Certified organic cropland in the United States: Is perceived value reality?

by

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ABSTRACT

Valuation of farmland in the United States is reliant on farm income, which relates to geographical factors, social and environmental pressures and commodity demands. In recent years, interest in certified organic cropland has emerged throughout the United States at an exponential level. Perception continues to evolve where cropland that undergoes certification and organic production could lead to increased land value and warrant higher returns for landowners in a cash rent scenario across the United States. In this study, a survey of over 400 certified organic landowners and farmers was conducted, and 109 viable responses utilized for analysis of land valuations in the central Midwest, Southern Plains, and East Coast. Data was evaluated from the respondents on a variety of topics such as length of the farmland lease/rent agreement, gross value of the organic commodities raised, and price of non-organic cash rents being paid, with the main objective of securing data about cash rent and land values and for certified organic farmland. Additional analysis of United States Department of Agriculture (USDA) National Agricultural Research Statistics Survey (NASS) for cash rents, environmental data, and regional net farm income in relation to certified organic cropland is discussed, but not directly included in this standard linear regression model. Case studies and literature reviews on this subject in the United States have been conducted and more data is being analyzed each year.

Data from this study indicates that while the perception from landowners is that certified organic farmland should be worth more from a cash rent standpoint, the reality is that there still many are unknown pressures on land valuations and few credible statistical

relationships were discovered in comparison to prices paid for cash rent of certified organic cropland in the central Midwest, Southern Plains, and East Coast. More research is needed to appropriately analyze the impact of organic cropland on cash rent values in these regions.

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CHAPTER I: INTRODUCTION

Asset valuation is critical to farmers in the United States. The need to identify and appropriately price land and cash rent agreements is critical to farm balance sheets and production choices. To-date, modest amounts of research have been published on the topic of certified organic crop land valuation in the United States. Some early University studies have demonstrated (Janzen, Fuller and Munkhnasan 2019), while on a limited basis, certified organic farmland has a higher market value. In their study, a producer survey of over 1,000 organic farms paying cash rent was conducted. The goal was to provide more information for investors, farmers, and financial institutions, to enable these sectors with a deeper understanding for more pointed and realistic decision-making tools for the organic owner/operator and the rates needed for adequate valuation of cash rent agreements throughout the U.S. In this study, the focus is on the producer segment per survey analysis, and the intent is to statistically correlate the perceived incentives for landowners to transition land to organic production, and willingness of operators to pay higher cash rents. While there is a vast amount of University research on conventional cash rents throughout the U.S., little is known about organic cash rent valuations, and how to factor in variables like commodity premiums, soil health and sustainability, as outlined in section 2.1 of this analysis.

Since 2002 when the United States Department of Agriculture (USDA) established standards for organic food and livestock production practices, interest in the sector has grown. Organic farmland in the U.S. grew from 1.3 million acres in 2002 to 2.7 million acres in 2017, accounting for 1 percent of U.S. cropland (Association, OTA Trade Report 2017). Certified organic farming systems rely on practices such as cultural and biological

pest management, and prohibit synthetic chemicals in crop production and antibiotics or hormones in livestock production (McBride, et al. 2015). Still, as commodity prices have leveled in recent years, and consumer demand for sustainable feed and food ingredients have increased, the organic sector has not kept pace with domestic demand. Markets for organic vegetables, fruits, and herbs have been developing for decades in the United States, and fresh produce is still the top-selling organic category in retail sales (E. USDA, Organic Market Overview 2020). Certified organic cropland and pasture accounted for only 0.6 percent of the total U.S. farmland; even less in field crops like corn (0.3 percent), soybeans (0.2 percent), and wheat (0.6 percent) (N. USDA 2012, 7, 8). The most popular organic livestock and poultry specialties are dairy cows (approximately 3 percent of U.S. dairy cows were certified organic in 2011) and layer hens (2 percent of U.S. layer hens were certified organic in 2011) (ERS, Organic Production Documentation 2019). As demand rises, so do the challenges of formulating adequate budgets for land that would seemingly be worth more value given the premium price paid for the crops, the agronomic requirements, and the value of the soil health. Evaluating real-time survey data from organic producers is intended to provide insight into how a predictive model can help those transitioning or interested in transitioning organic acres be proactive and realistic in farmland valuation with their cash rent agreements.

