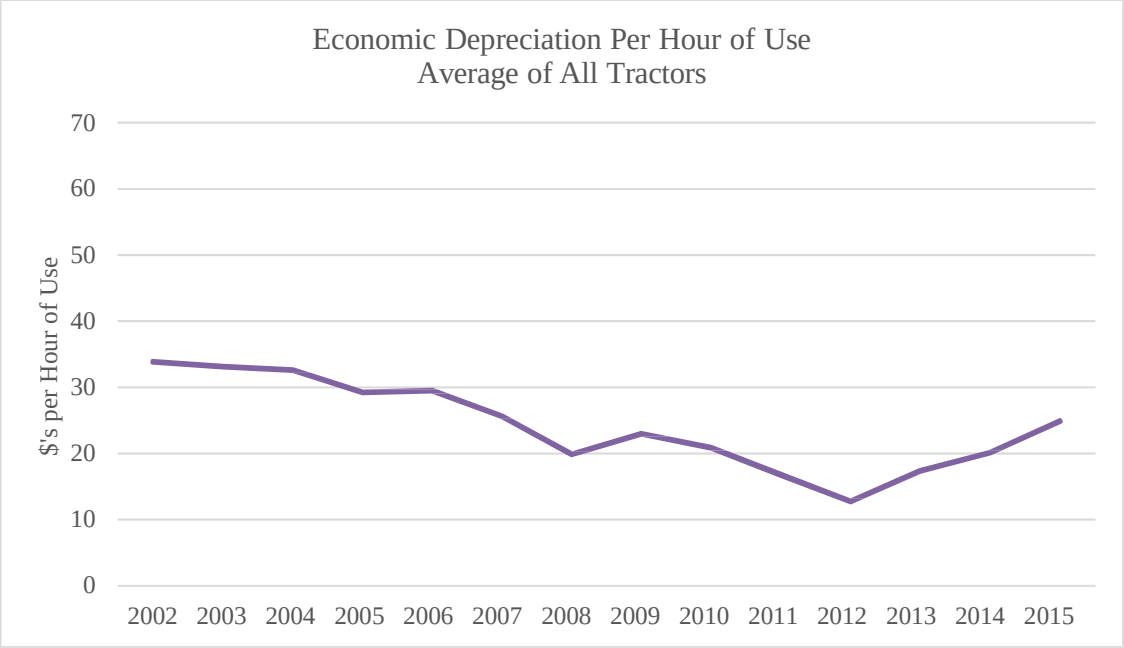


The economic depreciation of all tractor models averaged together per year is shown in Figures 5 and 6 and following the same trend. The average economic depreciation per hour of use of all tractors in 2002 was $34. The first year of the high margin period (2007) as identified in this study revealed an average economic depreciation per hour of use for all tractors of $26. The lowest yearly averages for economic depreciation for all tractors averaged together occurred toward the end of the high margin period in 2011 and 2012. In 2011, the economic depreciation per hour of use for all tractors averaged together was $17 while the economic depreciation per hour of use in 2012 for all tractors was $13.

Figure 5

	Economic Depreciation Per Hour of Use													
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
JD -7810	$33	$28	$43	$20	$18	$23	$11	$12	$18	$8	$5	$5	$26	$17
JD - 8000	$33	$27	$42	$20	$16	$36	$32	$14	$21	$20	$17	$17	$19	$31
JD - 8300	$30	$43	$34	$19	$26	$36	$29	$19	$17	$13	$14	$8	$13	$15
JD - 8400	$27	$35	$25	$27	$41	$23	$19	$21	$25	$28	$20	$27	$37	$43
CIH - 7220	$36	$22	$17	$26	$27	$20	$14	$16	$14	$18	$6	$10	$14	$19
CIH - 7230	$37	$51	$33	$26	$33	$23	$11	$56	$17	$11	$10	$31	$15	$19
CIH - 7240	$42	$33	$41	$36	$34	$23	$23	$19	$28	$17	$14	$20	$18	$30
CIH - 7250	$33	$26	$26	$60	$41	$21	$20	$27	$27	$19	$16	$21	$19	$25
Average	$34	$33	$33	$29	$30	$26	$20	$23	$21	$17	$13	$17	$20	$25

Figure 6



By grouping the years into the sub-periods based on relative profit margin environments yields data consistent with our expectations. Figure 7 summarize the averages calculated for the sub-periods in this study. The average depreciation for the 8 tractor models over the 2002-2015 period averaged $24 per tractor hour. The average depreciation for the 8 tractor models over the 2002-2006 period averaged $32 per tractor hour. The average depreciation for the 8 tractor models over the 2007-2013 period averaged $19 per tractor hour. The average depreciation for the 8 tractor models over the 2014-2015 period averaged $23 per tractor hour.

Figure 7

	Economic Depreciation Per Hour of Use				
Tractor Series	*2002-2015*	*2002-2006*	*2007-2013*	*2007-2015*	*2014-2015*
JD -7810	$19	$28	$12	$14	$22
JD - 8000	$25	$28	$22	$23	$25
JD - 8300	$23	$30	$19	$18	$14
JD - 8400	$28	$31	$23	$27	$40
Case IH - 7220	$19	$26	$14	$15	$17
Case IH - 7230	$27	$36	$23	$21	$17
Case IH - 7240	$27	$37	$21	$21	$24
Case IH - 7250	$27	$37	$22	$22	$22
Average	**$24**	**$32**	**$19**	**$20**	**$23**

Discussion

The tractors in this study were found to have a lower resale value per unit and per-hour-of-use and therefore higher effective economic depreciation in the period of lower profit margins from 2014 through 2015 compared to the preceding high margin period of 2007 through 2013. The high margin period of 2007 through 2013 has the lowest economic depreciation per hour of use of the 3 sub-periods identified. Higher profit margins leading to stronger demand for used equipment and higher relative resale and trade-in values are evident in the 2007-2013 sub-period. The $19 economic depreciation per hour of use is the lowest of any of the sub periods. Lower profit margins typically result in weaker farm machinery and equipment demand. This relatively weaker demand during lower margin periods leads to lower relative resale prices for farm equipment and in this study, tractors. Lower profit margins before and after this high margin period identified in this study as the 2002-2006 and 2014-2015 periods

Conclusions

The tractors examined in this study were found to have a lower resale value per unit and per-hour-of-use and therefore higher effective economic depreciation in the period of lower profit

margins from 2014 through 2015 compared to the period of higher profit margins from 2007 through 2013.

The results of this study provide evidence that economic depreciation does vary based on the margin environment. Calculation of economic depreciation per hour of use and the comparison of this economic depreciation per hour of use between different margin sub-periods reveals differences. Change in resale or trade-in price per unit and economic depreciation per-hour-of-use of select tractor makes/models over this time series implies a change in economic depreciation between periods of high profit margins and periods of low to negative profit margins.

These differences do reveal that high margin periods result in lower economic depreciation and that low profit margin periods result in higher economic depreciation due to weaker secondary markets and lower resale and trade-in prices. This leads to one conclusion that the general farm economy and associated profitability and the current profit margin environment and machinery and equipment demand should be considered when utilizing hourly economic depreciation measures. Following secondary farm machinery markets closely will enable a grower to more closely estimate their effective economic depreciation.

Additionally, calculating depreciation per machine hour for power equipment may be more accurate than traditional methods of calculating depreciation and should be considered as a primary driver when determining depreciation in addition to potential secondary drivers of acreage covered, age and obsolescence.

Additional consideration may also be given to changing the way depreciation of farm power equipment is taught and utilized in calculating costs for budgeting purposes.

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