

JULY 2020

# PURDUE AGRICULTURAL ECONOMICS REPORT

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## Indiana farmland values increase but signal concern of potential COVID-19 slump

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The COVID-19 pandemic will be the defining economic event of 2020. As documented in the previous *Purdue Agricultural Economics Report*, the pandemic has had a profound impact on the Indiana food and agriculture sector. Land is the farm sector's largest input, and as a result, farmland values generally reflect broad trends in the costs and returns of agricultural production. The 2020 *Purdue Land Values and Cash Rents Survey* suggests that farmland prices across the State generally improved on a year-to-year basis. However, the survey suggests that these gains primarily occurred between June and December 2019, and since December, farmland prices have declined modestly. Survey respondents expect these recent declines to continue throughout the remainder of 2020 and expressed concern over the long-run impacts of COVID-19 on Indiana farmland markets.

One survey respondent stated, "Fear of long-term COVID-19 market impacts are real among Southeast Indiana farmers. Despite good economic conditions prior to March 2020, with other factors (trade, policy, etc.), there is little optimism." However, at least one respondent reported "land prices high during this COVID-19 pandemic, at levels not seen for several years, which was not expected." While another stated that "sales in March were higher than we expected them to be, but due to the pandemic, we feel like they have decreased to levels similar to last year."

Statewide, the strongest year-to-year increase was for poor quality land which increased by 6.3% to \$5,746 (Table 1). Top quality land increased by 4.5% to \$8,579, and average quality land increased by 3.2% to \$7,236. The year-to-year increases were driven by positive price movements between June and December 2019. Over this period, top, average,

and poor quality farmland values increased by 5.5%, 5.0%, and 8.7%, respectively. However, between December 2019 and June 2020, top, average, and poor quality farmland values posted modest declines of 1.0%, 1.7%, and 2.2%, respectively.

The survey responses were also divided into six regions to examine locational differences (Figure 1). The pattern of rising values in the second half of 2019 and then falling values during the first half of 2020 was consistent across almost all regions and land quality classes. The only exception was found for average quality land in the North region, where prices also declined during the second half of 2019. While statewide values exhibited a year-over-year net gain, in two instances the 2020 declines outpaced the gains at the end of 2019: poor quality land in the North region and average quality land in the Central region. Thus, year-to-year change between 2019 and 2020 were negative in three cases, two of which were in the North region.

Consistent with historical experience, the highest per acre farmland values were in the West Central region. Top, average, and poor quality farmland values in the West Central region were \$9,308, \$8,121, and \$6,707 per acre, respectively. The least expensive farmland continues to be in the Southeast region with top, average, and poor quality land having values of \$6,069, \$4,884, and \$3,653 per acre, respectively.

In addition, Table 1 reports the average per acre farmland value divided by respondents' long-term corn yield estimate. This measure captures the value or cost of farmland per unit of productivity (per bushel of corn). Based on this measure of cost, the highest price farmland is top quality farmland in the Southwest region at \$43.36 per bushel. This was closely followed by the Northeast region, where price per bushel ranged from \$42.24 to \$43.10 per bushel.

To gauge expectations for the remainder of 2020, respondents provide farmland projections for December 2020. Respondents appear to generally expect the declines of the first half of the year to continue at a modest pace. Statewide land values are expected to recede by 1.5%, 2.0%, and 3.0% for top, average, and poor quality land, respectively. At a regional level, the most pronounced expected declines include average quality land in the North region (-4.1%) and poor quality land in the North (-3.5%), Central (-6.2%), and Southwest (-3.0%) regions.

An important influence on farm real estate markets is the transition of farmland to nonagricultural commercial or residential uses. For example, one 2020 respondent noted that local farmland prices were supported by "huge increases in 1031" exchange funds. As a result, the survey collects information about the price of land moving out of agricultural production. The statewide average value

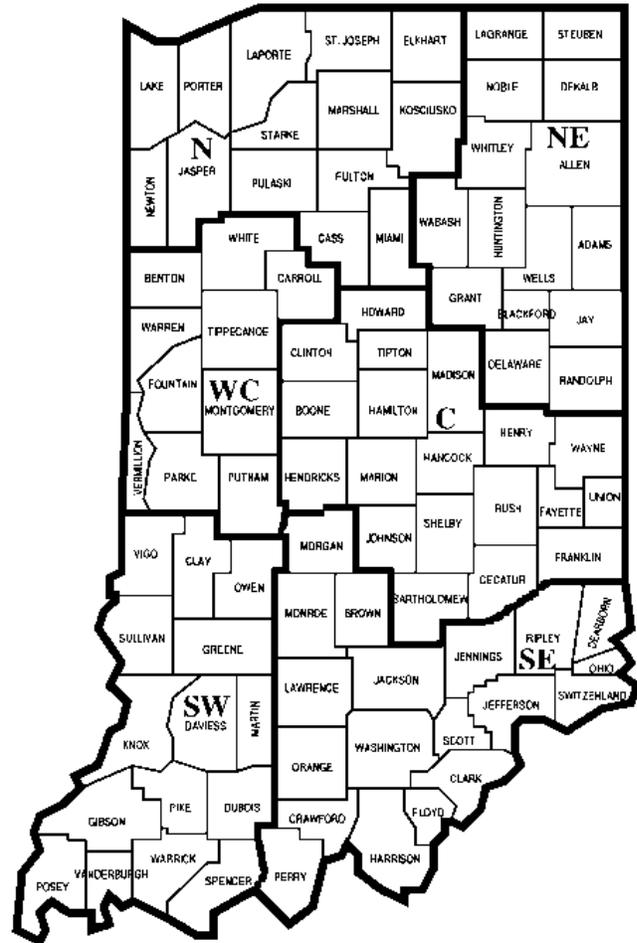


Figure 1. County clusters used in Purdue Land Value Survey to create geographic regions

of transitional land was \$15,127 per acre, a 14.2% increase from the previous June. Recreational land values also increased from \$3,673 per acre in June 2019 to \$3,876 per acre in June 2020, an increase of 5.5%. Like farmland, transitional and recreational land values increased between June and December 2019 and declined between December 2019 and June 2020.