1.2 Research Hypothesis

Due to the implied value of organic land due to soil health, cost of production and economic value of the end product, this analysis is expected to articulate how a number of variables affect the price operators should be willing to pay for growing organic crops in a cash rent scenario on certified organic cropland in the United States.

CHAPTER II: LITERATURE REVIEW

Janzen, Fuller, & Munkhnasan (2019), compare and analyze the potential for organic/conventional farming profitability. Their strategy discussed the permanent and economically meaningful differences in profitably for organic agriculture, and how the differences should affect prices based on several factors, but specifically land. They reviewed the fact that by examining land values they should be able to dictate the net effect of organic conversion on profitability, and whether any resulting economic rents are captured by landowners, or other input suppliers. If rents associated with organic agriculture are bid into rental rates for organic land, and capitalized in land values, it is assumed that farmers will only benefit if they already own the land. Organic research is constrained to organic certification practices and does not allow for fluid changes in the structure of business or production practices because producers cannot adjust their market or on farm practices. The study notes a 20 percent premium in organic farmland rental rates, but not due to higher profits on organic farms (Janzen, Fuller and Munkhnasan 2019). While the farmland premium suggests a humble incentive for landowners to transition to organic production, farm operators may be unwilling to convert farming practices due to external constraints outside of the economic realm.

2.1 Cash Rent Agreements

Farms can be rented for fixed amounts per acre for all acres in the farm regardless of the number of acres of cropland, pasture, building or waste. This is referred to as whole farm rental rate. Or, the farm may be rented for a fixed amount per acre with a different rental rate for any pasture or buildings (Plastina 2020). An April 2020 revision of the Ag Decision Maker from Iowa State University (ISU) outlines approaches for determining

cash rents. Cash rent agreements can be based on several factors. Following the ISU information, the factors are: what others (in the same region) are paying, average yields, corn suitability rating (CSR2 index), productivity indexes, share of gross crop value, return on investment and crop share equivalent. Each of these factors has obstacles that must be overcome and while the study was not conducted from an organic producer standpoint, it would outwardly align with conventional producers and land rent agreements (Plastina 2020).

While paying what others are paying is a method that assumes what others are charging is fair and equitable, impediments of this method include the fact that charging what others are charging may not take into consideration the financial or physical capabilities of one tenant versus another. Rumors of values paid may often be just that, as these rates are not published, rather self-reported data to sources like the United States Department of Agriculture (USDA) or University extension experts. In the ISU guidelines, it is noted that differences in land quality should be addressed. Land productivity should not be assumed and when using this method, dollars should be addressed according to actual yields and productivity indexes (Plastina 2020). Average yields can be used to calculate cash rent rates, traditionally using five-or ten-year crop yield averages. Simple averages can be used, and rents generated accordingly using gross dollars earned per bushel or acre, as one method of evaluation.

Productivity indices, an indication of farmland productivity can be used for formal structuring of cash rent agreements. The corn suitability rating system in Iowa, as updated in 2013 to be CSR2, is used for property tax assessment purposes. Output values of the CSR2 range from 5-100, with higher numbers indicating higher land productivity (Johanns

2014). Other indices such as the Illinois Crop Productivity Rating cans be used to fairly compare soil quality for purposes of cash rent valuations (Olson 2000).

Share of gross crop revenue as the foundation for rental agreements logically follow models like the Iowa CSR2 and Illinois' Crop Productivity Rating because cash rent rates and agreements tend to follow the gross revenue generated from the crop being produced. Gross crop value is the USDA National Agricultural Statistics Service (NASS) state average yield times the state average price from October through December. Gross crop revenue is also shown, which includes gross crop value plus USDA commodity program payments and crop insurance indemnity payments. Expected crop insurance payments are zero when average yields and prices are assumed, so there is no need to try to estimate crop insurance payments that would be received the following fall when setting cash rents in advance.

