



# AGRICULTURAL ECONOMICS REPORT

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## Farmland Values Survey 2024

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### *Farmland Prices Increase Despite Downward Pressure*

Todd Kuethe, Professor, Schrader Endowed Chair in Farmland Economics

State-wide farmland prices once again hit a new record in 2024, according to the recent Purdue Farmland Value and Cash Rent Survey. The average price of top-quality farmland is \$14,392, up 4.8% from June 2023 (Table 1). Average and poor-quality farmland also hit new highs at \$11,630 and \$9,071 per acre, with an annual increase of 3.7% and 4.4%, respectively. Survey respondents suggest that this price growth principally occurred during the second half of 2023, with prices retreating a bit in the first half of 2024.

Similar to the pattern observed in the previous year, the change in farmland prices from 2023 to 2024 varied substantially across regions and quality grades. The Southwest region experienced particularly high appreciation rates for top and average-quality land. The Southeast region, in contrast, experienced the most pronounced declines across all three quality grades. Traditionally, the Central region is home to the highest per acre prices across all three quality grades, yet, in 2024, the average price per acre for top-quality land in the Southwest now exceeds those in the Central region.

The Central region still exhibits the highest value per acre for average and poor-quality land.

Respondents generally expect farmland prices to decline modestly through the remainder of 2024. At the state level, prices in December 2024 are expected to remain just above those observed in June of 2023.

The value of land transitioning out of agricultural production exhibited a 21.6% gain from 2023, reaching a new high of \$30,666 per acre. Several survey respondents note the influence of large-scale public or private land development projects in their area. One respondent notes that “production agriculture cannot compete with those economic forces,” and other respondents mention that farmers who sell their land to develop typically “reinvest” in farmland. In contrast, the state-wide average price for recreational land dipped slightly in 2024 to \$8,089 (a 1% decline from 2023). The average price, however, likely masks the high variability of recreational land, which was characterized by one respondent as “nutty.”

**Table 1:** Average estimated Indiana land value per acre (tillable, bare land), per bushel of corn yield, and percentage change by geographic area and land class, selected time periods, Purdue Land Value Survey, June 2024<sup>1</sup>

Area	Land Class	Corn Bu/A	Land Value						Land Value/bu			Projected Land Value	
			June 2023	Dec 2023	June 2024	6/23-6/24	6/23-12/23	12/23-6/24	Amount 2023	Amount 2024	% Change 6/23-6/24	Dec 2024	% Change 6/24-12/24
			\$/A	\$/A	\$/A	%	%	%	\$	\$	%	\$	%
North	Top	222	13,000	14,500	14,222	9.4	11.5	-1.9	58.50	64.00	9.4	13,778	-3.1
	Average	191	10,083	11,469	11,250	11.6	13.7	-1.9	52.72	58.82	11.6	10,781	-4.2
	Poor	160	7,468	8,656	8,625	15.5	15.9	-0.4	46.68	53.91	15.5	7,938	-8.0
Northeast	Top	219	13,793	14,200	14,386	4.3	3.0	1.3	62.95	65.66	4.3	14,300	-0.6
	Average	187	11,583	11,610	11,727	1.2	0.2	1.0	61.85	62.62	1.2	11,525	-1.7
	Poor	157	8,692	9,420	9,300	7.0	8.4	-1.3	55.43	59.30	7.0	9,140	-1.7
W. Central	Top	233	13,965	15,030	13,941	-0.2	7.6	-7.2	60.06	59.96	-0.2	14,241	2.2
	Average	204	11,490	12,300	11,512	0.2	7.0	-6.4	56.34	56.45	0.2	11,310	-1.8
	Poor	179	9,321	9,532	9,432	1.2	2.3	-1.0	52.20	52.82	1.2	9,229	-2.2
Central	Top	225	14,852	14,633	14,600	-1.7	-1.5	-0.2	65.91	64.79	-1.7	14,267	-2.3
	Average	199	12,576	12,490	12,282	-2.3	-0.7	-1.7	63.09	61.61	-2.3	12,010	-2.2
	Poor	172	9,657	10,100	9,833	1.8	4.6	-2.6	56.04	57.06	1.8	9,417	-4.2
Southwest	Top	226	12,857	16,444	16,078	25.0	27.9	-2.2	56.83	71.06	25.0	16,072	0.0
	Average	191	9,450	11,833	11,578	22.5	25.2	-2.2	49.57	60.74	22.5	11,689	1.0
	Poor	149	7,182	7,744	7,644	6.4	7.8	-1.3	48.28	51.39	6.4	7,533	-1.5
Southeast	Top	203	12,213	11,500	11,000	-9.9	-5.8	-4.3	60.31	54.32	-9.9	10,400	-5.5
	Average	183	10,031	9,250	9,250	-7.8	-7.8	0.0	54.97	50.68	-7.8	8,500	-8.1
	Poor	158	8,125	6,500	6,500	-20.0	-20.0	0.0	51.59	41.27	-20.0	5,750	-11.5
Indiana	Top	226	13,739	14,831	14,392	4.8	7.9	-3.0	60.88	63.77	4.8	14,325	-0.5
	Average	196	11,210	11,982	11,630	3.7	6.9	-2.9	57.10	59.24	3.7	11,405	-1.9
	Poor	167	8,689	9,197	9,071	4.4	5.8	-1.4	52.08	54.37	4.4	8,758	-3.5
	Transition <sup>2</sup>		25,228	29,916	30,666	21.6	18.6	2.5				29,554	-3.6
	Recreation <sup>3</sup>		8,170	8,067	8,089	-1.0	-1.3	0.3				8,301	2.6

<sup>1</sup>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.

