

P.A.E.R. PURDUE AGRICULTURAL ECONOMICS REPORT

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THE BEARS CONTROL THE 2015 INDIANA FARMLAND MARKET

Craig L. Dobbins, Professor and Kim Cook, Research Associate

Last year at this time there were signals that the boom propelling crop agriculture upward for ten years was running out of gas. Since then, the continued low grain prices have begun to influence things other than net farm income. Purchases of machinery, buildings, farmland, and other capital items have declined. There has also been a steady flow of reports about declining farmland values in the Midwest. This year's Purdue Farmland Value Survey will be another such report.

This survey has been conducted in June for more than 40 years. Farmland market professionals are surveyed to track changes in Indiana's farmland market¹.

Farmland Values

For the state as a whole, all qualities of farmland declined. Top, average, and poor quality farmland declined by 5.1%, 3.8%, and 4.8%, respectively (Table 1). Top, average, and poor farm land quality had a per acre value of \$9,266, \$7,672, and \$5,863, respectively. This is the first time since 2009 that all three farmland quality classes declined. In 2009, there were small declines of 0.2%, 1.2%, and 1.7% for top, average, and poor quality land, respectively.

The state average corn yield for each farmland quality was up again this year. Top, average and poor farmland had expected yields of 200, 169, and

¹ The individuals surveyed include rural appraisers, agricultural loan officers, FSA personnel, farm managers, and

farmers. The results of the survey provide information about the general level and trend in farmland values.

137 bushels per acre, respectively. Dividing value by bushels per acre results in a cost per bushel of \$46.33, \$45.40, \$42.80, respectively for top, average, and poor land. On a per bushel basis there was only a difference of \$3.53 between the per bushel cost of top quality land and poor quality land. Higher yields and lower per acre values resulted in lower cost per bushel in 2015. The decline per bushel ranged from 7.0% to 8.3%.

As always, there were differences by region of the state. The state was divided into the six regions shown in Figure 1.

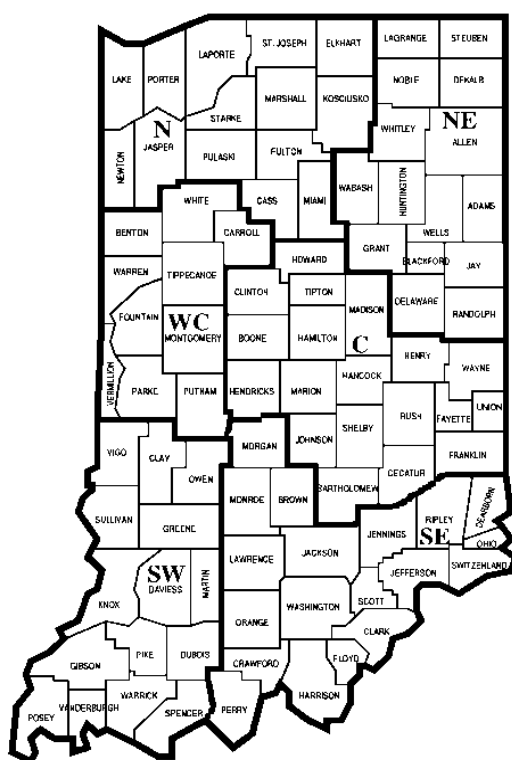


Figure 1. County clusters used in Purdue Land Value Survey to create geographic regions

Regions of the state that have historically seen the highest farmland values, the West Central and Central regions, experienced some of the larger declines (Table 1, page 3). In the West Central region per acre June farmland values declined 7.3% to 11.5%. In the Central region, June per

acre farmland declined 5.4% to 9.0%. In both cases, top quality farmland declined the most. In discussions of changes in farmland values, you often hear statements expressing the sentiment that top quality farmland is holding its value better than poor land. Data from these two regions do not support this conventional wisdom.

In the Southwest, farmland values were up. This is the only region to report an increase for all three farmland qualities.

The North, Northeast, and Southeast regions reported declines of 1.7% to 4.7% except for poor quality land in the Northeast and Southeast. Poor land in these two regions increased nearly 2.0%

The highest per acre farmland values continue to be in the West Central region of Indiana. Top, average, poor quality farmland had values of \$10,383, \$8,913, and \$6,926, respectively. For top quality farmland, the next highest was the Southwest region with a per acre value of \$10,218. For average and poor quality land the second highest values were in the Central region. The Southeast region continues to have the lowest per acre farmland values.

The value per bushel of corn declined in all regions and land qualities except for top quality land in the Southwest region. This region reported an increase of 4.7% for high quality farmland.

Cash Rents

On a state-wide basis cash rents for all farmland qualities were lower in 2015 than 2014. Top, average, and poor quality farmland had a cash rent of \$285, \$229, and \$175 per acre, respectively. These were decreases of 1.3% to 2.4%. This is the first time since 1999 that the survey reported a decline of all three farmland qualities.

With an increase in yields and a decrease in cash rent, cash rent per bushel declined. The decline per bushel for top, average, and poor quality land was \$0.03, \$0.01, and \$0.03, respectively.

Table 1. Average estimated Indiana land value per acre (tillable, bare land), per bushel of corn yield, and percentage change by geographical area and land class, selected time periods, Purdue Land Value Survey, June 2015¹

Area	Land Class	Corn bu/A	Land Value					Land Value/Bu			Projected Land Value	
			Dollars Per Acre			% Change		Amount	Amount	% Change	Dec. 2015	% Change
			June 2014	Dec 2014	June 2015	6/14-6/15	12/14-6/15	2014	2015	6/14-6/15	2015	6/15-12/15
	\$/A	\$/A	\$/A	%	%	\$	\$	%	\$	%		
North	Top	202	9,856	9,993	9,537	-3.2%	-4.6%	50.80	47.21	-7.1%	9,081	-4.8%
	Average	168	7,919	8,057	7,617	-3.8%	-5.5%	48.88	45.34	-7.2%	7,279	-4.4%
	Poor	136	5,888	6,219	5,611	-4.7%	-9.8%	45.29	41.26	-8.9%	5,427	-3.3%
Northeast	Top	191	9,310	9,356	9,061	-2.7%	-3.2%	49.26	47.44	-3.7%	8,717	-3.8%
	Average	161	7,753	7,845	7,588	-2.1%	-3.3%	48.46	47.13	-2.7%	7,311	-3.7%
	Poor	130	6,013	6,200	6,120	1.8%	-1.3%	45.55	47.08	3.4%	5,782	-5.5%
W. Central	Top	213	11,726	11,160	10,383	-11.5%	-7.0%	56.92	48.75	-14.4%	9,881	-4.8%
	Average	182	9,616	9,399	8,913	-7.3%	-5.2%	54.95	48.97	-10.9%	8,421	-5.5%
	Poor	156	7,611	7,851	6,926	-9.0%	-11.8%	51.78	44.40	-14.3%	6,866	-0.9%
Central	Top	202	10,528	10,202	9,578	-9.0%	-6.1%	52.64	47.42	-9.9%	9,155	-4.4%
	Average	173	8,640	8,650	8,176	-5.4%	-5.5%	50.82	47.26	-7.0%	7,839	-4.1%
	Poor	144	6,861	7,050	6,473	-5.7%	-8.2%	48.32	44.95	-7.0%	6,476	0.0%
Southwest	Top	204	9,041	10,264	10,218	13.0%	-0.4%	47.84	50.09	4.7%	9,901	-3.1%
	Average	167	7,006	7,723	7,522	7.4%	-2.6%	46.40	45.04	-2.9%	7,394	-1.7%
	Poor	124	4,513	4,978	4,892	8.4%	-1.7%	40.29	39.45	-2.1%	4,733	-3.3%
Southeast	Top	184	5,212	5,323	5,113	-1.9%	-3.9%	28.80	27.79	-3.5%	5,023	-1.8%
	Average	150	4,368	4,457	4,293	-1.7%	-3.7%	30.98	28.62	-7.6%	4,213	-1.9%
	Poor	114	3,360	3,598	3,423	1.9%	-4.9%	33.50	30.03	-10.4%	3,320	-3.0%
Indiana	Top	200	9,765	9,688	9,266	-5.1%	-4.4%	49.82	46.33	-7.0%	8,877	-4.2%
	Average	169	7,976	8,004	7,672	-3.8%	-4.1%	48.93	45.40	-7.2%	7,356	-4.1%
	Poor	137	6,160	6,304	5,863	-4.8%	-7.0%	46.67	42.80	-8.3%	5,721	-2.4%
	Transition ²	XXX	12,976	12,061	11,829	-8.8%	-1.9%				11,894	0.5%
Recreation ³	XXX	4,542	4,680	4,523	-0.4%	-3.4%				4,623	2.2%	