Another method for evaluation of cash rent rates is to multiply the estimated current market value for cropland by an expected rate of return (Ward 2020). Surveys show that cash rents for good cropland in Iowa in recent years have averaged about 3-4 percent of current land values (Plastina 2020). Still, many factors impact expected crop returns and variability of crop return, and according to Barry Ward, Leader Production Business Management at Ohio State University these factors are outlined as follows:

- Land (Soil) Quality: Higher quality soils translate into higher rents.
- Fertility Levels: Higher fertility levels often result in higher cash rents.
- Drainage/Irrigation Capabilities: Better surface and sub-surface drainage of a farm often results in better yields and higher potential cash rent. Likewise,

irrigation equipment tied to the land will allow for higher yields, profits, and rents.

- Size of Farm/Fields: Large farms/fields typically command higher average cash rent per acre due to the efficiencies gained by operators.
- Shape of Fields: Square fields with fewer "point rows" will generally translate into higher cash rents as operators gain efficiencies from farming fields that are square.
- Market Access and Local Grain Market Prices: Access to multiple grain markets and the local grain prices and grain basis can drive rental rates.
- Previous Tillage Systems or Crops: Previous crops and tillage systems that allow for an easy transition for new operators may enhance the cash rent value.
- Field Border Characteristics: Fields surrounded by tree-lined fencerows, woodlots or other borders affecting crop growth at the field edge will negatively impact yield and therefore should be considered in rental negotiations.
- Wildlife Damage Potential: Fields adjacent to significant wildlife cover including woodlots, tree lined fencerows, creeks, streams, and such may limit production potential to border rows and should be considered in rental negotiations.

Secondary Factors Affecting Rental Rates:

- Buildings and Grain Storage Availability: Access to machinery and grain storage may enhance the value of the cropland rental rate.

- Location of Farm (Including Road Access): Proximity to prospective operators may determine how much operators are willing to bid for cash rents. Good road access will generally enhance cash rent amounts.
- USDA Farm Program Measurables: Farms that participate in the USDA Farm Program and have higher "program yields" may command higher cash rents than non-program farms.
- Services Provided by Operator: Operators that provide services such as clearing fence rows, snow removal and other services may be valued by the landowner. This may even be a partial substitute for cash rent compensation.
- Conditions of Lease: Conditions placed on the lease by the landowner may result in fewer prospective operators and a lower average cash rent.
- Payment Dates: Leases that require part or all the rent to be paid early in the year (up-front) may result in lower rental rates due to higher borrowing or opportunity costs for the operator.
- Reputation of Landowner or Operator: Reputations of the parties may play a part in the cash rental negotiations. A landowner with a reputation of being difficult to work with may see cash rents negatively affected by this reputation. Farmers with a similar negative reputation may have to pay higher rents.
- Special Contracts: Farms with special contract commitments may restrict the operator from changing crops based on market conditions. This may negatively impact cash rents. There may also be contracts that positively affect cash rents such as high value crop contracts or contracts for receiving livestock manure.

- Tolerant/Resistant Weed Populations: Problematic herbicide tolerant or resistant weed populations may negatively affect rental rates.
- Population Density: Farmland in or around areas with significant human populations or close to large urban centers may require extra time, care and caution and carry more risk which may negatively affect rents.

Whether the ground is certified or not, farmland valuation and cash rental rates can be developed based on the facts above. It would seem logical that organic farms would follow the same specific criteria as outlined. Yet, little data has been developed for producers and landowners to articulate the need for higher cash rent rates in for their certified organic farms.