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

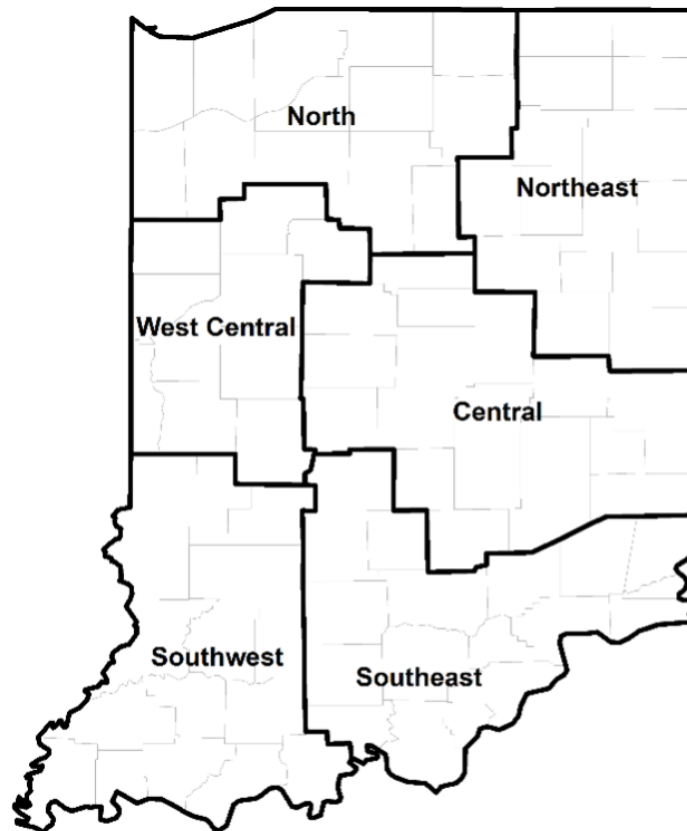
<sup>3</sup>Recreation land is land located in rural areas used for hunting and other recreational uses.

### ***Farmland Market Forces***

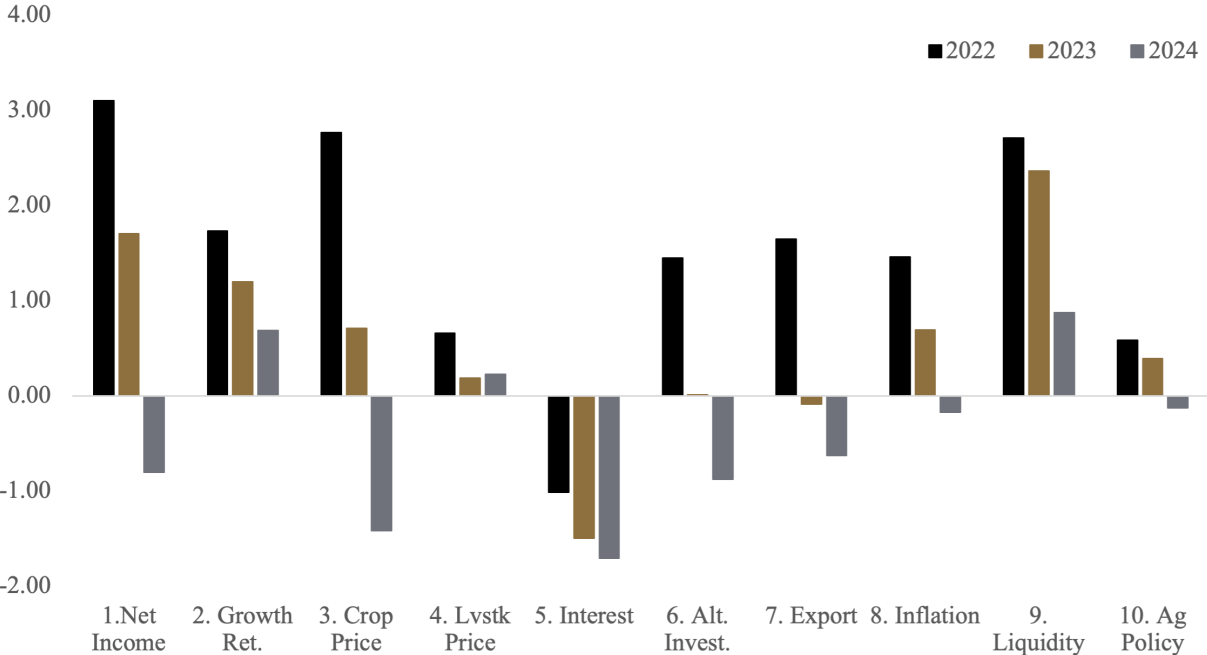
Respondents were asked to evaluate the importance of ten market forces that may potentially influence the farmland market: (1) current net farm income, (2) expected growth rate in farm returns, (3) crop price level and outlook, (4) livestock price level and outlook, (5) current and expected interest rates, (6) returns to alternative investments, (7) outlook for U.S. agricultural export sales, (8) U.S. inflation rate, (9) cash liquidity of buyers, and (10) current U.S. agricultural policy. Respondents rate each market force on a scale of -5 to +5, with -5 being the strongest negative influence. A positive influence is given a value between 1 and 5, with 5 representing the strongest positive influence. A score of 0 indicates the force was not influential. An average for each item was calculated, and averages for 2022, 2023, and 2024 are included in Figure 2. The horizontal axis shows the item from the list above.

The most notable difference between 2024 and the two preceding years is the number of market forces putting downward pressure on farmland prices. Similar to previous years, higher interest rates are putting the strongest downward pressure on farmland prices, and respondents suggest that the influence of the high interest rate environment is increasing relative to previous years. As of June 2024, farmland prices are also being negatively impacted by farm incomes, crop prices, the return to alternative investments, and exports. Both inflation and agricultural policy place modest negative pressure on farmland prices, as well. In addition, the respondents suggest that the positive influences like growth in returns and farmers' liquidity are less impactful than in previous years.