¹ The land values contained in this summary represent averages over several different locations and soil types. Determining the value for a specific property requires more information than is contained in this report and should include an evaluation by a professional appraiser.

² Transition land is land moving out of production agriculture into other, typically higher value, uses.

³ Recreation land is land located in rural areas used for hunting and other recreational uses.

As with farmland values, there were differences by region of the state. Some the largest declines in cash rent were in the West Central where cash rents declined 3.9% to 5.1%. Contrary to the conventional wisdom that says higher quality farmland holds its value better than poor quality farmland, the largest decline was in high quality farmland. The central region reported declines in cash rent of 2.8% to 4.6%.

In the North and Northeast regions the changes in cash rent were mixed. With the exception of high quality farmland in the North, the declines were small, ranging from 0.4% to 1.9%. The poor quality farmland in the North and top quality

farmland in the Northeast reported small increases in cash rent.

Both the Southwest and Southeast continue to report increases in cash rents. The southern portions of the state had the most favorable 2014 yields in relationship to their long-term trends.

Transition and Recreation Land, and Rural Home Sites

Transitional land represents farmland moving out of production agriculture and typically into a higher value use such as residential housing or commercial uses. While both the housing market and the overall general economy show signs of stronger growth, the average value of transition

farmland declined by 8.8% for the state. Since last year's survey indicated a 22.6% increase in average value, this year's decline is more likely a downward correction than a change in the direction of an upward trend. State-wide there was almost no change in the value of recreational land (Table 1).

These two markets are highly specialized. Values are strongly influenced by the planned use, tract size and location. Values in these markets have a very wide range. In June 2015, transitional land reports ranged from \$2,800 to \$35,000 per acre. Recreational land reports ranged from \$1,500 to \$10,500.

Because of the wide range of values in these markets, the median value² may give a more meaningful picture than the arithmetic average. On a state-wide basis, the median value of transitional land in June 2015 was \$10,000 per acre, the same value as reported in 2014. The median value for rural recreational land in June 2015 was \$3,500 per acre, \$375 less than in 2014.

Respondents were asked to estimate the value of rural home sites located on a blacktop or well-maintained gravel road with no accessible gas line

Table 2. Average estimated Indiana cash rent per acre, (tillable, bare land) 2014 and 2015, Purdue Land Value Survey, June 2015

Area	Land Class	Corn bu/A	Rent/Acre		Change '14-'15 %	Rent/bu. of Corn		Rent as % of June Land Value	
			2014 \$/A	2015 \$/A		2014 \$/bu.	2015 \$/bu.	2014 %	2015 %
North	Top	202	297	284	-4.4%	1.47	1.41	3.1	3.0
	Average	168	228	227	-0.4%	1.36	1.35	3.0	3.0
	Poor	136	166	167	0.6%	1.22	1.23	3.0	3.0
Northeast	Top	191	261	262	0.4%	1.37	1.37	2.9	2.9
	Average	161	205	203	-1.0%	1.27	1.26	2.7	2.7
	Poor	130	159	156	-1.9%	1.22	1.20	2.6	2.5
W. Central	Top	213	352	334	-5.1%	1.65	1.57	3.4	3.2
	Average	182	291	281	-3.4%	1.60	1.54	3.3	3.2
	Poor	156	233	224	-3.9%	1.49	1.44	3.4	3.2
Central	Top	202	305	296	-3.0%	1.52	1.47	3.2	3.1
	Average	173	248	241	-2.8%	1.43	1.39	3.0	2.9
	Poor	144	197	188	-4.6%	1.38	1.31	3.0	2.9
Southwest	Top	204	277	278	0.4%	1.36	1.36	2.7	2.7
	Average	167	204	216	5.9%	1.22	1.29	2.7	2.9
	Poor	124	143	149	4.2%	1.15	1.20	2.9	3.0
Southeast	Top	184	186	202	8.6%	1.01	1.10	3.6	4.0
	Average	150	141	152	7.8%	0.95	1.01	3.2	3.5
	Poor	114	98	118	20.4%	0.86	1.04	2.8	3.4
Indiana	Top	200	292	285	-2.4%	1.46	1.43	3.1	3.1
	Average	169	232	229	-1.3%	1.37	1.36	3.0	3.0
	Poor	137	179	175	-2.2%	1.31	1.28	3.0	3.0

¹ The cash rent reported in this summary represents averages over several different locations and soil types. Determining an appropriate cash rent for a specific property requires more information than is contained in this report. You may also want to obtain advice from a professional that manages agricultural properties.

or city utilities. Like transitional farmland and recreational farmland these properties have a very wide range in value. Because of this wide range, median values are reported. The median value for five-acre home sites ranged from \$8,000 per acre in the Southeast region to \$11,000 per acre in the West Central and Central region (Table 3). Reported per acre median values of the larger tracts (10 acres) ranged from \$8,250 per acre in the Southeast region to \$11,000 per acre in the West Central, region. For 2015, the home site data indicate that the change in values was mixed.

² The median is the middle observation in data arranged in ascending or descending numerical order.