2.1.2 What is Missing?

Several variables inhibit the increased velocity in expansion of certified organic cropland in the United States. While more research is needed, we know that for the last twenty years, and specifically in the 2014 study by Elizabeth Reaves and Nathaniel Rosenblum regarding barriers and opportunities for organic producers, factors such as cost associated with transitioning conventional farm ground to certified organic, production challenges, such as weed pressure, regulatory issues, and inconsistent research and knowledge of agronomic best-practices are often a barrier to entry in the market (Reaves and Rosenblum 2014, 5-7). “USDA requires organic farmers and food handlers to meet a uniform organic standard and makes certification mandatory for operations with organic sales over $5,000. USDA has accredited about 50 U.S. State and private certification programs, and over 30 foreign programs (E. USDA, USDA Services: Organic Certification and Accreditiation 2019). Certifying agents review applications from farmers and

processors for certification eligibility, and qualified inspectors conduct annual onsite inspections of organic operations" (ERS, Organic Production: Organic Certification 2019).

Once operators or landowners have made the 36-month commitment to transition, challenge exists. Weed pressure, changes in soil health and readily accessible hands-on technical support and historical research trials for the organic grower, while rising, is minimal when compared to their conventional counterparts. It is noted that while the first three years are the entry period, the real timeline is five to seven years for producers, which reflects one entire organic cropping cycle[1] (Goldhammer 2017). Still, constraints remain due to the variation in understanding actual accounting profits and expected economic profits, in the production and supply chain arenas. Recruitment of farmers in certain regions of the U.S. who are willing to take the risk of organic production is among the biggest gap in expansion of organic farmland in the U.S. today (Reaves and Rosenblum 2014, 6-8).

Additionally, not just the valuation of the farmland itself, operators must have a better understanding of how to value their cash rent agreements when negotiating with landowners, regardless of certification status. If the grower feels there is incentive to transition the ground, they must be willing to negotiate agreements in a justified, fair, and equitable manner.

[1] National Organic Program (NOP) Crop Rotation (§ 205.205) is defined as "alternating annual crops grown on a specific field in a planned pattern or sequence in successive crop years so that crops of the same species or family are not grown repeatedly without interruption on the same field." Crop rotation must include but not limited to sod, cover crops, green manure crops, and catch crops that provide the following functions that re application to the operation: maintain and improve organic matter, provide pest management, manage deficient or excess plant nutrients, and prevent soil erosion. (Goldhammer 2017)

2.2 Pricing of Organic Rents

McBride, Greene, Foreman, and Ali (2015) discuss that although there is interest in organic agriculture, little has been done to address potential environmental concerns and from a relative cost standpoint. Little is known about costs and returns of organic crop production on commercially scaled operations. In their 2015 study they note a limited economic analysis aside from experimental field trials. The study utilized USDA ARMS data for corn, soybeans, and wheat. Regression analysis with endogenous treatment-effects were employed to describe the difference in organic and conventional production costs. Results were analyzed by the change in mean cost-of-production estimates for organic and conventional producers. The study found that organic production takes place more in northern states where there is less pest pressure. In addition, it found that organic farmers in those regions are more likely to only have one job, on the farm, creating a correlation that less overhead is needed for production of organic commodities. Their study notes the cost in organic production, per bushel with per acre results. However, important to note, that while often used interchangeably, price per bushel and price per acre are different computations. The difference being allocation of costs over units (Gloy and Widmar 2020). Costs developed on an input basis (per acre), or costs developed on an output basis (per bushel). This distinction is critical when analyzing structure of cash rents for valuation of sound forecasting and evaluation processes. Neither method is more formidable than the other, but procedures and practices that allow for a standard metric to be used for more insightful and intuitive planning is necessary.

McBride, Greene, Foreman, and Ali (2015) find results that the per bushel operating costs, compared to conventional production were similar, $83-98 per acre

higher for corn, $55-62 per acre higher for wheat and $106-120 per acre higher for soybeans. The per-bushel economic costs of organic production were higher because of higher per acre costs, or costs developed on an input basis, and lower yields. They hypothesized that the reason some conventional farms are not being transitioned, despite the added economic benefits, are the increased demand on the producer in the organic space, as the processes tends to be more multifarious and arduous (McBride, et al. 2015).