**Figure 1:** County clusters used in Purdue Land Values survey to create geographic regions

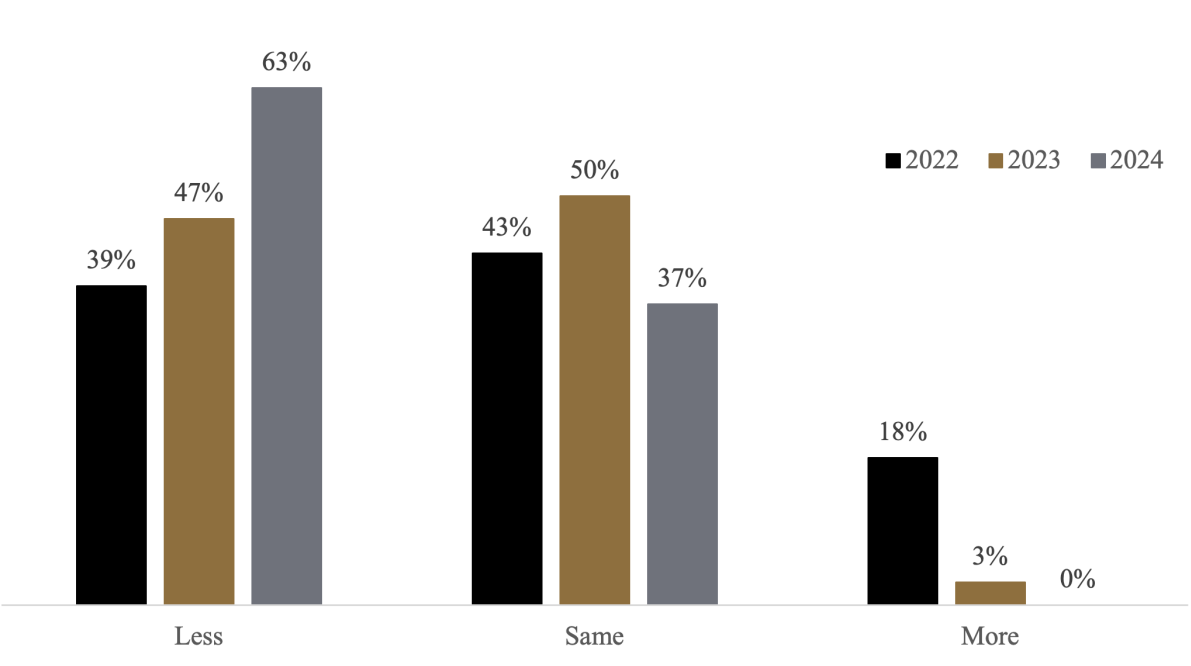


**Figure 2:** Influence of drivers of Indiana farmland values



As one respondent summarizes, “Lots of fundamentals pointing towards lower farmland prices, but low supply is keeping them up.” As shown in Figure 3, the majority of respondents (63%) suggest that less farmland is on the market in June of 2024, relative to June 2024. The remaining respondents see little change in farmland available for sale, and no respondents reported an increase in the amount of land for sale. As another respondent notes, “current market seems to be influenced by supply as much as crop prices and interest rates. We have a lower than average overall supply on the market, along with steady demand, so prices are firm.”

**Figure 3:** Percentage of respondents indicating less, same, or more farmland on the market than in the previous June



### *Five-Year Forecasts*

Respondents' pessimism about the remainder of 2024, however, does not appear to carry over to the medium to long term. Respondents were asked to forecast the five-year average corn price, soybean price, mortgage rate, and inflation rate (Table 2). While respondents are slightly less optimistic about corn and soybean prices relative to a year ago, their price expectations sit just above the average over the last five years. In addition, respondents expect both interest rates and inflation to moderate slightly, relative to the previous year. In addition, respondents expect both cash rents and land values to increase by around 13% by 2029. Thus, respondents likely expect conditions to improve across the agricultural sector and the broader economy over the next five years.

**Table 2:** Projected five-year average corn and soybean prices, mortgage interest, and inflation

Year	Price (\$/bu)		Rate (%)	
	Corn	Soybeans	Interest	Inflation
2020	3.8	9.1	3.9	2.1
2021	4.7	11.2	4.9	3.4
2022	5.7	12.8	6.4	5.8
2023	5.5	12.8	6.8	4.5
2024	5.0	12.4	6.6	3.7
<b>Average</b>	4.9	11.7	5.7	3.9

### *Cash Rent*

Statewide, cash rents exhibited little change from 2023 to 2024 (Table 3). Indiana per acre cash rent for top quality land increased by 2.3% to \$313, and per acre cash rent for average quality land increased by less than one percent to \$260. The statewide average per acre cash rent for poor-quality land, however, fell by 3.7% to \$204. These statewide averages, however, mask some of the variation across Indiana. Rental rates for all quality grades declined in both the Central and Southeast regions but exhibited modest increases across various quality grades in other regions. These changes largely follow what was observed in land values, as represented by rental rate as a share of land values, which held relatively steady from 2023 to 2024. In addition, rental rates per bushel of corn held relatively stable as well.

### *Looking Ahead*

While farmland prices increased between the 2023 and 2024 Purdue Farmland Value and Cash Rent Surveys, much of the growth appears to have taken place in the later half of 2023. A number of forces are placing downward pressure on farmland prices, most notably interest rates and crop prices, yet respondents suggest that current prices are being supported by the relatively small amount of land available for sale. Survey respondents are generally pessimistic about the remainder of 2024, but their longer-term expectations for economic conditions are not as gloomy.

**Table 3:** Average estimated Indiana cash rent per acre, (tillable, bare land) 2023 and 2024, Purdue Land Value Survey, June 2024

Area	Land Class	Corn Bu/A	Rent/Acre		Change 23-24 %	Rent/bu. of corn		Rent as % of June Land Value	
			2023 \$/A	2024 \$/A		2023 \$/bu	2024 \$/bu	2023 %	2024 %
North	Top	222	289	297	2.93	1.30	1.34	2.2	2.1
	Average	191	233	239	2.59	1.22	1.25	2.3	2.1
	Poor	160	185	180	-2.46	1.15	1.13	2.5	2.1
Northeast	Top	219	291	289	-0.55	1.33	1.32	2.1	2.0
	Average	187	239	239	0.32	1.27	1.28	2.1	2.0
	Poor	157	191	188	-1.56	1.22	1.20	2.2	2.0
W. Central	Top	233	327	339	3.55	1.41	1.46	2.3	2.4
	Average	204	278	284	2.10	1.36	1.39	2.4	2.5
	Poor	179	243	231	-5.02	1.36	1.29	2.6	2.4
Central	Top	225	310	306	-1.31	1.37	1.36	2.1	2.1
	Average	199	275	263	-4.17	1.38	1.32	2.2	2.1
	Poor	172	238	213	-10.83	1.38	1.23	2.5	2.2
Southwest	Top	226	296	323	8.89	1.31	1.43	2.3	2.0
	Average	191	239	251	5.02	1.25	1.31	2.5	2.2
	Poor	149	173	182	4.88	1.16	1.22	2.4	2.4
Southeast	Top	203	299	263	-11.85	1.48	1.30	2.4	2.4
	Average	183	246	218	-11.11	1.35	1.20	2.4	2.4
	Poor	158	208	177	-14.86	1.32	1.12	2.6	2.7
Indiana	Top	226	306	313	2.29	1.36	1.39	2.2	2.2
	Average	196	257	260	0.91	1.31	1.32	2.3	2.2
	Poor	167	212	204	-3.73	1.27	1.22	2.4	2.3

### **Purdue Farmland Value and Cash Rent Survey**

The Purdue Farmland Value and Cash Rent Survey is conducted each June. The survey is possible through the cooperation and contribution of numerous professionals knowledgeable of Indiana's farmland market. These professionals include farm managers, rural appraisers, land brokers, agricultural loan officers, farmers, and Farm Service Agency (FSA) county office directors.