The survey also collects information on the value of farmland moving into rural residences and subdivisions. Respondents provide estimates of the value of rural home sites located on a blacktop or well-maintained gravel road with no accessible gas line or city utilities. These markets are characterized by a very wide range of values. As a result, results are summarized by median values (the value dividing a series of ordered numbers in half). As shown in Table 2, the median value for five-acre home sites was \$10,000 per acre for North, Northeast, and Southeast regions. The median values were a bit higher in the West Central (\$11,500), Central (\$12,000), and Southwest (\$12,500) regions. The median value of \$10,000 per acre also holds for ten-acre home sites in all regions except Northeast (\$12,000) and Southeast (\$8,000).

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 2020<sup>1</sup>

Area	Land Class	Corn bu/A	Land Value									Projected	
			Dollars Per Acre						Land Value/Bu			Land Value	
			June	Dec	June	% Change			Amount	Amount	% Change	Dec.	% Change
			2019	2019	2020	6/19-6/20	6/19-12/20	12/19-6/20	2019	2020	6/19-6/20	2020	6/20-12/20
	\$/A	\$/A	\$/A	%	%	%	\$	\$	%	\$	%		
North	Top	208	8,082	8,648	8,478	4.9%	7.0%	-2.0%	39.07	40.76	4.3%	8,239	-2.8%
	Average	179	6,939	6,899	6,731	-3.0%	-0.6%	-2.4%	38.87	37.60	-3.3%	6,458	-4.1%
	Poor	150	5,068	5,150	4,914	-3.0%	1.6%	-4.6%	34.31	32.76	-4.5%	4,744	-3.5%
Northeast	Top	201	7,611	8,636	8,626	13.3%	13.5%	-0.1%	42.67	42.92	0.6%	8,576	-0.6%
	Average	176	6,678	7,705	7,586	13.6%	15.4%	-1.5%	41.78	43.10	3.2%	7,470	-1.5%
	Poor	152	5,208	6,503	6,421	23.3%	24.9%	-1.3%	41.51	42.24	1.8%	6,343	-1.2%
W. Central	Top	217	9,178	9,362	9,308	1.4%	2.0%	-0.6%	44.64	42.89	-3.9%	9,200	-1.2%
	Average	189	7,851	8,234	8,121	3.4%	4.9%	-1.4%	42.95	42.97	0.0%	8,026	-1.2%
	Poor	163	6,318	6,811	6,707	6.2%	7.8%	-1.5%	40.32	41.15	2.1%	6,656	-0.8%
Central	Top	211	8,588	8,953	8,809	2.6%	4.3%	-1.6%	44.03	41.75	-5.2%	8,674	-1.5%
	Average	184	7,652	7,780	7,606	-0.6%	1.7%	-2.2%	43.91	41.34	-5.9%	7,442	-2.2%
	Poor	157	6,191	6,396	6,213	0.4%	3.3%	-2.9%	42.42	39.57	-6.7%	5,829	-6.2%
Southwest	Top	211	8,167	9,281	9,150	12.0%	13.6%	-1.4%	43.19	43.36	0.4%	9,006	-1.6%
	Average	179	6,617	7,194	7,110	7.5%	8.7%	-1.2%	38.01	39.72	4.5%	6,981	-1.8%
	Poor	148	4,408	5,106	4,967	12.7%	15.8%	-2.7%	31.60	33.56	6.2%	4,817	-3.0%
Southeast	Top	188	5,900	6,180	6,069	2.9%	4.7%	-1.8%	32.82	32.28	-1.6%	6,015	-0.9%
	Average	162	4,600	5,035	4,884	6.2%	9.5%	-3.0%	31.65	30.15	-4.7%	4,853	-0.6%
	Poor	132	3,268	3,785	3,653	11.8%	15.8%	-3.5%	28.63	27.67	-3.4%	3,633	-0.5%
Indiana	Top	207	8,212	8,667	8,579	4.5%	5.5%	-1.0%	42.65	41.44	-2.8%	8,449	-1.5%
	Average	180	7,011	7,361	7,236	3.2%	5.0%	-1.7%	40.99	40.20	-1.9%	7,089	-2.0%
	Poor	152	5,405	5,875	5,746	6.3%	8.7%	-2.2%	37.99	37.80	-0.5%	5,574	-3.0%
	Transition <sup>2</sup>	XXX	13,245	15,441	15,127	14.2%	16.6%	-2.0%				14,876	-1.7%
	Recreation <sup>3</sup>	XXX	3,673	3,967	3,876	5.5%	8.0%	-2.3%				3,812	-1.7%

<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.

Table 2. June median value of unimproved five-acre or less home sites and ten-acre or more subdivisions

Area	Median value, \$ per acre							
	5 Acres or less for home site				10 Acres & over for subdivision			
	2017	2018	2019	2020	2017	2018	2019	2020
	\$/A	\$/A	\$/A	\$/A	\$/A	\$/A	\$/A	\$/A
North	9,750	10,000	10,000	10,000	10,000	10,000	8,250	10,000
Northeast	9,750	10,000	10,000	10,000	10,000	10,000	10,000	12,000
West Central	9,125	10,000	10,000	11,500	8,000	10,000	10,000	10,000
Central	10,000	10,000	10,000	12,000	10,000	11,000	10,000	10,000
Southwest	10,000	10,000	9,000	12,500	9,000	10,000	15,000	10,000
Southeast	10,000	9,000	10,000	10,000	8,000	7,250	10,000	8,000

## Farmland Market Forces

Respondents were asked to evaluate the importance of ten market forces that may potentially influence the farmland market. These forces include: (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 to indicate the effect of each item on farmland values. A negative influence is given a value from -1 to -5, with -5 being the strongest negative influence. A positive influence is given a value of between 1 and 5, with 5 representing the strongest positive influence. A score of zero indicates the item was not an influence in the market. An average for each item was calculated. The averages for 2018, 2019, and 2020 are included in Figure 2. The horizontal axis shows the item from the list above.