Table 3. Median value of five-acre and ten-acre unimproved home sites

Area	Median value, \$ per acre							
	5 Acres or less for home site				10 Acres & over for subdivision			
	2012 \$/A	2013 \$/A	2014 \$/A	2015 \$/A	2012 \$/A	2013 \$/A	2014 \$/A	2015 \$/A
North	8,000	8,500	8,500	10,000	7,500	8,000	8,750	10,000
Northeast	8,350	8,500	10,000	9,500	7,700	10,000	10,000	9,000
West Central	8,250	10,000	10,000	11,000	9,750	9,000	14,000	11,000
Central	9,500	12,000	12,000	11,000	9,250	10,000	10,000	10,000
Southwest	8,775	10,000	9,500	10,000	9,000	10,000	9,500	10,000
Southeast	10,000	6,000	9,000	8,000	7,000	7,000	9,000	8,250

reported. The bottom of the vertical lines indicates the minimum price reported. The square on the line is the average.

Figure 3 (page 6) illustrates the same information for cash rents. In

The number of regions with an increase were just about the same as the number of regions with a decrease from June 2014 to June 2015.

Range of Responses

Tables 1 and 2 provide information about the averages of the survey responses. Averages are helpful in establishing a general value for farmland and cash rent and the direction in which values and rents are moving across time. However, it is important to remember that an average is developed from a number of responses about perceived values and cash rents.

In some cases, responses might be closely clustered around the average. In other cases, the responses may be widely dispersed because of a wide difference in the respondent's perceptions. It is possible to have the same, or nearly the same, average with either type of dispersion. Figure 2 illustrates these properties for farmland values. The top of the vertical lines is the maximum price

both the case of farmland value and cash rent, the survey provides a general guide to values or rents but does not indicate a farmland value or cash rent for a specific farm. Arriving at a value or cash rent for a specific farm requires additional research and maybe some assistance from a professional.

Cash Rent and Farmland Value

There are many factors that influence farmland values. One very important influence of farmland values is the net return generated for the farmland owner. Cash rents are used as a proxy for the owner's return. Dividing the farmland value by the

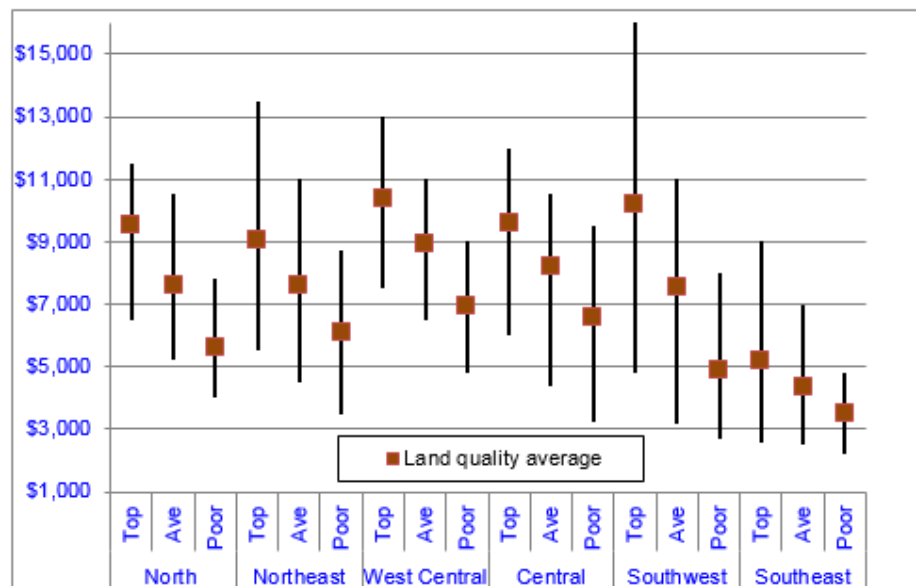


Figure 2. Maximum, average and minimum value per acre by farmland quality and region, June 2015

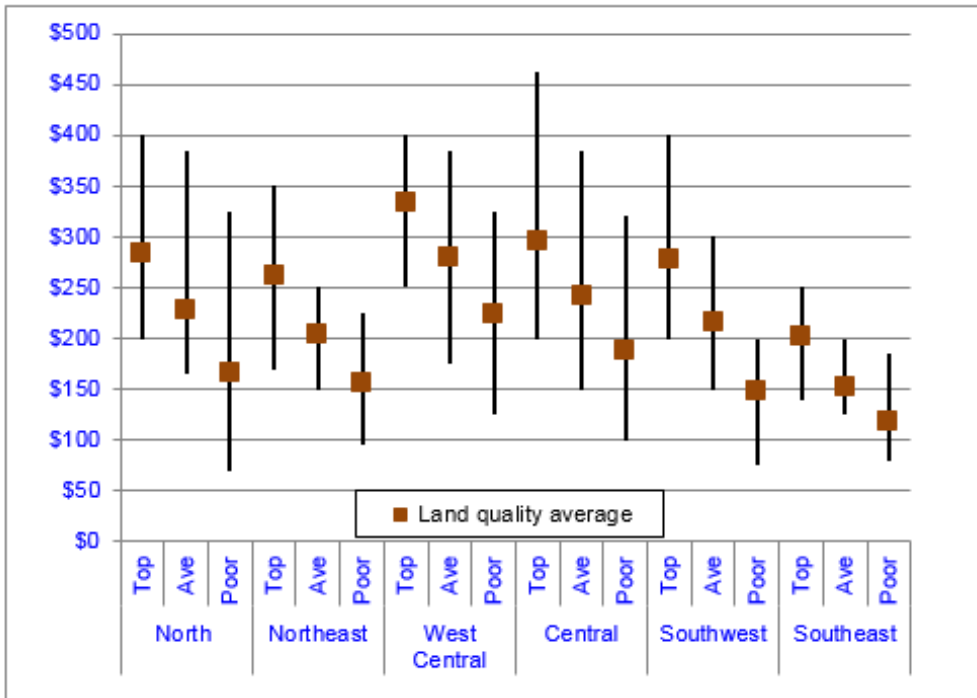


Figure 3. Maximum, average and minimum cash rent per acre by farmland quality and region, June 2015

cash rent provides the farmland value to income multiple. Some refer to this as the price-earnings ratio for farmland. Regardless of the label, this measure represents how much market participants are willing to pay for \$1 of annual farmland income.

This multiple has been steadily increasing from a value of 12.4 in 1986. It reached an all-time high in 2014 at 34.4. In 2015, the multiple declined to 33.5. This is only the fourth time since 1986 that the multiple has declined. (Figure 4)

What might lead people to pay 2.7 times more for \$1 of annual income on farmland in 2015 as in 1986? Three possibilities include: 1) the decline in interest rates. Economics indicates that as interest rates decline, the discount rate will decline and market participants will value future income more highly; 2) increasing expectations about the growth in the net return. Given the high margins experienced over the past several years and discussions about the need to feed a

growing world population, it is likely that buyers become more optimistic about the growth rate of returns; and 3) buyers may view farmland purchases as less risky than alternative investments. This lowers the risk premium required for farmland purchases and increases the amount buyers are willing to pay for farmland.

Market Drivers

To obtain additional insight into the drivers influencing current farmland values, respondents were asked

to rate eleven different items.

These items included: 1) current net farm income, 2) expected growth in returns to land, 3) crop price level and outlook, 4) livestock price level and outlook, 5) current and expected interest rates, 6) returns on competing investments, 7) outlook for U.S. agricultural export sales, 8) U.S. inflation rate, 9) current inventory of land for sale, 10) cash liquidity of buyers, and 11) current U.S. agricultural policy.