These professionals were selected because their daily work requires they stay well-informed about farmland values and cash rents. These professionals provide an estimate of the market value for bare poor, average, and top-quality farmland in December 2023, June 2024, and a forecast for December 2024. To assess productivity of the farmland, respondents provide an estimate of long-term corn yield for top, average, and poor productivity farmland. Respondents also provide a market value estimate for land transitioning out of agriculture and recreational land.

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

Prior reports are located at: [https://purdue.ag/paer\\_archive](https://purdue.ag/paer_archive)

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## AGRICULTURAL ECONOMICS REPORT

### *Trends in Farmland Price to Rent Ratios in Indiana*

Michael Langemeier, Professor of Agricultural Economics

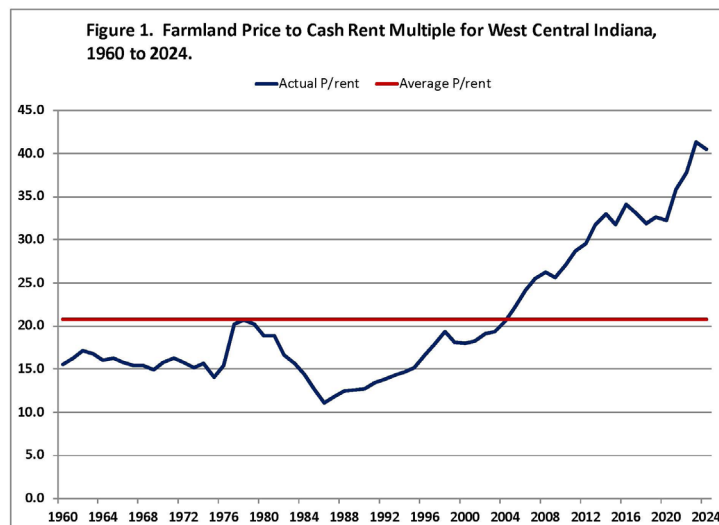
Farmland prices in west central Indiana increased slightly in 2024 (0.2%) and are 19.7% above the previous peak in 2014. Compared to the farmland price in 2007, current farmland prices in west central Indiana are 187% higher. Farmland prices are influenced by many factors, including net income, growth in earnings, crop and livestock prices, interest rates, alternative investment returns, inflation, liquidity, agricultural policy, and energy policy. Cash rent, which is influenced by net return to land, along with interest rates, is often referred to as a fundamental factor impacting farmland prices. Concerns are periodically expressed by many investment analysts 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 market to over-shoot its fundamental value.

A standard measure of financial performance most commonly used for stocks is the price-to-earnings ratio (P/E). A high P/E ratio sometimes indicates that investors think an 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 attributes.

This paper computes a ratio equivalent to the P/E ratio for farmland, the farmland price to cash rent ratio (P/rent), and discusses trends in the P/rent ratio. We use land value and cash rent data for the 1960 to 2024 period for west central Indiana to illustrate the P/rent ratio. Data from 1975 to 2024 were obtained from the annual Purdue Land Value and Cash Rent Survey. For 1960 to 1974, the 1975 Purdue survey numbers were indexed backward using the percentage change in USDA farmland value and cash rent data for the state of Indiana.

#### *Price to Rent Ratio*

The P/rent ratio for west central Indiana averaged 20.8 over the 64-year period from 1960 to 2024 (figure 1). The peak P/rent ratio before 1990 occurred during the 1977 to 1979 period. The P/rent ratio dropped substantially from 1980 to 1986, reaching a low of 11.1 in 1986. The rise from around 15 in 1976 into the 20s and down to 11.1 in 1986 corresponds to what is viewed as the bubble in farmland prices that was followed by one of the most difficult periods in history for production agriculture (i.e., the early-to-mid 1980s).





The P/rent ratio has been above the long-run average since 2004. From 2004 to 2014, the P/rent ratio increased from 20.6 to 33.0. Since 2014, the P/rent ratio has ranged from 31.7 in 2015 to 41.3 in 2023. The current value of 40.5 is relatively high compared to the historic average of 20.8 and a previous high of around 20, and thus at least raises concerns that current farmland prices are overvalued in relation to returns. Having said that, one of the reasons often mentioned as a major explanatory factor associated with the recently high P/rent ratio is low interest rates. The average interest rate on 10-year treasuries from 1960 to 2024 was 5.8%. The interest rate on 10-year treasuries has been below its long-run average since 2001. However, after averaging less than 1.0% in 2020, the 10-year treasury rate has been increasing. The average rate for the first six months of 2024 was 4.3%.

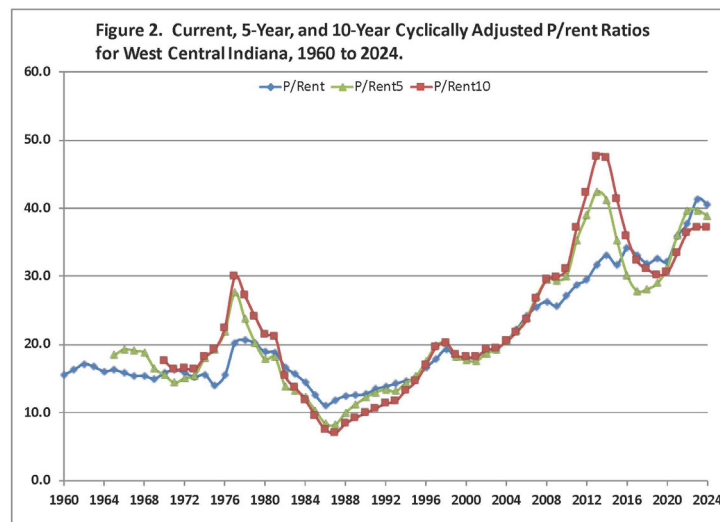
Over the 64-year period from 1960 to 2024, the P/E ratio for stocks is 19.7, which is similar to the long-run average P/rent ratio. Though the long-run averages are similar, the P/E and P/rent ratios do not necessarily track one another. The average correlation coefficient between these two measures is only 0.30. Though not the topic of this paper, the diversification potential between the stock market and farmland is relatively high.

### *Cyclically Adjusted P/Rent*

Shiller (2005; 2024) uses a 10-year moving average for earnings in the P/E ratio, often labeled either P/E10 or cyclically adjusted P/E (CAPE), to remove the effect of the economic cycle on the P/E ratio. 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. 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 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?