For 2020, there are three positive influences: interest rates, returns from alternative investments, and inflation. Each of these factors were also positive in 2019, yet the results suggest that they have increased in importance. The most notable positive influence

is current and expected interest rates. For example, one respondent strongly stated, “At this point in time, the price of corn is immaterial, it’s all about interest rates.” Since June 2019, the Federal Reserve’s Open Market Committee reduced the Federal Funds (overnight deposit) rate several times. These rate cuts include the emergency measures to limit the adverse effects of the COVID-19 Pandemic, and current interest rates are once again at historic lows. Low interest rates place positive pressure on farmland values by reducing the cost of potential borrowers.

The survey also identifies three negative influences: net farm incomes, crop prices, and livestock prices. In each case, respondents have become more negative as market disruptions and uncertainty place downward pressure on current farmland values.

In recent years, the limited supply of farmland is often credited for the relatively stable farmland prices despite the declines in farm incomes. When asking respondents to compare the amount of farmland on the market this year compared to last year, 55.8% respondents indicated less. This follows the pattern of recent years (Figure 3). Only 7.8% of respondents indicate an increasing supply of farmland on the market relative to 2019. At least one respondent suggests that the continued tightening supply of farmland could be linked to the current COVID-19 pandemic. “As of early June, land auctions in Indiana have not shown any decline in prices, but there has

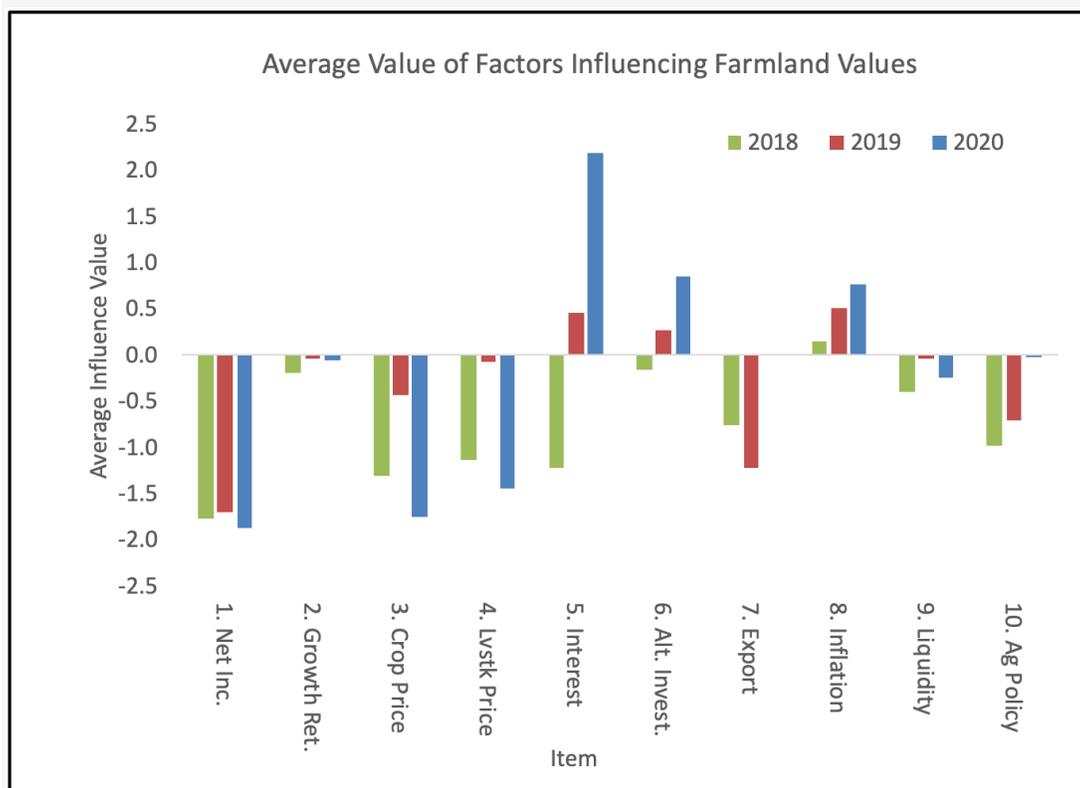


Figure 2. Influence of drivers of Indiana farmland values.