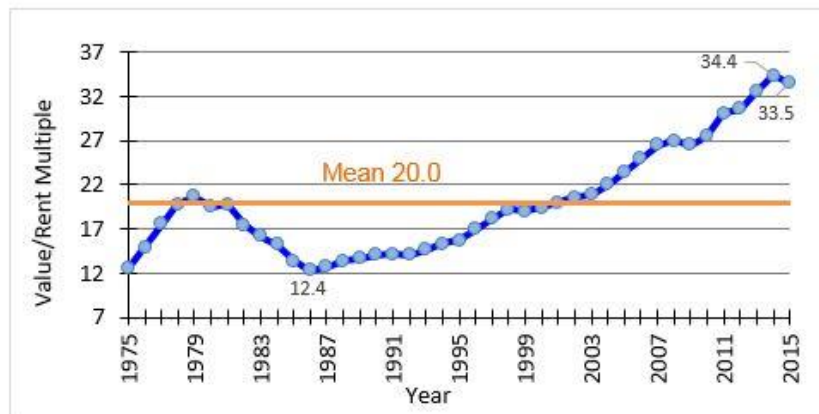


Figure 4. Value to rent multiple for average Indiana farm land, 1975 - 2015.

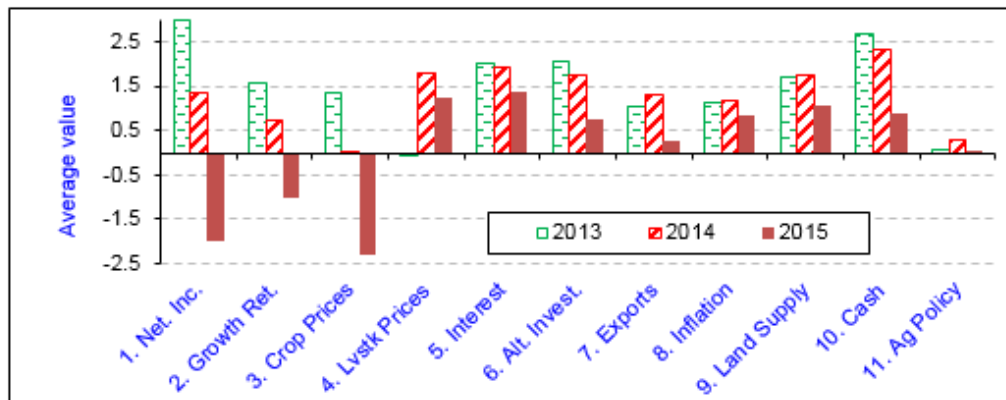


Figure 5. Influence of selected factors on Indiana farmland values

Respondents used a scale from -5 to +5 to indicate the effect of each item on farmland values. A negative influence is given a value from -1 to -5, with a -5 representing the strongest negative influence. A positive influence was indicated by assigning a value between 1 and 5 to the item, with 5 representing the strongest. An average for each item was calculated.

In order to provide a perspective on the changes in these influences, data from 2013, 2014, and 2015 are presented in Figure 5.

Respondents' expectations of net farm income, growth in returns, and crop prices have become negative.

Expectations for some forces influencing farmland prices are still positive, but their strength has declined. These include livestock prices, interest rates, and the supply of farmland on the market. The cash position of buyers remains positive but is much less positive than in 2013 and 2014.

Another noticeable change in market drivers is agricultural policy. Agricultural policy is currently viewed as not having much influence on farmland values. In the past, agricultural policy has been an important contributor to increasing values or a mechanism for supporting farmland values.

Future Expectations

The 2015 Purdue Farmland Value Survey indicates farmland values have changed directions for at

least one year. To obtain a sense for what respondents see happening in the future, they were asked to forecast farmland values for the last half of 2015 and for five years into the future.

Table 1 contains the forecast for December 2015. On a state-wide basis, respondents expect

farmland values to continue to move downward. State-wide farmland values of top, average, and poor farmland are expected to decline 4.2%, 4.1% and 2.4%.

On a regional basis, the expected decline in farmland values varies. The larger declines are expected in the North, Northeast, West Central and Central regions. The smaller expected declines are expected in the Southwest and Southeast. This again is likely because of very favorable 2014 yields in the Southern portion of the state.

When asked to forecast farmland values five years from now, 26% of the respondents expect farmland values to be higher. There was a smaller number of respondents in this group when compared to 2014 when 40% expected farmland values to increase. The expected increase in farmland values in 2015 was 8.6% compared to 13% in 2014. If this change is realized, this increase will be much smaller than the historical five year increase.

Twenty-six percent of the respondents expected farmland values to be the same in five years.

Forty-eight percent of the respondents expect farmland values to decline. This compares to 40% in 2014. The expected average decline was 14%

Expectations about future market conditions have a strong influence on farmland values. To obtain information about their future expectations, survey

respondents were asked to provide an estimate of the average corn and soybean price for the period 2015 to 2019. On average, survey participants expect corn prices to average \$4.02 per bushel, a decline of \$0.68 from their 2014 estimate (Table 4). The estimated five-year soybean price decreased \$2.26 to \$9.76 per bushel. Both of these prices are likely to be less than the break-even price for corn and soybeans. These price expectations have quickly changed. In 2013, corn was expected to average \$5.52 per bushel and soybeans \$12.16 over five years.

Interest rates have important implications for real estate markets. As interest rates decline, the price of real estate tends to increase. There has been a general decline in interest rates for the past 30 years. Interest rates have reached a level where there seems to be little possibility of further declines. Signals from the Federal Reserve Bank indicate they plan to begin to raise interest rates this fall. The FED's long-run target is to add 4% to interest rates. Survey respondents' expectations about the average long-term interest rate over the next five years indicates an expectation that interest rates will remain low.

Inflation does not seem to be a worry. The expected inflation rate for the next five years is expected to be 2.4%. This is a decline of 0.3% from the 2014 estimate.

Given the high grain prices of the past several years and the large increase in farmland values, a period of steady or declining farmland values would not be surprising. The wet summer weather in the Eastern Corn Belt appears likely to shorten the 2015 corn and soybean crop, which may influence Indiana land values. The path that farmland and cash rent values take in 2016 will also depend on the global supply and demand for grains and oil seeds.

Concluding Comment

Lower crop prices and continued high costs have led farmland values and cash rents to decrease. In 2015 farmland values declined statewide by 3.8%

to 5.1% depending on land quality. Survey respondents expect further declines in the last half of 2015.

Statewide cash rents for 2015 decreased 1.3% to 2.4%

Based on prices for corn and soybeans in the futures market for 2016, 2017, & 2018 and the current costs of corn and soybean production, crop prices are below the total cost of production for many farmers. This means that the economic profits of the past several years have become economic losses.

Farmers will be looking for ways to reduce their cost of production per bushel and lower land costs will be one of the places they will look.