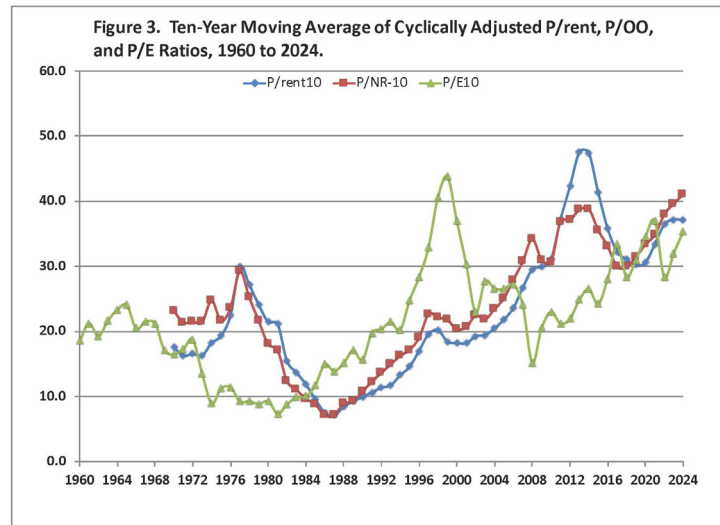
The P/rent ratios reported thus far are the current year's farmland price divided by current year cash rent. Here, we model our P/rent10 after Shiller's cyclically adjusted P/E ratio. Cash rent and farmland prices are deflated, and the 10-year moving averages of real cash rent are calculated. The P/rent10 ratio is computed by dividing the real farmland price by the 10-year moving average real cash rent. A similar computation is done for operator net returns (P/NR-10). We also compute a P/rent5 ratio by dividing real farmland price by a 5-year moving average of real cash rent.

Figure 2 compares the current P/rent ratio with the P/rent5 and P/rent10 ratios. From 2011 to 2015, the P/rent10 ratio was substantially higher than the P/rent ratio. Essentially, during this time period, current cash rent, used to compute the P/rent ratio, was higher than the 10-year average cash rent. The P/rent5 ratio was also higher than the P/rent ratio during this time period; however, this ratio was not as high as the P/rent10 ratio. Assuming that cash rent and interest rates were primary drivers of farmland prices during this period, those purchasing farmland were likely using current cash rents rather than a longer-run average of cash rents when evaluating the expected long-run returns from owning land. The P/rent10 ratio is currently lower than the P/rent and P/rent5 ratios, indicating that the ten-year average real cash rent is higher than the current and five-year average real cash rents.





The P/rent10, P/NR-10, and Shiller's P/E10 ratios are illustrated in Figure 3. The P/rent10 ratio peaked in 2013 at 47.5. The ratio then steadily declined, reaching a low of 30.2 in 2019. The ratio increased from 30.5 in 2020 to 37.2 in 2023. The current P/rent10 ratio (i.e., 37.1) is still relatively high compared to the long-run average (using 1960 to 2024 data) of 22.9. Does the current P/rent10 ratio signify a bubble, or is something else going on? With regard to this question, we would like to make two points. First, though interest rates have increased recently, they are still low compared to the long-run averages since 2008. The rate on 10-year treasuries has averaged only 2.7% since 2008. Second, as we note below, the P/rent10 is currently below the P/NR-10 ratio, suggesting that, if anything, the P/rent ratio would be higher in equilibrium.



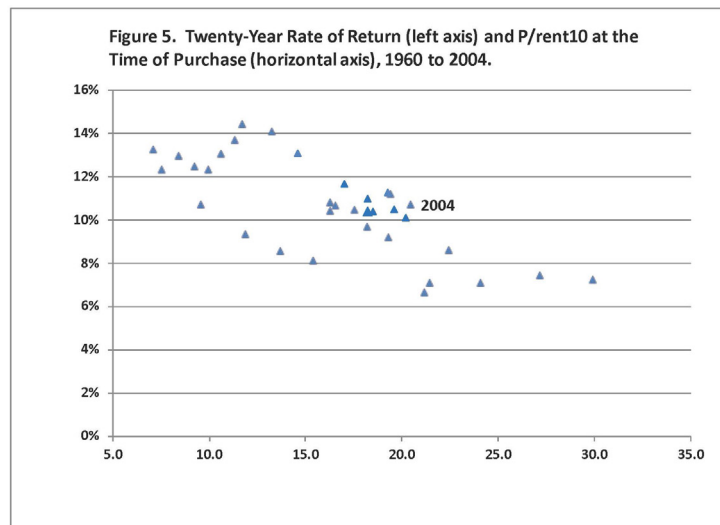
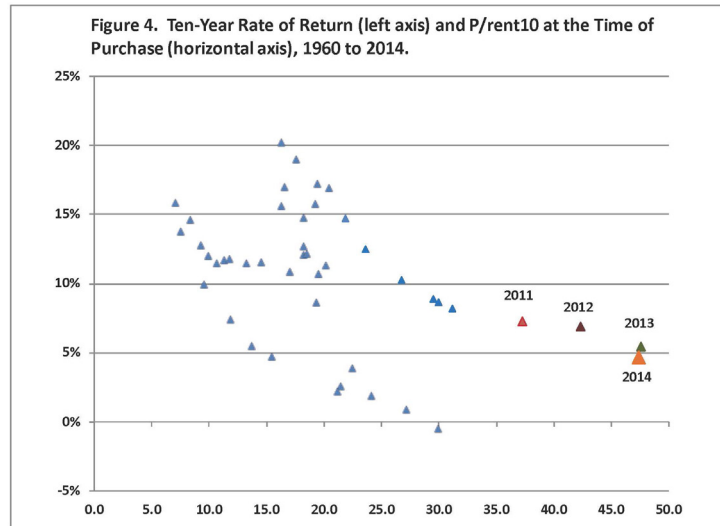
The P/NR-10 ratio fell through the first half of the 1970s when real returns grew faster than land values, increased from around 20 in the mid-1970s to 28.2 in 1977, and then fell to 6.8 in 1987. The P/NR-10 ratio then increased steadily until it reached an initial peak of 38.8 in 2014. The P/NR-10 ratio has ranged from 30.2 to 41.3 since 2014. From 2015 to 2018, the P/NR-10 ratio was smaller than the P/rent10 ratio, indicating that ten-year average cash rents were smaller than ten-year average net returns to land. Since 2019, the P/NR-00 ratios have been slightly higher than the P/rent10 ratio. In the long run, you would expect the two ratios to be similar. In fact, the average P/rent10 and P/NR-10 ratios for the 1960 to 2024 period were 22.9 and 23.6, respectively.