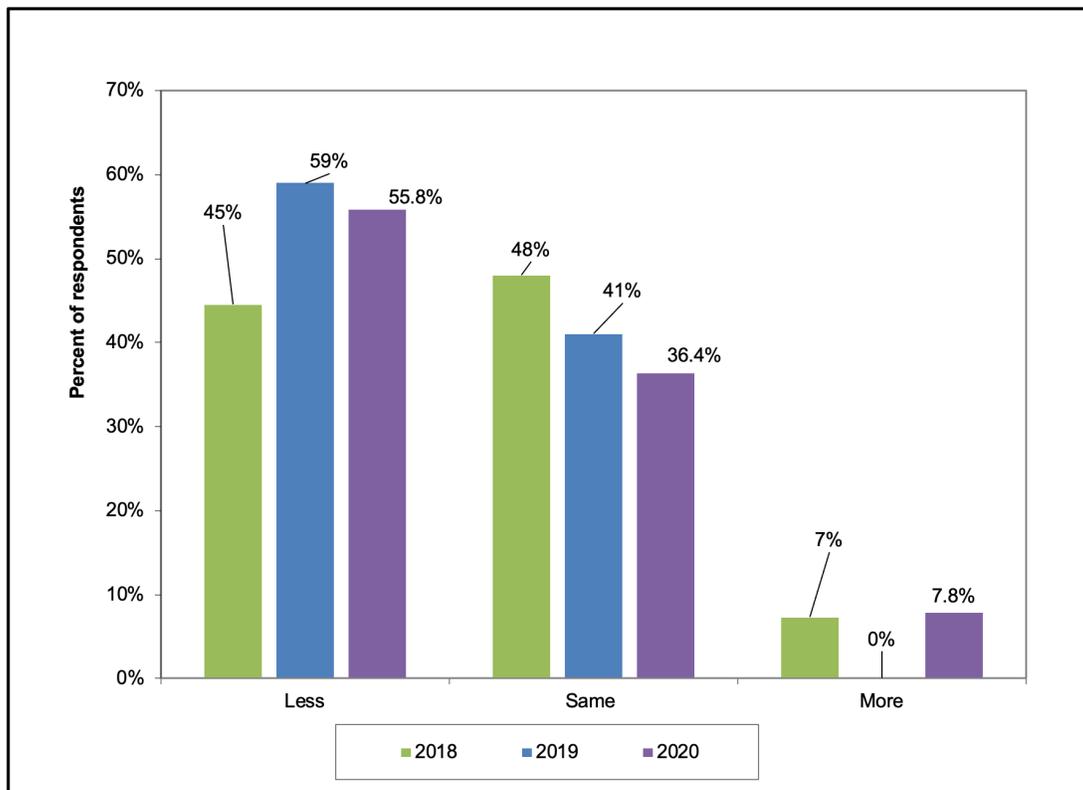


Figure 3. Percentage of respondents indicating less, same, or more farmland on the market than in the previous June

been a decline in sellers willing to put their farms on the market.”

It is also important to note that farmers still appear to be the primary purchasers of farmland. The 2020 survey suggests farmers purchased 65.4% of land sold. Non-farm investors were the next largest purchaser, at 20.1%, followed by developers and institutional investors at 8.1% and 5.3%, respectively.

**Five-Year Forecasts**

Respondents were asked to forecast the five-year average corn price, soybean price, mortgage rate, inflation rate, and finally the change in farmland value. The price and rate information for the past five years are presented in Table 3.

Respondents estimated the five-year per bushel average price of corn to be \$3.77. This was a \$0.38 decrease from the previous year and lowest price projection of the last five years. The five-year per bushel soybean price was estimated to be \$9.07, an increase of \$0.06 per bushel. Although prospects are improved from 2019, they remain well below the average of the last five years.

Given the current economic downturn and prospects for a potential recovery, it is not surprising that respondents expect interest rates to decline to 3.9%.

This is the lowest expected rate in the last five years by a wide margin. However, respondents’ expectations for inflation is only slightly lower than previous years at 2.1%.

Where do respondents expect farmland to be in five years given these projections? Not surprisingly, respondents provided a wide range of expectations. The 2020 survey asked respondents to predict the total change in farmland prices between June 2020 and five years from now. The average response was a modest 3.44% increase. This suggests an increase that just outpaces expected inflation, which is consistent with historic farmland growth rates.

Table 3. Projected five-year average corn and soybean prices, mortgage interest, and inflation

Year	Prices, \$ per bu.		Rate, % per year	
	Corn	Soybeans	Interest	Inflation
2016	4.05	10.03	4.9%	2.4%
2017	3.79	9.34	5.1%	2.2%
2018	3.97	9.99	5.5%	2.5%
2019	4.15	9.01	5.5%	2.4%
2020	3.77	9.07	3.9%	2.1%
Average	\$3.95	\$9.49	5.0%	2.3%

## Cash Rents

Statewide cash rental rates increased across all land quality classes in 2020. The largest increase was in low quality land which increased by 5.4% to \$175 per acre. This was followed by a 4.8% and 4.0% increase in average and top quality land, respectively. The rental rate increases offset the reduction in rents that occurred between 2018 and 2019.

At the regional level, cash rental rates increased across all land qualities and regions, with the

exception of low quality land in the North region which fell by 2.9%. Similar to farmland values, the West Central region had the highest cash rental rates for top (\$293), average (\$252), and poor (\$212) quality land. The largest price increases for each quality class were found in the Southwest region. Top quality land increased by 15.5% to \$269. Average quality land increased by 19.3% to \$216, and poor quality land increased by 20.1% to \$161. The West Central region also had the highest cash rental rates in a per bushel of corn basis, ranging from \$1.30 to \$1.35 per bushel.

**Table 4. Average estimated Indiana cash rent per acre, (tillable, bare land) 2019 and 2020, Purdue Land Value Survey, June 2020**

Area	Land Class	Corn bu./A	Rent/Acre		Change '19-'20 %	Rent/bu. of Corn		Rent as % of June Land Value	
			2019 \$/A	2020 \$/A		2019 \$/bu.	2020 \$/bu.	2019 %	2020 %
North	Top	208	263	272	3.4%	1.25	1.31	3.3	3.2
	Average	179	214	219	2.3%	1.18	1.22	3.1	3.3
	Poor	150	170	165	-2.9%	1.13	1.10	3.4	3.4
Northeast	Top	201	226	242	7.1%	1.12	1.20	3.0	2.8
	Average	176	189	205	8.5%	1.07	1.16	2.8	2.7
	Poor	152	152	174	14.5%	1.00	1.14	2.9	2.7
W. Central	Top	217	284	293	3.2%	1.31	1.35	3.1	3.1
	Average	189	241	252	4.6%	1.28	1.33	3.1	3.1
	Poor	163	195	212	8.7%	1.20	1.30	3.1	3.2
Central	Top	211	251	261	4.0%	1.21	1.24	2.9	3.0
	Average	184	219	222	1.4%	1.19	1.21	2.9	2.9
	Poor	157	180	185	2.8%	1.15	1.18	2.9	3.0
Southwest	Top	211	233	269	15.5%	1.10	1.27	2.9	2.9
	Average	179	181	216	19.3%	1.01	1.21	2.7	3.0
	Poor	148	134	161	20.1%	0.91	1.09	3.0	3.2
Southeast	Top	188	189	200	5.8%	1.01	1.06	3.2	3.3
	Average	162	151	171	13.2%	0.93	1.06	3.3	3.5
	Poor	132	116	131	12.9%	0.88	0.99	3.5	3.6
Indiana	Top	204	249	259	4.0%	1.22	1.27	3.0	3.0
	Average	175	207	217	4.8%	1.18	1.24	3.0	3.0
	Poor	147	166	175	5.4%	1.13	1.19	3.1	3.0