For Purdue crop costs estimates see 2015 Purdue Crop Cost & Return Guide at:

https://ag.purdue.edu/commercialag/Documents/Resources/Management-Strategy/Crop-Economics/2015_03_01_Dobbins_Purdue_Crop_Guides.pdf

Table 4. Projected five-year average corn and soybean prices, mortgage interest, and inflation

Year	Prices, \$ per bu.		Rate, % per year	
	Corn	Beans	Interest	Inflation
2011	\$5.68	\$11.59	6.1%	3.3%
2012	\$5.56	\$12.04	5.2%	3.1%
2013	\$5.52	\$12.16	5.1%	2.7%
2014	\$4.70	\$12.02	5.0%	2.7%
2015	\$4.02	\$9.76	5.0%	2.4%
Average	\$5.10	\$11.51	5.3%	2.8%

Purdue Land Value and Cash Rent Survey

The Purdue Land Value and Cash Rent Survey is conducted each June. The survey is possible through the cooperation of numerous professionals knowledgeable of Indiana's farmland market. These professionals include farm managers, appraisers, land brokers, agricultural loan officers, Purdue Extension educators, farmers, and persons representing the Farm Credit System, the Farm Service Agency (FSA) county offices, and insurance

companies. Their daily work requires that they stay well informed about land values and cash rents in Indiana.

These professionals provide an estimate of the market value for bare poor, average, and top quality farmland in December 2014, June 2015, and a forecast value for December 2015. They also provide an estimate of the current cash rent for each farmland quality. To assess the productivity of the land, respondents provide an estimate of long-term corn yields. Respondents also provide a market value estimate for land transitioning out of agriculture and recreational land.

Responses from 204 professionals are contained in this year's survey representing all but nine Indiana counties. There were 29 responses from the North region, 33 responses from the Northeast region, 45 responses from the W. Central region, 48 responses from the Central region, 25 responses from the Southwest region, and 24 responses from the Southeast region. Figure 1 illustrates the counties in each region.

Appraisers accounted for 27% of the responses, farm loan professionals represented 32% of the responses,

farm managers and farm operators provided 21% of the responses, 12% government service, and other professionals provided 8% of the responses.

We express a special appreciation to the support staff of the Department of Agricultural Economics. Tracy Buck coordinated survey mailings and handled data entry. Without her assistance and the help of others the survey would not have happened.

The data reported here provide general guidelines regarding farmland values and cash rent. To obtain a more precise value for an individual tract, contact a professional appraiser or farm manager that has a good understanding of the local situation.

All prior reports are located at the Department Web Site <https://ag.purdue.edu/commercialag/Pages/Resources/Farmland/Land-Prices/PAER-Archive.aspx>

INDIANA PASTURE LAND, IRRIGATED FARMLAND, HAY GROUND, AND ON-FARM GRAIN STORAGE RENT

Craig L. Dobbins, Professor and Kim Cook, Research Associate

Estimates for the rental value of irrigated farmland, pasture land, hay ground, and on-farm grain storage in Indiana are often difficult to find. For the past several years, questions about these items have been included in the Purdue Farmland Value Survey. The values from the June 2015 survey are reported here. Because the number of responses for some items is small, the number of responses is also reported.

Averages for pasture rent, the market value of and cash rent for irrigated farmland, and the rental of on-farm grain storage are presented in Tables 1, 2, and 3, respectively. The rental rate for grain bins

includes two situations; one for just the bin and a second for the bin and utilities. Table 4 (page 11) provides information about the rental rate for established alfalfa-grass and grass hay ground.

Information from prior years' surveys can be found in the Purdue Agricultural Economics Report archive:

<http://www.agecon.purdue.edu/extension/pubs/paer/archive.asp>

This information can be found in the August issue beginning in 2006.

Table 1. Pastureland: Number of responses, annual cash rent, and carrying capacity, June 2015

Region	Number of responses	Annual rent (\$ per acre)	Carrying Capacity (acres per cow)
North	19	\$106	2.2
Northeast	14	\$109	2.1
West Central	24	\$170	1.3
Central	21	\$110	1.7
Southwest	9	\$62	2.2
Southeast	19	\$56	1.9
State	106	\$109	1.8

Table 2. Irrigated farmland: Number of responses, estimated market value, annual cash rent and rent as a percent of farmland value, June 2015

Region ¹	Number of responses	Corn Yield (bu. per acre)	Market Value (\$ per acre)	Cash Rent (\$ per acre)	Rent as % of Land Value
North	17	235	\$9,929	\$337	3.4%
Northeast	6	238	\$8,333	\$302	3.6%
West Central	11	253	\$13,340	\$424	3.2%
Central	7	253	\$12,000	\$402	3.3%
Southwest	7	218	\$8,571	\$289	3.4%
State	49	238	\$10,616	\$353	3.3%

¹ There was an insufficient number of responses for the Southeast region to report values. The values from this region are included in the state total.

Table 3. On-Farm grain storage rental: Number of responses and annual per bushel rent, June 2015

Region	Bins only		Bins and electric utilities	
	Number of responses	Rent (\$/bu.)	Number of responses	Rent (\$/bu.)
North	29	\$0.25	18	\$0.32
Northeast	18	\$0.12	17	\$0.17
West Central	28	\$0.38	25	\$0.55
Central	20	\$0.32	20	\$0.38
Southwest	7	\$0.14	9	\$0.20
Southeast	14	\$0.13	14	\$0.17
State	106	\$0.25	103	\$0.33

Table 4. Rental of established alfalfa and grass hay ground, June 2015

Region	Alfalfa/Alfalfa-Grass Hay		Grass Hay	
	Responses	Rent (\$/A)	Responses	Rent (\$/A)
North	15	\$180	15	\$141
Northeast	15	\$186	13	\$145
West Central	20	\$229	18	\$203
Central	10	\$205	8	\$192
Southwest	5	\$90	5	\$60
Southeast	17	\$81	17	\$60
State	82	\$203	76	\$138

IS FARMLAND STILL AN ATTRACTIVE INVESTMENT? AN UPDATE

Timothy G. Baker, Michael D. Boehlje, and Michael R. Langemeier, Professors

A year ago in this publication we examined evidence that farmland values had become very high relative to underlying fundamentals. During the past year, farmland prices declined over much of the Corn Belt. However, farmland prices still remain substantially above historical prices. For example, farmland prices in 2015 in West Central Indiana are 78% higher than they were in 2010 and 287% higher than they were in 2005 (for current land values see Dobbins and Cook, in this edition of PAER). Concerns are still being expressed that farmland prices are higher than justified by the fundamentals. One justification for this concern is that previous research has established the tendency of the farmland prices to over-shoot their fundamental value.

In this article we have updated our various measures with the lower 2015 land values and have highlighted how these changes have begun a process of adjustment in the various ratios. Some of the text in this article is the same as last year's article because we believe it is important for land owners and investors to understand these basic principles.