As suggested in a peer reviewed study regarding rental rates in the state of Kansas, Taylor & Featherstone (2018) address the potential impact of social capital in farmland leasing relationships. While economic incentive is one factor to consider, the impact of social capital is highly variable. Trust, the commodity and local markets, intrinsic productivity of the ground, costs, and social capital of the tenant, are all factors in development in lease and rent agreements. They note that the Ricardian rent theory suggests that farmland rental rates are determined by the future stream of income to the land as a function of land-specific productivity, commodity and input prices, and land location characters. While the empirical model was utilized for the study and hypothesis in length of relationship and geography of the landowner evaluated, the results found that over the course of the average span of rents (16.1 years) cash rent decreased by 10 percent for each 100 percent increase in number of years of relationship. Additionally, established farmers versus beginning farmers, given the constraints on capital availability could be causation for lower rents in certain regions due to established farmers' social capital in relationships with the landowners.

2.3 Cropland Sales and Farmland Real Estate

In a 2019 Iowa State University survey, 69 percent of Iowa farmland owners have no plans to sell their land. Addressing the attractiveness of the geography is critical, land

owner marginal tax brackets, and recent statewide values show that farmland value surveys indicate prices are stabilizing after several years of decreasing value since 2013 (17 percent decrease) (Swoboda 2019). The tenant-landlord relationship is vital to producers and landowners, alike. In Iowa alone, more than half of the cropland in that state is rented, and 82 percent of owned land is debt-free. Again, external factors weigh heavily and are difficult to analyze when developing the methods for farmland cash rent valuation. According to the study by (Borchers, 2014) "the portion of the market value derived from agricultural production is typically referred to as its agricultural use value. Across the United States, agricultural land is given preferential tax treatment, in which the taxable value of the land is based on the implied agricultural use value and not the full market value. This has important implications for public finance (Anderson 2012). A number of states have recently revised, or are reconsidering, the tax treatment of agricultural properties (O'Dea, 2013; Sherrick and Kuethe, 2014).

If the divergence between market values and agricultural use value remains, while farm incomes remain high, states and localities may look to this potential tax revenue to help ease financial difficulties" (Borchers 2014, 1310). In this article they modeled land values by exploring a modeling approach as an illustrative alternative to the more traditional hedonic model. The portion of farmland's market value not attributed to agricultural use could be thought of as a "residual" value, and this residual can be obtained from a simple regression of the farmland price on a measure of agricultural return where $\boldsymbol{P}$ is a vector of farmland prices, $\boldsymbol{R}$ is a vector of the agricultural returns to land and the regression residual, u, is the component of farmland value that cannot be explained by agricultural returns. By design the residual u contains only the component of agricultural land values that is orthogonal to the

agricultural use value, if the assumption that observed cash rents fully capture agricultural returns holds: $P=R\alpha+u$ (Borchers 2014).

In conjunction with agricultural land valuation is the effect of legacy planning for farmland owners. This affects both non-organic and organic landowners in their planning. Little research is available on real-estate of certified organic farmland, but it is important to realize the future projections on all farmland in the U.S. and how it could affect organic farmers and the valuation of the land that is certified organic in the years ahead. According to the USDA: ten percent, 93 million acres, of all land in farms is expected to be transferred during 2015-2019, most of which, six percent, will change hands through gifts, trusts, or wills. Of all land expected to be transferred, only about a quarter, 21 million acres, will be sold between nonrelatives. While the amount of farmland expected to be sold is relatively small, some of the land transferred through trusts, wills and gifts may then be sold by the new owners, bolstering the supply of land available for purchase. But, as of now, data is too limited to elicit meaningful research on transfers of organic cropland, and land appraisals prove difficult because of the novelty of the organic certification (Mercaris 2020). This research, or lack thereof, correlates with the need for deeper understanding of certified organic cropland and how farmers can utilize tools for proper planning in cash rent scenarios for the future when land sales and transfers are on the docket in their localities.

Farm real estate values and cropland average value per acre continue to increase year over year. USDA NASS 2019 survey data reflect the increase in values by region as outlined in Table 2.1 Farmland Real Estate vs Cropland Average Value. These values articulate all farmland, indifferent of production practices. Still, this analysis warrants evaluation in reasoning in theories included in relation to Table 2.1.