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.

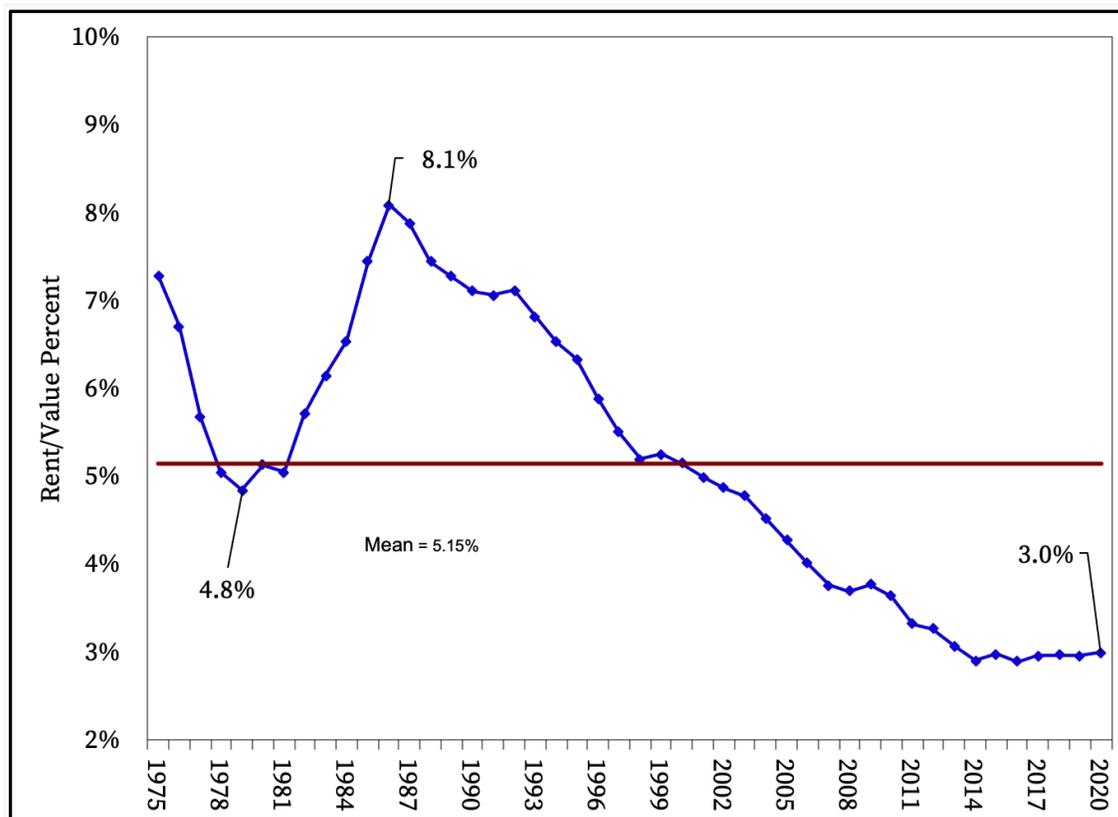


Figure 4. Gross cash rent for average quality farmland divided by average value of average quality farmland, 1975-2020

Statewide, cash rent as percent of land value remains 3% (Table 4 and Figure 4). This relationship has held relatively constant since the recent peak in farmland values in 2014, following a long decline from 1985 through 2014 (Figure 4). Although the ratio between cash rent and land value varies by region and land quality, the variation is tightly clustered around 3.0%.

### Looking Ahead

Statewide farmland values sit just below the historic peak of 2014, and on a year-to-year basis, values exhibited their largest gain since June 2013-2014. However, farmland prices have declined slightly since December, which may reflect changes in broader economic conditions related to the COVID-19 pandemic. As mentioned previously, many survey respondents emphasized the uncertainty related to the current COVID-19 pandemic. Given the disruptions across the food value chain and deep economic uncertainty, it is difficult to posit what the next year has in store for Indiana farmland market. The COVID-19 pandemic is a global phenomenon which will likely continue to disrupt trade patterns and income flows around the world. Everyone is hoping for a quick economic recovery, but as one respondent stated succinctly, “who knows what

COVID-19 will do to the land selling price.”

### **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 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 2019, June 2020, and a forecast value for December 2020. 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 for an individual tract, contact a*

professional appraiser or farm manager that has a good understanding of the local situation.

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

## 2020 Indiana Pastureland, Hay Ground, and On-Farm Grain Storage Rent<sup>1</sup>

Craig L. Dobbins, Professor of Agricultural Economics

Estimates for the current rental value of pastureland, hay ground, irrigated land, and on-farm grain storage in Indiana are often difficult to locate. For the past several years, questions about these items have been included in the Purdue Farmland Value Survey. These tables report the values from the June 2020 survey.

Table 1 reports averages and the number of responses for pasture rent. The number of acres required to support a cow, animal unit, is also presented.