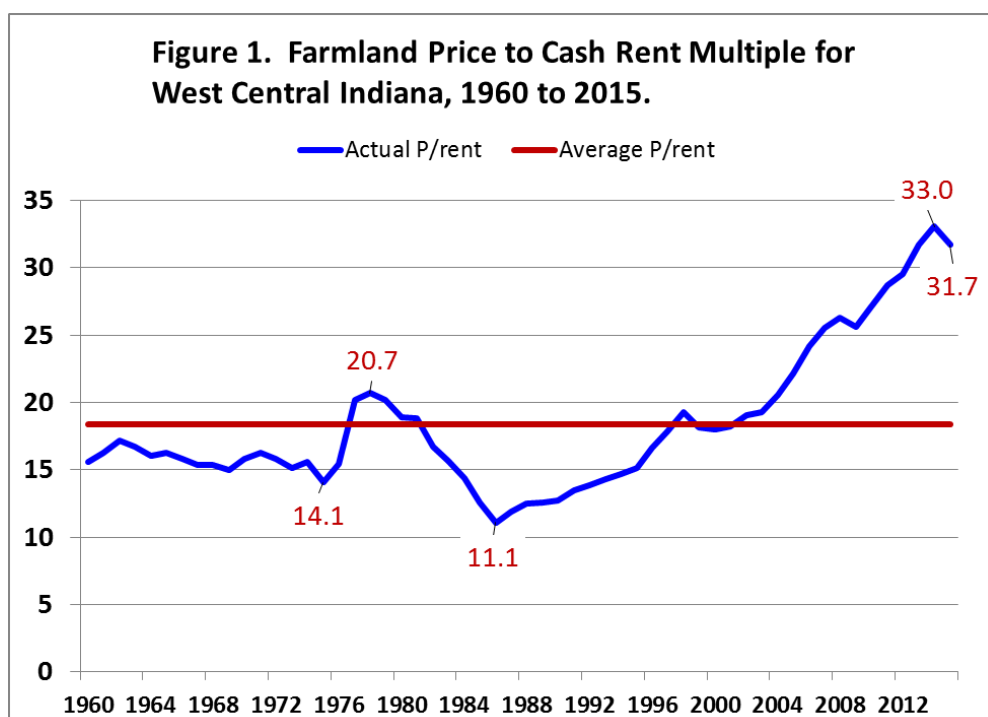
Price in Relationship to Earnings

A standard measure of value used for stocks is the price to earnings ratio (P/E). A high P/E ratio sometimes indicates that investors think the investment has good growth opportunities, relatively safe earnings, a low capitalization rate, or a combination of these factors. However, a high P/E ratio may also indicate that an investment

is less attractive because the price has already been bid up to reflect these positive factors.

The equivalent ratio of farmland price to cash rent ratio (P/rent) can be compared to the P/E ratio of stocks included in the S&P 500. We use land value and cash rent data for 1960 to 2015 for West Central Indiana to illustrate the P/rent ratio. Data from 1975 to 2015 were obtained from the annual Purdue Land Value and Cash Rent Survey. For 1960 to 1974, the 1975 Purdue survey numbers were indexed backwards using the percentage change in USDA farmland value and cash rent data for the state of Indiana.

The P/rent ratio for West Central Indiana has an average value of 18.4 over the 56 year period from 1960 to 2015, with a high of 33.0 in 2014 and a low of 11.1 in 1986, which was perhaps the bottom after the price bubble of the 1970s and very early 1980s, (Figure 1). During that bubble, the P/rent ratio rose from 14.1 in 1975 to 20.7 in 1978. The



P/rent ratio subsequently dropped to its low in 1986. The early and mid-1980s is recognized as a difficult period of adjustment for U.S. agriculture.

Over the past year, land values fell more than cash rents decreased thus resulting in a drop in the P/rent ratio to 31.7. While this is a slight movement back toward the historic average of 18.4 and previous high around 20, the continued extremely high level at least raises concerns that current farmland prices could be overvalued in relationship to returns. In addition, it should be recognized that the downward adjustment of the P/rent ratio from 1978 to 1986 took eight years. This raises the question whether the drop in the P/rent ratio over the past year is just the start of a longer adjustment process?

Farmland versus Stock

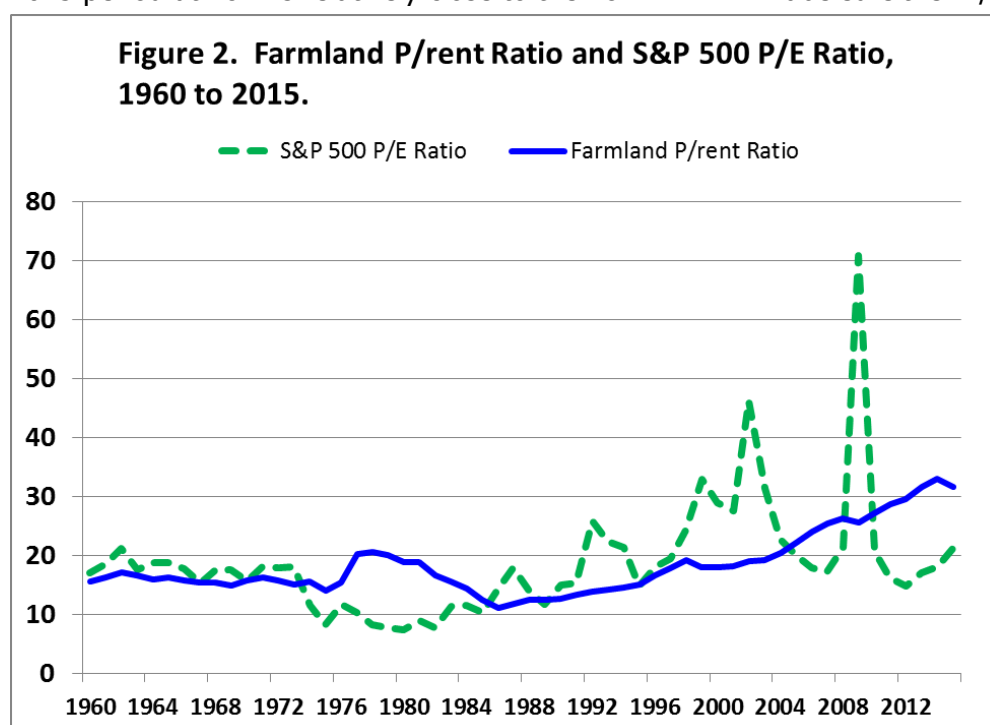
A comparison of the P/rent ratio to the P/E ratio used for stocks provides insight into the comparative attractiveness of farmland as an investment. Figure 2 shows the P/E ratio for the S&P 500 and the P/rent ratio for farmland. The average P/E ratio for the S&P 500 for the 1960 to 2015 period at 18.7 is relatively close to the 18.4

average for the P/rent ratio for farmland. The P/E ratio for stocks was generally higher than the P/rent ratio for farmland from 1986 to 2004. Since 2004, except for 2009 which exhibited a very high P/E ratio for stocks, the P/rent ratio for farmland has been higher than the stock P/E ratio. In addition, to being relatively high, the P/rent ratio has exhibited an upward trend in the last ten years.