It is evident from Figure 3 that there is not a close link between the P/E10 ratio and the P/rent10 ratio. The P/E10 ratio was much higher than the P/rent ratio from 1995 to 2002. In contrast, the P/E10 ratio was quite a bit lower than the P/rent ratio from 1976 to 1981, from 2011 to 2015, and during the last few years.

### ***Buy at a High Ratio: Get a Low Future Return?***

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 multiple-year returns, like for the next 10 or 20 years. The West Central Indiana farmland and cash rent data from 1960 to 2024 are used to compute 10-year and 20-year annualized rates of return. Returns are the sum of the average of cash rent as a fraction of the farmland price each year, plus the annualized price appreciation over the holding period.

The results for farmland show a negative relationship similar to that exhibited in Shiller's stock data. The 10-year holding period returns for farmland show a strong negative relationship (Figure 4). That is, if one purchased farmland when the P/rent10 ratio was very high, like now, they tended to have a low 10-year rate 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). The 20-year holding returns range from 6 to 14%.



As noted above, figure 4 presents the ten-year rate of return for farmland and the P/rent10 ratio for land purchased in west central Indiana from 1960 to 2014. The P/rent10 ratio in 2014 (i.e., 47.4) was the second highest ratio experienced since 1960. Despite this fact, the ten-year rate of return for farmland purchased in 2014 was still 4.7%. The P/rent10 ratio for land purchased in 2015 is 41.3. From 2016 to 2024, the P/rent10 ratios range from 30 to 37. Will rates of return for land purchased since 2015 stay positive? The answer to this question depends on what happens to net returns to land and interest rates. If long-run net returns are strong and interest rates stay relatively low, the answer to the question is probably yes.

The 20-year rate of return for land purchased in 2004 is 10.7%, which is in the middle of the range of 20-year rates of return illustrated in Figure 5. Since 1996, the 20-year rate has been in a fairly tight range (i.e., 10 to 12%). It will be interesting to see if the 20-year rate of return declines as the P/rent10 ratio increases in the next few years. For land purchased in 2005, the P/rent10 is 21.8. In the following five years, this rate will increase to approximately 31. After 2010, the P/rent10 ranges from 30 to 47.

## ***Final Comments***

Our analysis indicates that the P/rent ratio (price per acre divided by cash rent per acre) is substantially higher than historical values. In order to maintain the current high farmland values, cash rents would have to remain relatively high, and interest rates would also have to remain relatively low. Most agricultural economists expect crop net returns to be lower than the levels experienced in 2021 and 2022 in the next few years. What about the capitalization rate, which is computed by dividing cash rent by land values (i.e., the inverse of the P/rent ratio)? The implied capitalization rate in 2024 using West Central Indiana data is 0.025. Several factors impact the capitalization rate, including interest rates and macroeconomic factors such as rent growth, GDP, credit risk, and asset class. The relationship between the capitalization rate and interest rates is not a one-to-one relationship. Specifically, capitalization rates have a much narrower range than interest rates. Having said that, the recent increases in interest rates puts upward pressure on the capitalization rates. This, along with lower net crop returns, suggests that the P/rent ratio should at least stabilize and, depending on the impact of interest rates on capitalization rates, could even decline in the near future.

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 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 record high P/rent ratio could be a warning to current farmland buyers that their odds of favorable returns on these purchases are probably not high.

Our reading from examining 64 years of history is that the current relationship between farmland prices and cash rents suggests that farmland prices are elevated. If we are correct, this means that those purchasing farmland at current prices may experience “buyer’s remorse” in coming years. However, there remain some possible situations in which farmland values could be maintained or even increase. Positive influences on land include relatively low interest rates, the relatively small percent of land currently on the market, the attractiveness of farmland to pension fund managers, and the fact that land is a good hedge against inflation.

## ***References***

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# PURDUE

## AGRICULTURAL ECONOMICS REPORT

### *Farmland Conversion in Indiana*

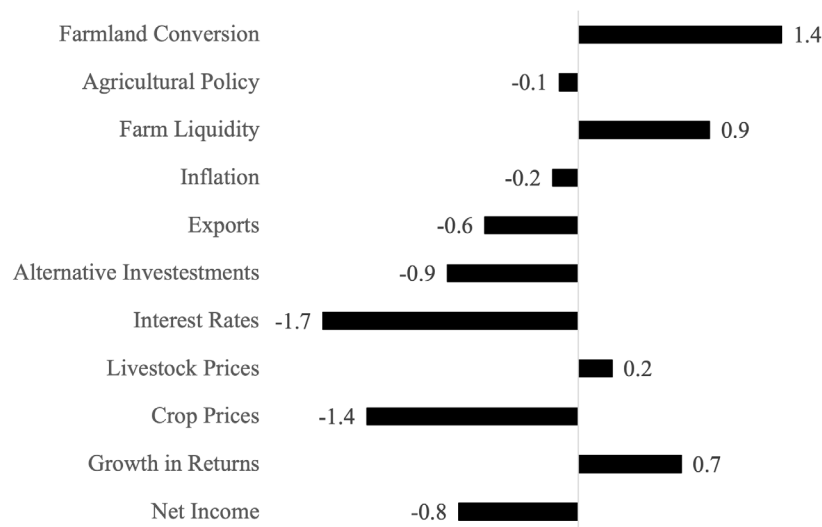
Todd Kuethe, Professor, Schrader Endowed Chair in Farmland Economics; and Megan Hughes, Graduate Research Assistant

Farmland conversion is once again an important topic across Indiana. A number of the respondents to the 2024 Purdue Farmland Value and Cash Rent Survey mention the influence of large public and private development projects on farmland market conditions in their area. These projects include developments related to infrastructure, manufacturing, energy, and residential land use.

For a number of years, the Purdue Farmland Value and Cash Rent Survey has asked respondents to evaluate the importance of ten market forces that may potentially influence the farmland market: (1) current net farm income, (2) expected growth rate in farm returns, (3) crop price level and outlook, (4) livestock price level and outlook, (5) current and expected interest rates, (6) returns to alternative investments, (7) outlook for U.S. agricultural export sales, (8) U.S. inflation rate, (9) cash liquidity of buyers, and (10) current U.S. agricultural policy. Respondents rate each market force on a scale of -5 to +5. A positive influence is given a value between 1 and 5, with 5 representing the strongest positive influence. Likewise, a negative influence is given a value between -1 and -5, with -5 being the strong negative influence. A score of 0 indicates the force was not influential. In 2024, an additional market force was added to the survey: the influence of farmland conversion.