Table 2 reports the average per acre rental rates and the number of responses for established alfalfa/grass hay and grass hay.

Table 3 provides information about the value and rental rate for irrigated farmland. These rates are for the associated with the production of corn and soybeans. When producing specialty crops such as seed corn or tomatoes, rent is frequently higher.

Table 4 provides information about on-farm grain storage rental rates. The rental rate for grain bins includes the situation where the bin is rented and the person renting the bin pays utility expense, where the bin is rented and the bin owner pays the utility bills, where the producer rents a system that includes dryer, leg, and bins. These rates are annual rates.

The first year for reporting this information was 2006. Past reports are in the Purdue Agricultural Economics Report Archive, [https://purdue.ag/paer\\_archive](https://purdue.ag/paer_archive). This information is typically found in the August issue of the specified year. However, 2016 results for are in the February 2017 issue and the 2017 results are in the April 2018 issue.

Region	Number of responses	Annual rent (\$ per acre)	Carrying Capacity (acres per cow)
Northeast	13	\$111	2.4
Central	14	\$63	2.0
Southwest & Southeast	21	\$55	2.0
State	52	\$71	2.1

<sup>1</sup>This information is a summary of data collected June 2018 as part of the Purdue Farmland Value Survey.

Region <sup>1</sup>	Alfalfa/Alfalfa-Grass Hay		Grass Hay	
	Responses	Rent (\$/A)	Responses	Rent (\$/A)
North & Northeast	15	\$147	15	\$114
West Central & Central	17	\$106	19	\$68
Southwest & Southeast	18	\$99	17	\$54
State	42	\$120	44	\$44

Region <sup>1</sup>	Number of responses	Corn Yield (bu. per acre)	Market Value (\$ per acre)	Cash Rent (\$ per acre)	Rent as % of Land Value	Furnished Well	Furnished Distribution System
State	35	237	\$8,204	\$283	3.5%	Landowner 80% Tenant 20%	Landowner 91% Tenant 9%

<sup>1</sup>Most of the observations reported here are from the North, Northeast, and Southwest regions.

Region	Bins only		Bins and electric utilities		Grain system	
	Number of responses	Rent (\$/bu.)	Number of responses	Rent (\$/bu.)	Number of responses	Rent (\$/bu.)
North & Northeast	57	\$0.13	46	\$0.18	45	\$0.25
West Central & Central	62	\$0.15	44	\$0.21	51	\$0.27
Southwest & Southeast	36	\$0.17	28	\$0.22	28	\$0.26
State	155	\$0.14	118	\$0.20	124	\$0.26

# Trends in farmland price to rent ratios in Indiana

Michael Langemeier, Professor of Agricultural Economics

Farmland prices have declined approximately 15 percent since 2014. However, farmland prices remain substantially above historical prices. For example, farmland prices in 2020 in West Central Indiana are 63% higher than they were in 2010 and 255% higher than they were in 2000 (for current land values see Kuethe and Dobbins, in this edition of PAER). 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 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 attributes.

This paper computes a ratio equivalent to 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 2020

period for West Central Indiana to illustrate the P/rent ratio. Data from 1975 to 2020 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.

## Price to Rent Ratio

The P/rent ratio for West Central Indiana has an average value of 19.6 over the 60-year period from 1960 to 2020, with a high of 34.1 reached 2016 and a low of 11.1 in 1986, which was perhaps the bottom of the valley after the price bubble of the 1970s and very early 1980s (Figure 1). At the peak of this bubble, the P/rent ratio reached a high of just over 20 from 1977 through 1979. The P/rent ratio subsequently dropped to the teens in the early 1980s, and reached its low in 1986. The rise from around 15 in 1976 into the 20s and down to 11.1 in 1986 corresponds exactly to what is viewed as the bubble in farmland prices that was followed by one of the more difficult periods for agriculture in the early-to-mid 1980s. The current value of 32.2 relative to the historic average of 19.6 and previous high around 20 at least raises concerns

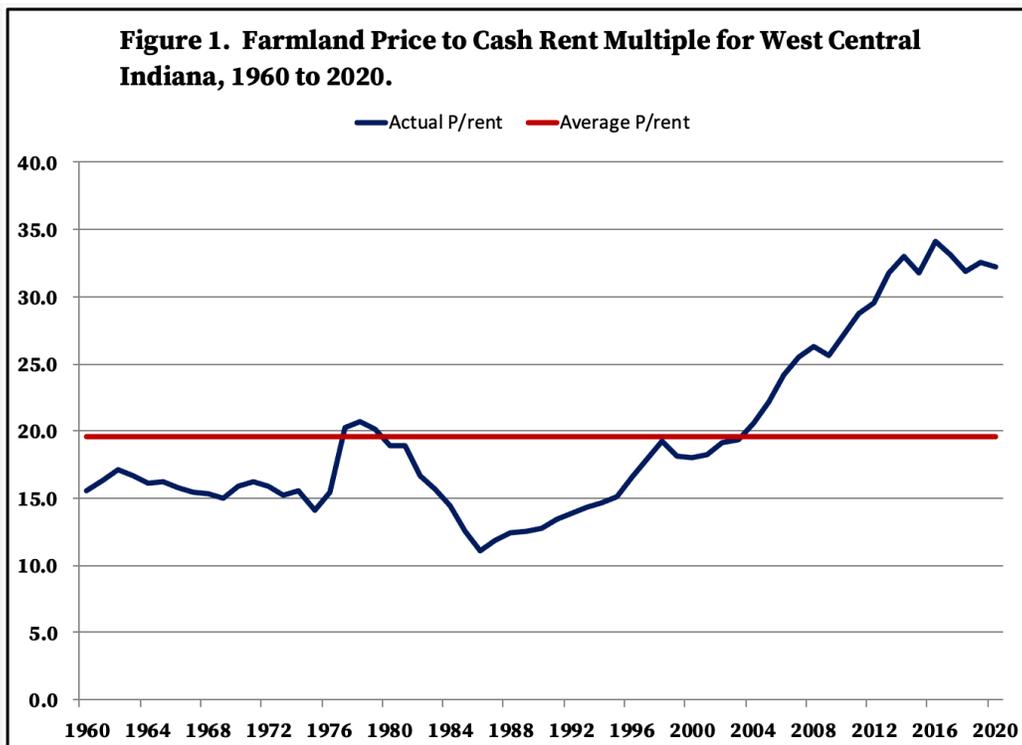


Figure 1. Farmland Price to Cash Rent Multiple for West Central Indiana, 1960 to 2020.

that current farmland prices could be overvalued in relationship to returns.