The current P/rent ratio of 31.7 is well above the average P/E multiple of 18.7 and the current P/E ratio of 21.2. From an investor viewpoint, to receive \$1,000 of earnings they would have to buy \$31,700 of farmland compared to only \$21,200 worth of stock to get the same \$1,000 of annual earnings. For 2015, these two ratios have started a process of convergence, but their continued wide gap is at least a signal that farmland prices are very high compared to alternative investments in the stock market.

Cyclically Adjusted P/Rent

To smooth out some of the sharp fluctuations in the P/E ratio Shiller (2005; 2014) uses a 10-year moving average for earnings in the P/E ratio, often labeled either P/E10 or cyclically adjusted P/E



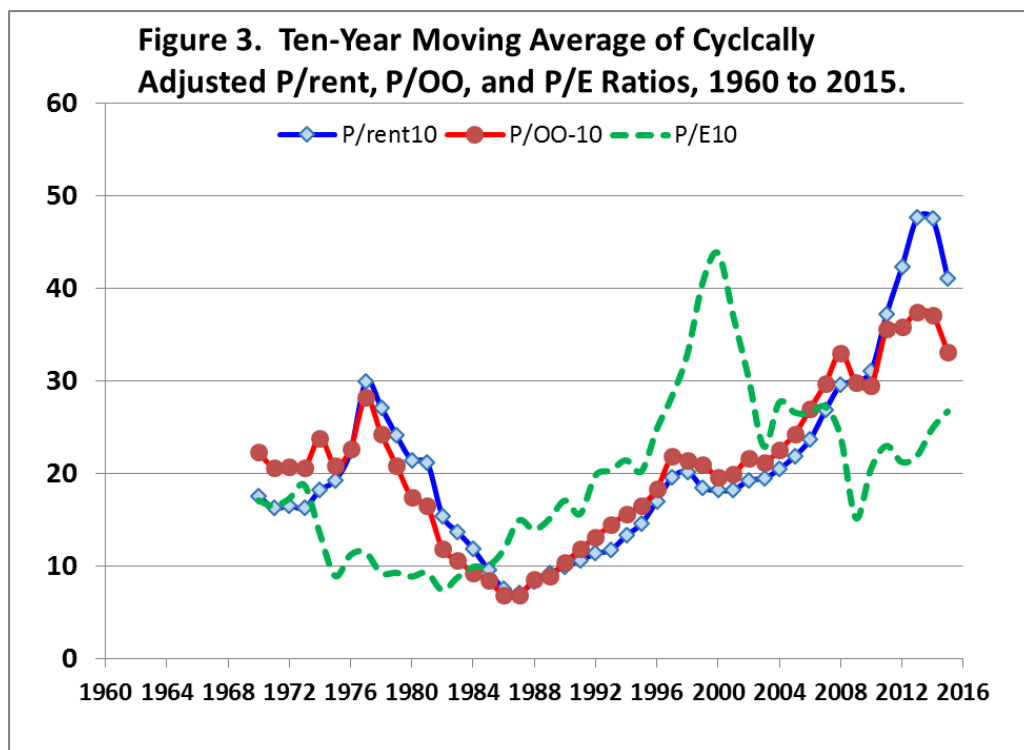
(CAPE). When earnings collapse in recessions, stock prices often do not fall as much as earnings, and the P/E ratios based on the low current earnings sometimes become very large (e.g., in 2009). Similarly, in good economic times P/E ratios can fall and stocks look cheap, simply because the very high current earnings are not expected to last, so stock prices do not increase as much as earnings. By using a 10-year moving average of earnings in the denominator of the P/E ratio, Shiller has smoothed out the impacts of the business cycle by deflating both earnings

and prices to remove the effects of inflation. Shiller also uses the P/E10 to gain insight into future rates of return. That is, if an investor buys an asset when its P/E10 is high, do subsequent returns from that investment turn out to be low, and vice versa?

The P/rent ratios reported thus far are the current year's farmland price divided by current year cash rent. Here we model our P/rent10 after Shiller's cyclically adjusted P/E ratio. To do this, cash rent and farmland prices are deflated, and then 10-year moving averages of real cash rent are calculated. The P/rent10 ratio is computed by dividing the real farmland price by the 10-year moving average real cash rent. A similar computation is done for 10-year owner-operator returns (P/OO-10).

Figure 3 shows all three of these ratios: P/rent10; P/OO-10, and Schiller's P/E10. The P/OO-10 increased from around 20 in the mid 1970's to 28.2 in 1977, and then fell to 6.8 in 1987. The P/OO-10 then increased steadily until it reached a peak of 37.4 in 2013. The P/OO-10 ratio was 37.0 in 2014 and 33.1 in 2014. Since 2012, the P/rent10 ratio has been substantially above the P/OO-10 ratio. Two important points are evident from Figure 3.

First, the P/rent10 ratio in 2013 and 2014 exceeded the peak of the S&P 500 P/E10 ratio during the dot-com stock bubble in the late-1990s and early-2000s. The P/rent ratio in 2015 is still more than double the long-run average. Could this be suggesting that the current farmland market is also in a bubble? Second, the relationship between the P/rent10 ratio and the P/OO-10 ratio suggests that producers did not bid all of the increases in owner/operator returns into cash rents. Producers



may be expecting owner/operator returns to remain low, which would make it difficult to maintain high cash rents. However, this relationship could also be explained if one expects cash rents to adjust slowly to changes in operator returns. Historically, there have been times when cash rents were slow to adjust.

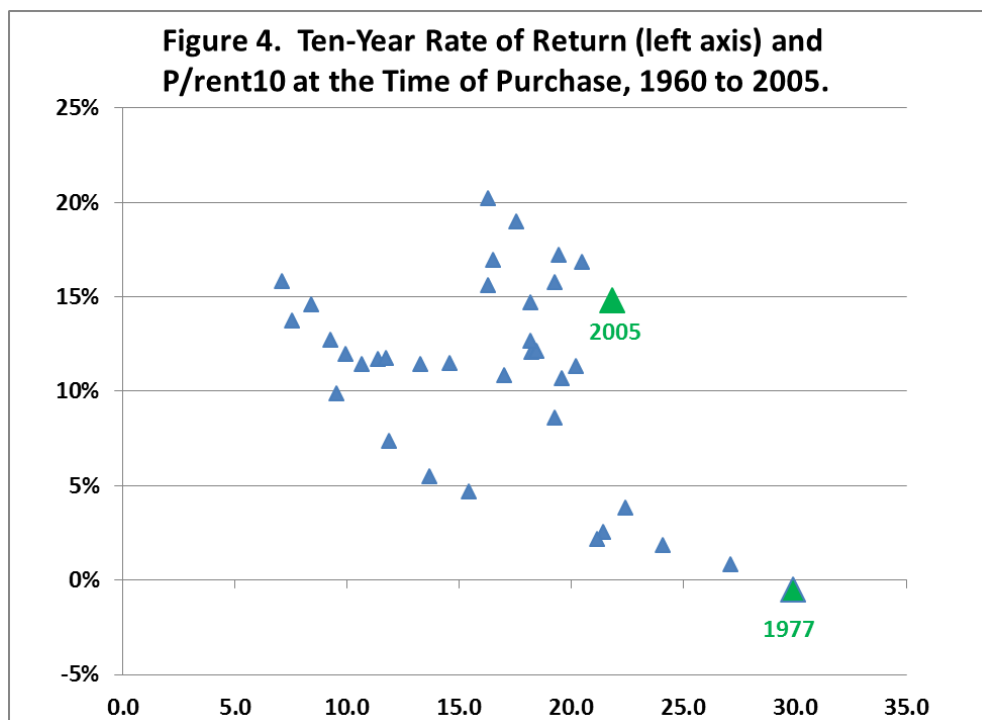
Buy at a High Ratio: Get Low Future Returns?