Table 2.1 Farmland Real Estate vs Cropland Average Value

Region	FRE 2015	CROP 2015	FRE 2016	CROP 2016	FRE 2017	CROP 2017	FRE 2018	CROP 2018
Northwest	5019	5520	5270	5650	5380	5700	5550	5940
Lake States	4740	4730	4730	4750	4880	4840	4890	4810
Corn Belt	6220	6700	6100	6500	5990	6380	6110	6370
Northern Plains	2320	3090	2200	2900	2150	2760	2110	2740
Appalachian	3810	3910	3880	3980	3970	4070	4030	4140
Southeast	3740	3840	3830	4030	3990	4060	4050	4160
Delta States	2790	2600	2830	2690	2920	2770	3000	2880
Southern Plains	1810	1690	1810	1700	1880	1780	2000	1820
Mountain	1130	1780	1140	1820	1170	1860	1200	1910
Pacific	4800	6190	4960	6350	5440	6650	5610	6830
48 states	3000	4100	2990	4040	3030	4030	3100	4050

(USDA, National Agricultural Statistics Survices 2019)

2.4 Structure of Cash Rents

As outlined in 2.1 Cash Rent Agreements, several factors and variations play into negotiating cash rent agreements in both conventional and organic markets including: weather, commodity pricing, logistics, soil/farm quality, and social relationships (Ward 2020). Cash rent can be set using a flexible method based on partial budgets, or the most common method is fixed rent method where the landlord is not responsible for any risk in the growing season, or income variables. In a study by Patterson, Hanson, and Robinson (1998) it was discovered that from a survey of 12 states in the north central United States where tenants primarily grow corn and soybeans, the contract agreement states that the tenant and landlord make a 50/50 crop share agreement where the output and inputs (seed, fertilizer, chemical) are split equally (Patterson, Hanson and Robinson 1998). While this is a traditional conventional cropland agreement, structure of cash rents in organic land are widely unknown. From the survey, cash rents reported by respondents were evaluated against USDA National Agricultural Statistics Survey (NASS) 2019 Cash Rents Survey for the corresponding regions. This NASS survey includes acres rented and cash rental rates from farmers and ranchers in the United States, in all counties or equivalent subdivisions within each state that have 20,000 acres or more of cropland and pastureland.

The Cash Rents Survey (NASS, Cash Rents Methodology and Quality Measures 2019) is conducted every other year and the June survey data is collected annually. Both surveys provide estimates of the current year's cash rents paid for irrigated cropland, non-irrigated cropland, and permanent pasturelands. It is important to note that all national and state level cash rent estimates are published in August for all states, excluding Alaska. District and county level cash rent estimates are published in September.

In the USDA NASS cash rent survey a "reweighted" estimator to compute direct measures of acres rented for cash is used. Each farm and ranch in the sample has an initial sampling weight. Ratio estimates are used for many items. For example, cash rent per acre values are calculated as the ratio of total rent paid to total acres rented. Ratio indicators use the reweighted estimate described above for the numerator and denominator direct expansions. Both the numerator and denominator must be usable for that record to be used in the ratio estimator. Coefficient of variation provides a measure of the size for the standard error relative to the point estimate and is used to measure the precision of the results of a survey estimator. This reweighted estimator, and ratio estimates may be cause for error in the USDA data. These results do not specifically articulate information on a per parcel, single operator, single landowner basis, making future projections challenging for farmers working to build cash rent agreements on certified organic cropland where the demands and yield expectations are highly variable.