Over the 60-year period from 1960 to 2020, the P/E ratio for stocks is 19.1, which is similar to the average P/rent ratio. The P/E and P/rent ratios do not necessarily track one another. The average correlation coefficient between these two measures is only 0.25. Though not the topic of this paper, diversification potential between the stock market and farmland is relatively high.

**Cyclically Adjusted P/Rent**

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), 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 (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 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 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 2 shows all three of these ratios: P/rent10; P/OO-10, and Shiller’s P/E10. The P/OO-10 fell through the first half of the 1970s when real returns grew faster than land values, 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 75.2 in 2015. The P/OO-10 ratio has ranged from 35.4 to 69.5 since 2015. Since 2014, the P/OO-10 ratio has remained above the P/rent10 ratio, indicating that cash rents have been higher than owner-operator returns. In the long-run, you would expect the two ratios to be similar. In fact, the average P/rent10 and P/OO-10 ratios for the 1960 to 2020 were 21.8 and 21.7, respectively. For the ratios to equilibrate, either cash rents will need to decrease, owner-operator returns will need to increase, or a combination of the two will need to occur. Typically, cash rents adjust slowly to changes in owner-operator returns.

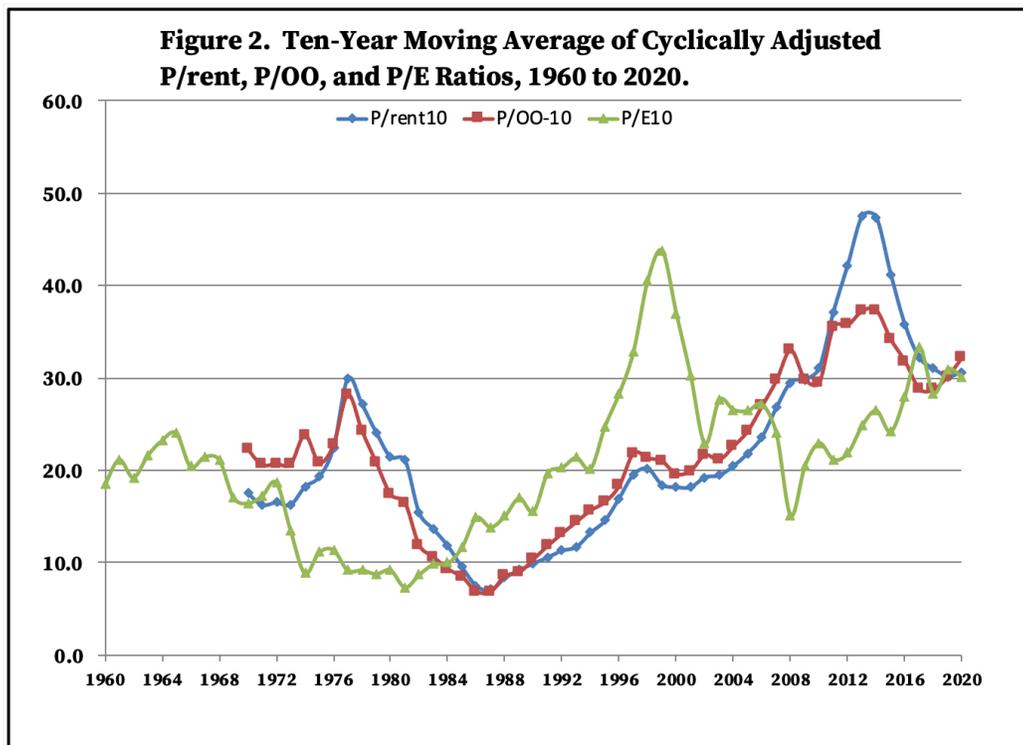


Figure 2. Ten-Year Moving Average of Cyclically Adjusted P/rent, P/OO, and P/E Ratios, 1960 to 2020.

The P/rent10 ratio reached a peak in 2013 at 47.5. Since then, the ratio has steadily declined reaching levels of 30.2 and 30.6 in 2019 and 2020, respectively. However, the P/rent10 ratio in 2020 is still relatively high compared to the long-run average (using 1960 to 2020 data) of 21.8. Does the current P/rent10 ratio signify a bubble or is something else going on? We contend that one of the primary reasons for the relatively higher P/rent10 ratio experienced in recent years are the relatively low interest ratios. The long-run average interest rate on 10-year treasuries is approximately 6.0 percent. In contrast, the rate since 2010 has averaged only 2.3 percent.

**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 2020 are used to compute 10 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 3). 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 4). The 20-year holding returns range from 6 to 14%.

The P/rent10 levels in 2011 through 2016 were above 35, which is literally off the chart (horizontal axis of Figure 3). The high P/rent10 ratio in 2011-2016 could be partially explained if market participants are expecting owner-operator returns to increase and the cost of capital to remain relatively low for the foreseeable future. It is important to note that the 10-year rate of return for land purchased in 2010 is much higher than the ten-year rate of return for land purchased in 1977, despite the fact that the two P/rent10 ratios for these two periods are similar.