As shown in Figure 1, our respondents suggest that farmland conversion is the largest positive influence on farmland prices in 2024. The effect is roughly equal to the downward pressure of current crop market prices, and it is exceeded in magnitude only by the downward pressure of interest rates.

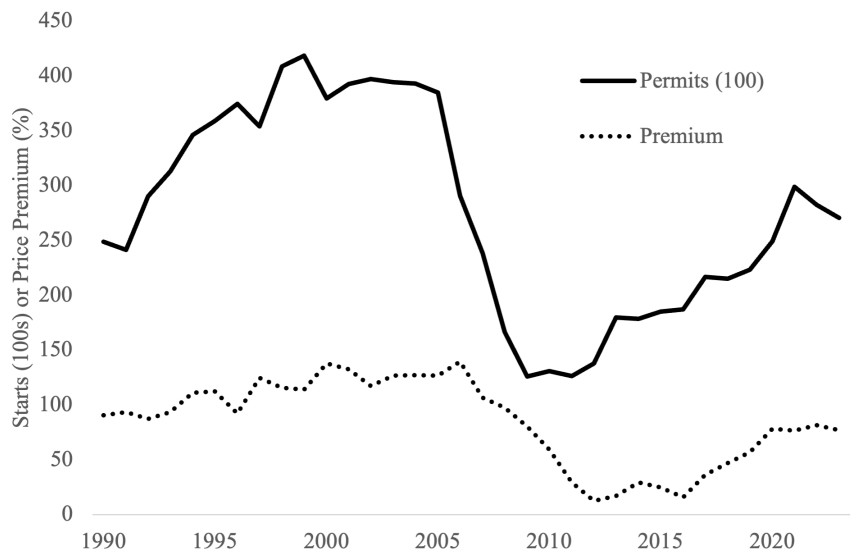
**Figure 1:** Influence of drivers of Indiana farmland values, 2024



As the Purdue Farmland Value and Cash Rent Survey continually shows, land that moves out of production agriculture and into other, typically higher value, uses tends to sell at a substantial premium to farmland in agricultural production, even the most productive lands. The dotted line in Figure 2 plots the percentage difference between the average price for top-quality farmland across Indiana and the value of land transitioning out of agricultural production. In 2023, farmland transitioning out of agricultural production sold at a 77% premium relative to high-quality land. This premium is driven by the demand for land for other uses. The solid line in Figure 2 represents the total number of housing construction permits in the state of Indiana (in 100s). In 2023, Indiana issued 27,055 housing construction permits.

Figure 2 shows that housing construction in Indiana fell drastically around the 2008 Financial Crisis. Between 2007 and 2009, housing construction permits fell by 47.3%, from 23,841 to 12,555. Over this same period, the premium for transitional land fell from 106% to 80%. Thus, prior to the 2008 Financial Crisis, farmland owners could effectively double their wealth by developing top-quality farmland for other uses, on average. Figure 2 further suggests that since 2011, the number of residential construction permits has generally been increasing, and the transitional premium soon followed, beginning in 2013. While housing permits and the premium have increased in recent years, both fall well below what was observed in the 1990s and early 2000s.

**Figure 2:** Price premium for transitional land and housing construction permits, 1990–2024



The primary concern of many across Indiana is the degree to which the increased demand for land ultimately leads to a loss in the amount of land available for agricultural production. The USDA Census of Agriculture provides one of the best measures of agricultural land in the United States once every five years. The most recent Census of Agriculture suggests that in 2022, Indiana was home to 12.5 million acres of cropland and nearly 633 acres of pastureland.

**Table 1:** Cropland and Pastureland Acres in Indiana, Census of Agriculture

Census	Cropland	Pastureland	Cropland	Pastureland
1997	13,065,057	1,366,738		
2002	12,909,002	1,098,301	-1.2	-19.6
2007	12,716,037	986,522	-1.5	-10.2
2012	12,590,633	762,619	-1.0	-22.7
2017	12,909,673	716,911	2.5	-6.0
2022	12,531,737	632,796	-2.9	-11.7
		<b>Average</b>	<b>-0.8</b>	<b>-14.0</b>

As noted by [the USDA](#), there are a variety of reasons that the amount of crop and pastureland can vary from Census to Census, including changes in technology, planting decisions, and changes in the methodology used in the Census of Agriculture. However, the data suggest that Indiana tends to lose a small share of cropland from Census to Census. The loss of pastureland is more pronounced, but it should be noted that some of this pastureland may have been converted to crop production. This notion is best supported by the increase in cropland acreage between the 2012 and 2017 Censuses. While there are certainly areas throughout Indiana that have experienced a large amount of farmland conversion, the Census of Agriculture suggests that, at the state level, land use change across Indiana may be considered relatively modest.

In short, farmland conversion is viewed as an important driver of farmland prices in many localized markets across Indiana. The price premium for land conversion is increasing yet remains below the highest observed almost two decades ago. At the state level, cropland conversion appears relatively modest, but there is some evidence that it has increased in the last five years.