Certified organic cropland accounts for about 1.1 percent of all cropland in the U.S., realizing that the NASS cash rents survey organic rent data are too small to influence results, and therefore the average values reported by NASS are taken as representative of conventional farmland rental prices. Mercaris' Meroterra study determined that NASS data did not produce any bias that could influence results of an analysis of organic land rent premiums as reported by survey respondents (Mercaris 2020). No bias was found due to Mercaris' use of a "Single Factor ANOVA Test, and Pair two-tailed t-Test comparing USDA NASS county-level irrigated field crop land rents to the set of non-differentiated irrigated land rent observations found within the Mercaris survey. These two groups were chosen because they are both aggregates of organic and

non-organic acreage, and therefore a good test of any inherent bias in the Mercaris survey. The results of these two tests indicated that both the mean and variance of the two series were not statistically different within a critical level of 5%, subsequently implying Mercaris' survey data is not biased by sample selection" (Mercaris 2020).

Historically, land values and corresponding cash rent values have been validated with studies that employ the Ricardian rent theory, which employs variable profit functions to analyze the determinants of cropland cash rental rates. Janzen, Fuller and Munkhnasan (2019) discuss that research has been done on whether economic or non-economic benefits and costs motivate farmers to adopt organic production practices. This research would support the theories of organic farmers bidding cash rent values to meet premium budgets, which mirrors actual market prices for goods sold. In Janzen, Fuller, and Munkhnasan (2019) they analyze USDA Agricultural Resource Management Surveys (ARMS) data between 2003 and 2011, "…average cash rental rates paid by organic farms for cropland were 34 percent higher than rental rates paid by conventional farms. Reported cropland values were 41 percent higher for organic farm" (Janzen, Fuller and Munkhnasan 2019, 1). This analysis denotes that organic farms are slightly larger on average, in terms of revenues, costs and acreage. On average organic farms earned more revenue and paid roughly double in variable costs. The study suggests that their sample sees higher variables costs than conventional farms ($732 versus $295) and higher per ace revenues ($943 versus $483).

At $140 per acre, the average rate to rent cropland in the United States in 2019 was $2 higher than in 2018. For irrigated cropland, the average rental rate per acre was $220 (up from $215 in 2018); for non-irrigated cropland it was $127 (up from $125). For

pastureland, the average rate per acre at $13 is $0.50 higher than in 2018 (NASS, 2019 Agricultural Land/Land Values and Cash Rents 2019).

Certified organic crops, both irrigated, and non-irrigated in regions being evaluated in this survey can be valued at approximately 3:1 to conventional products, (Mercaris 2020) (Figure 2.2). The logic behind the sentiments presented by not only farmers and landowners but industry experts, alike, would lead to the expectation that organic cropland cash rents would be at a similar ratio. Data provided by the survey suggests there is a premium being paid for organic land of approximately $70 per acre, annually compared to conventionally farmed land. USDA NASS data shown in Table 2.2 USDA NASS Survey Cash Rent by Region (Non-organic).

Table 2.2 USDA NASS Survey Cash Rent by Region (Non-organic)

Program	Year	Period	Region	Commodity (Measured in $/acre	Value
SURVEY	2019	YEAR	APPALACHIAN	RENT	$103.00
SURVEY	2019	YEAR	CORN BELT	RENT	$203.00
SURVEY	2019	YEAR	DELTA STATES	RENT	$111.00
SURVEY	2019	YEAR	LAKE STATES	RENT	$153.00
SURVEY	2019	YEAR	MOUNTAIN	RENT	$ 87.50
SURVEY	2019	YEAR	NORTHEAST	RENT	$ 87.00
SURVEY	2019	YEAR	NORTHERN PLAINS	RENT	$106.00
SURVEY	2019	YEAR	PACIFIC	RENT	$305.00
SURVEY	2019	YEAR	SOUTHEAST	RENT	$ 88.50
SURVEY	2019	YEAR	SOUTHERN PLAINS	RENT	$ 40.00

RENT, CASH, CROPLAND - EXPENSE, MEASURED IN $ / ACRE
Source: USDA NASS https://quickstats.nass.usda.gov/results/8D409D17-433E-393C-B40F-672149A803A4

2.5 Consumer Trends

Consumer demands for organic products and the premiums they are willing to pay have increased over the last 15 years, growing the organic market by over 5 percent every year between 2010-2018.