The 20-year rate of return for land purchased in 2000 is 10.2 percent, which is in the middle of the range of 20-year rates of return illustrated in figure 4. 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 2000 the P/rent10 is 18.2. In the next five years, this rate will increase to approximately 22, and then increase dramatically for

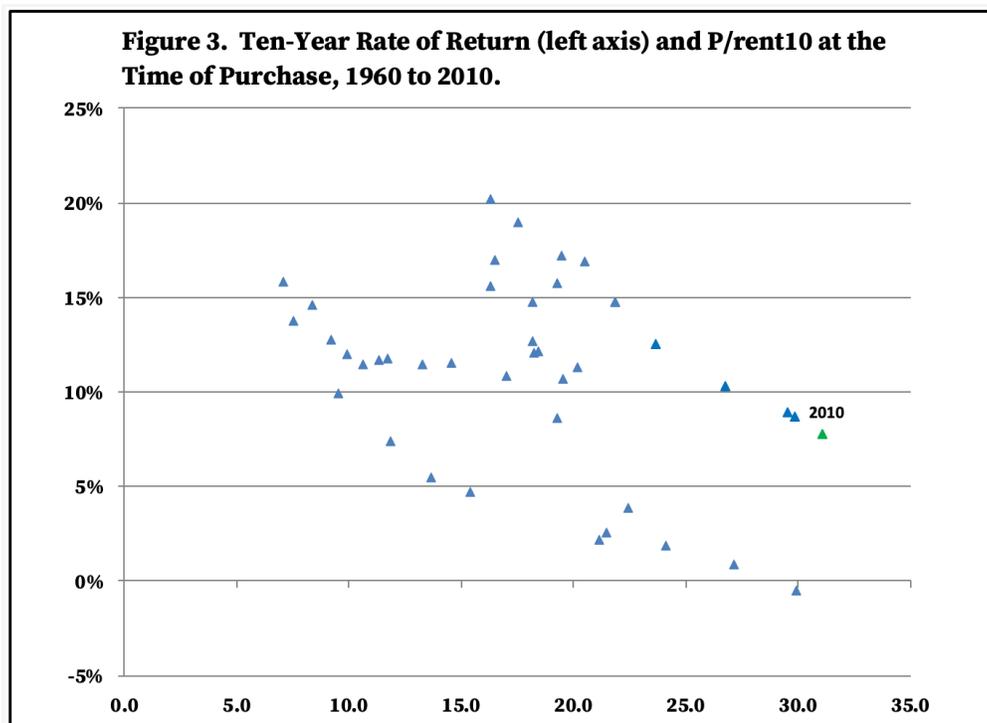


Figure 3. Ten-Year Rate of Return (left axis) and P/rent10 at the Time of Purchase, 1960 to 2010.

land purchased in 2006 on.

**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, 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 relatively high, and interest rates would also have to remain very low. Most agricultural economists expect crop returns to remain at current levels, putting downward pressure on cash rents, and for interest rates to remain similar to current levels 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 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 may be low.

Our reading from examining 60 years of history is that current farmland values are elevated in relationship to the underlying economic fundamentals. If we are correct, this means that those purchasing farmland at current prices may experience “buyer’s remorse” in coming years. But having said this, there remain some possible situations in which farmland values could be maintained or even increase. Positive influences on land include 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.

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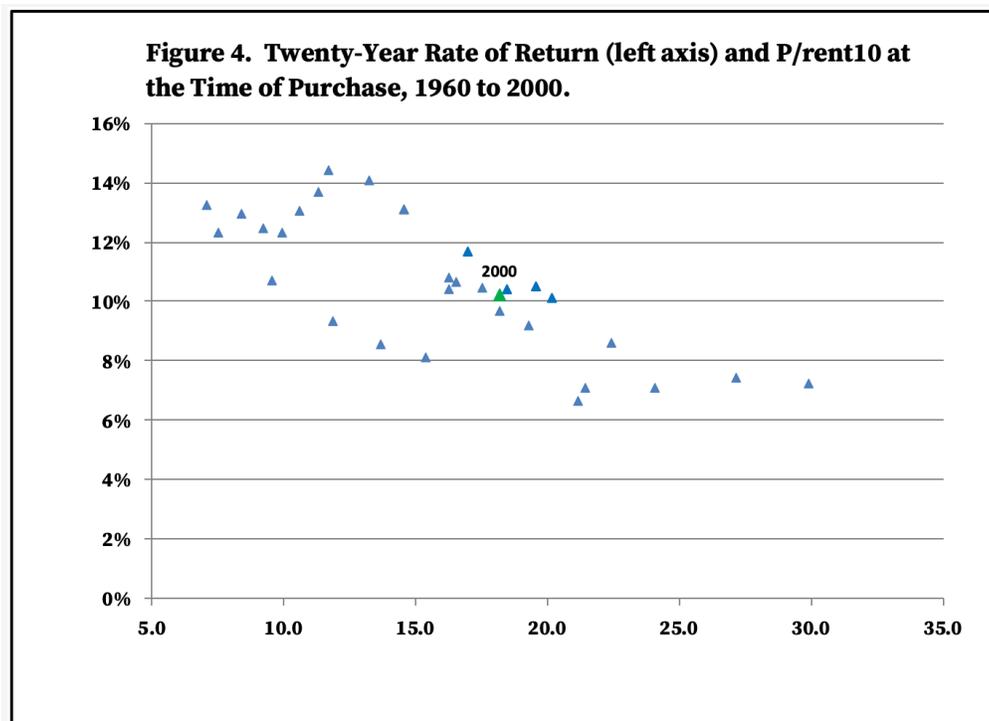


Figure 4. Twenty-Year Rate of Return (left axis) and P/rent10 at the Time of Purchase, 1960 to 2000.

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