Shiller also discusses the relationship between the P/E10 ratio and the annualized rate of return from holding S&P 500 stocks for long periods. In general, his results show that the higher the P/E10 ratio at the time of purchase, the lower the resulting annualized multiple year returns, like for the next 10 or 20 years. The West Central Indiana farmland and cash rent data from 1960 to 2015 are used to compute 10 and 20 year annualized rates of return. Returns are the sum of annual cash rent plus the annualized price appreciation over the holding period.

The 10-year holding period returns for farmland show a strong negative relationship (Figure 4, page 15), similar to Shiller's stock market results. That

is, if one purchased farmland when the P/rent10 ratio was very high, like now, they tended to have low 10-year rates of return. Alternatively, if one purchased farmland when the P/rent10 was intermediate or low, they tended to have moderate to high 10-year returns. The 10-year returns ranged from a small negative to 20%. The 20-year holding period returns also exhibit a strong negative relationship with the P/rent10 ratio (Figure 5, page 16). The 20-year holding returns range from 6% to 14%.

The highest historical P/rent10 in our data for which a 10-year holding period return can be calculated is 30 in 1977, resulting in the only negative 10-year holding period return in our data. The P/rent10 levels in 2011 through 2015 were above 35, which is literally “off the chart” (horizontal axis of Figure 4). In this recent period, cash rents have increased, but farmland prices have increased much more. Farmland prices since 2011 have been at a historically high multiple of moving average cash rent, even higher than the level seen in the late 1970s prior to the agricultural crisis of the 1980s. The high P/rent10 ratio in 2011-2015 could be partially explained by market participants incorporating the current high rents into future expectations faster than they are incorporated into a 10-year moving average. Biofuel demand has been a step-up in demand that is not very likely to decline substantially. Similarly, increased export demand, mainly soybean demand by China, could be seen as likely to hold and even expand rather than decline. However, even if one considers the average of only the highest three years of cash rent, one still requires a combination of strong continued growth expectations and low cost of capital to justify current farmland prices and the current ratios.



Summary: Farmland Price Adjustment Underway

Our analysis indicates that the P/rent ratio (price per acre divided by cash rent per acre) is substantially higher than historical values, and that this ratio is also high relative to the comparable P/E ratio on stocks as measured by the S&P 500. In order to maintain the current high farmland values, cash rents would have to remain very high, or even move higher, and interest rates would also have to remain very low, or move even lower. Most agricultural economists expect crop returns to remain at current levels, putting downward pressure on cash rents, and for interest rates to move upward in coming years.

Furthermore, we demonstrated that farmland values have tended to have a cyclical component in which farmland values move too high relative to the underlying fundamentals and then over time move too low relative to fundamentals. We use a cyclically adjusted P/rent ratio to show that a very high P/rent ratio, as we have now, tends to be associated with low subsequent returns. Simply stated, this means that the historical relationships

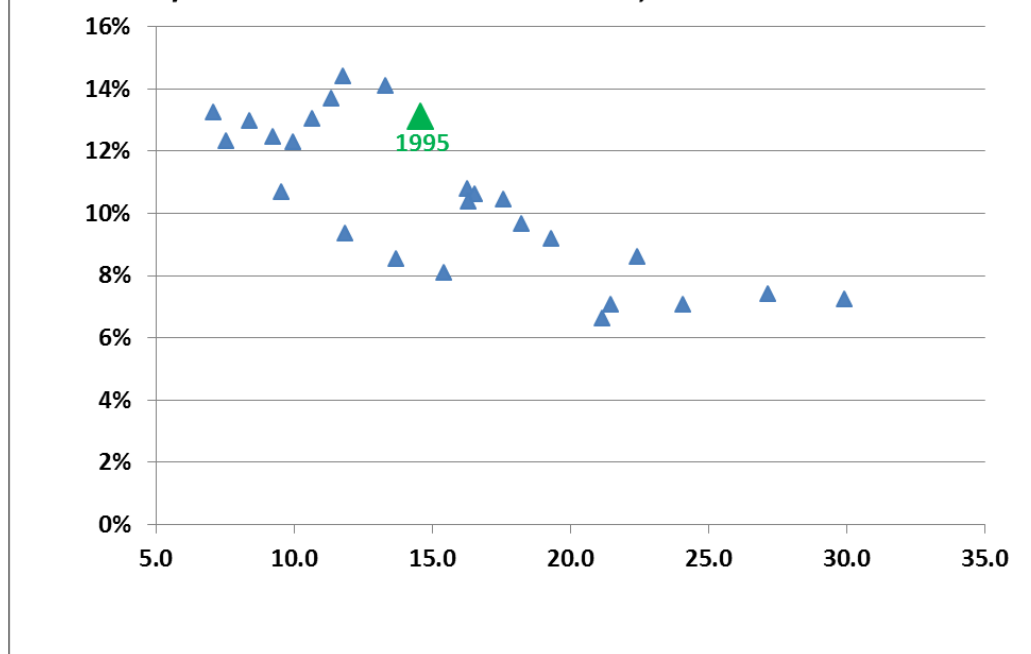
show that those who bought farmland when the P/rent ratio was high, like now, tended to have low subsequent returns. On the other hand, those who bought farmland when the P/rent ratio was intermediate or low, tended to have intermediate or high subsequent returns. The current near-record high P/rent ratio could be a warning to today's farmland buyers that their odds of favorable returns on current purchases may be low.

Our reading from examining 56 years of history is that current farmland values have recently been extremely elevated in relationship to the underlying economic fundamentals. Secondly, the ratios we have presented have begun to adjust downward in the past one or two years. Thirdly, we observe from history that once these ratios peak and begin downward adjustments, that adjustment may continue for a number of years.

If we are correct, this means that those purchasing farmland at current prices have a high probability of experiencing "buyer's remorse" in coming years. As we have shown in our review of history, buying land when the price is high in relation to returns, as it continues to be now, has tended to result in low average returns in the subsequent 10 to 20 years after purchase.

While the course seems to be set for even lower land values and rents in the next few years, there remain some possible situations in which farmland values could be maintained or even increase. These might include much higher grain and soybean prices than are now expected by futures markets; very rapid declines in prices for inputs like seed, fertilizer and chemicals; and interest rates that stay the same or decrease from current low levels. None

Figure 5. Twenty-Year Rate of Return (left axis) and P/rent10 at the Time of Purchase, 1960 to 1995.



of these are in the current outlook, and thus we tend to favor continued downward adjustments in land values and cash rents.

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