# PURDUE

## AGRICULTURAL ECONOMICS REPORT

### *Research Spotlight: The Impact of Solar Energy on Indiana Farmland Prices*

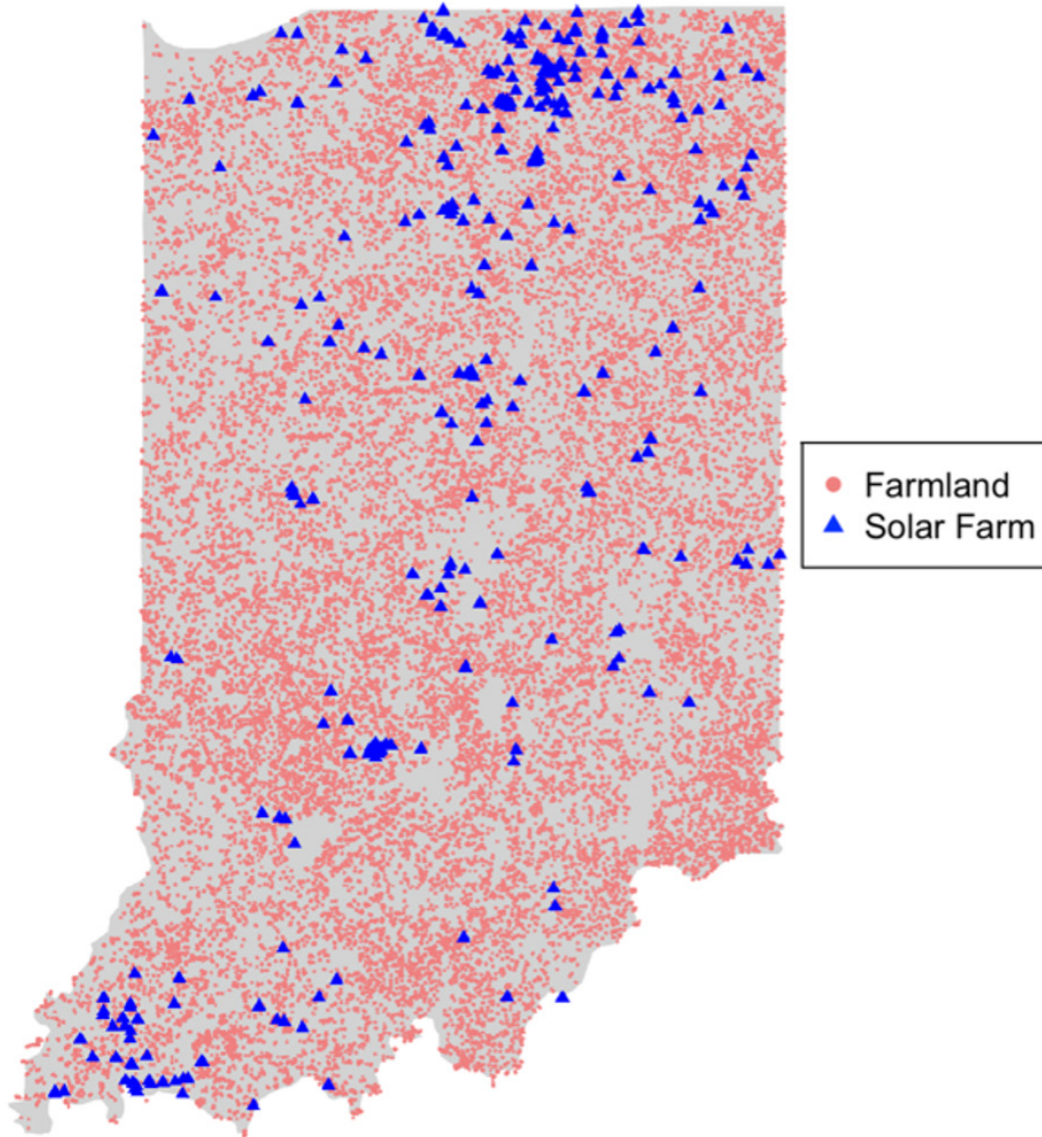
Binayak Kunwar, Graduate Research Assistant

According to the [U.S. Energy Information Administration](#), solar generation accounted for about 3% of U.S. energy generation, but it is expected to increase to about 20% by 2050. Recent surveys conducted by the [Purdue Center for Commercial Agriculture](#) suggest that farmers' interest in leasing farmland for solar energy generation has increased substantially over the last year. Solar energy leases typically offer rates well above rental rates for agricultural production. Farmers who lease land for solar generation may decide to reinvest in additional farmland or consider the solar option value when purchasing farmland. As a result, the impact of solar energy generation on farmland prices is an emerging issue for farmland owners, farmers, and policymakers across Indiana. Little is known, however, about the degree to which solar energy facilities influence farmland prices. My thesis research aims to provide some initial understanding of the influence of solar on farmland prices. The complete thesis is available [here](#), but this article provides a brief summary.

#### **Research Approach**

In my research, I estimate the correlation between solar energy generation facilities and farmland prices in Indiana using a hedonic price model. The hedonic price model uses multiple regression analysis to decompose farmland transaction prices into the contribution of various attributes associated with the sales price, including acreage, soil quality, distance to the nearest town or city, the presence of power transmission lines, population density, and the distance to neighboring utility-scale solar generation facilities. Multiple regression analysis provides an approximate measure of the “dollar value” of each characteristic while controlling for all the other variables in the model. Hedonic price models are often referred to as “constant quality” price indexes.

My hedonic price model examines the transaction prices for bare farmland across all 92 Indiana counties from January 2015 to December 2020. The data, obtained from Indiana Land Sales Bulletin, includes the acreage, soil productivity, sales price, and location for each parcel sold. Using geographic information systems (GIS), the location information was used to include additional variables, such as population density and distance to the nearest town or city. Most importantly, we also calculate the distance from each parcel to the nearest utility or commercial-scale solar generation facility, obtained from the [Southern Indiana Renewable Energy Network \(SIREN\)](#). Figure 1 plots the location of each transacted farmland parcel (red dot) and commercial or utility-scale solar generation facility (blue triangle).

**Figure 1:** Study Area

### ***Findings***

The hedonic price model estimates suggest that farmland near utility or commercial-scale solar generation facilities sells at a premium of 1.4% per mile on average. As previously stated, the hedonic price model estimates the impact of solar generation facilities on farmland transaction prices while controlling for all other characteristics included in the model. Thus, if two parcels are sold in the same year, in the same county, with the same acreage, soil productivity, distance to towns and cities, both with or without power transmission lines, and the same population density, the parcel closer to solar generation is expected to sell, on average, at a 1.4% premium for every mile closer to the solar generation facility.

In addition to these baseline results, the hedonic price model was also estimated across the farmland price distribution. The estimation results suggest that, for the highest-valued farmland (the top 10% of farmland prices), the estimated premium rises to 1.8%. Thus, for very high-value farmland, the transaction price is expected to increase by 1.8% per mile closer to the solar generation facility. The price premium, however, is less than 1% for the bottom 10% of farmland transacted. Our results, therefore, provide a preliminary indication that commercial or utility-scale solar facilities place a stronger price pressure on more valuable land.

### *Takeaways*

My thesis research provides preliminary evidence that solar generation facilities place a positive price premium on nearby farmland. Further, the price premium increases for higher-valued farmland. These findings may be important to farmers, landowners, and policymakers. As solar energy continues to expand across Indiana, understanding its impact on land prices is key to making informed decisions. Rising farmland values near solar farms can affect farming costs and practices, potentially influencing agricultural production. The potential for increasing solar energy production offers both opportunities and challenges. On one hand, it potentially increases farmland values, which benefits current landowners. On the other hand, the increased values may represent an additional challenge for prospective farmland buyers. Decision makers will likely consider these dynamics to seek a balance between fostering sustainable energy production and maintaining the viability of the agricultural sector.

Again, for the interested reader, the full thesis is available [here](#).