Table 2.3 Organic Food vs. Total Food Sales 2010-201 shows that in the 2020 Organic Industry Survey, the USDA found that consumers continue to seek the organic label to feed their families the healthiest food possible (Association, News 2020).

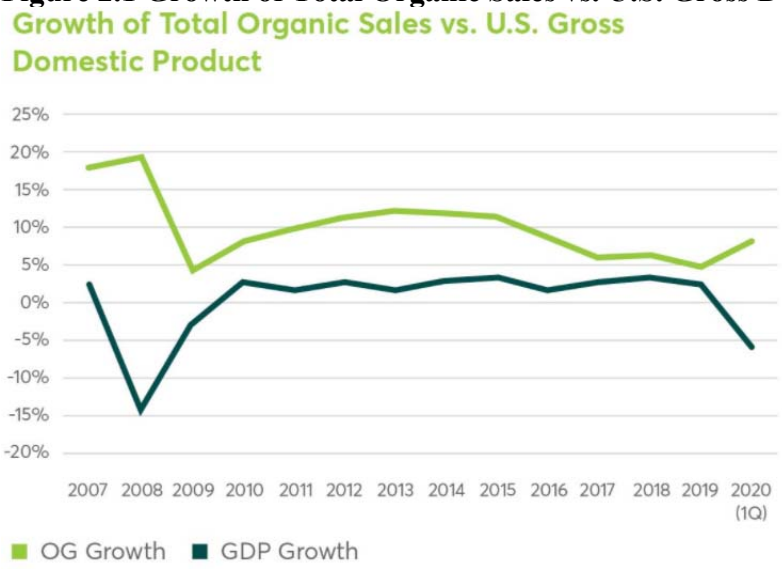
Table 2.3 Organic Food vs. Total Food Sales 2010-2019

Category	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Organic Food	22,961	25,148	27,965	31,378	35,099	39,006	42,507	45,209	47,862	50,065
Growth %	8.0%	9.5%	11.2%	12.2%	11.9%	11.1%	9.0%	6.4%	5.9%	4.6%
Total Food	677,354	713,985	740,450	760,486	787,575	807,998	812,907	822,160	940,972	860,583
Growth %	1.2%	5.4%	3.7%	2.7%	3.6%	2.6%	0.6%	1.1%	2.3%	2.3%
Organic (as % Total)	3.4%	3.5%	3.8%	4.1%	4.5%	4.8%	5.2%	5.5%	5.7%	5.8%

Source: Organic Trade Association 2020 Organic Industry Survey conducted 2/7/2020-3/27/2020

Additionally, while the globe has been rocked by the coronavirus pandemic, and the organic food marketplace turned upside down early in 2020, prior to 2020, the organic market grew steadily year over year. It is yet to be derived if consumers will be more price sensitive and cause a slowdown in organic sales, or because of people becoming increasingly aware of their health and looking for cleaner products, will they be willing to invest in premium products regardless of changes in net family income.

Figure 2.1 Growth of Total Organic Sales vs. U.S. Gross Domestic Product

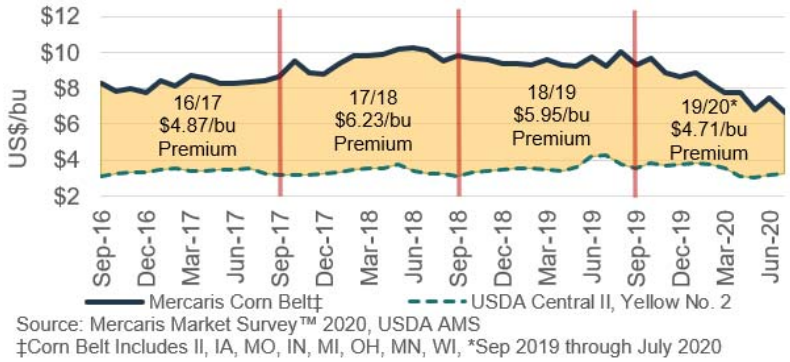


(Organic Trade Association 2020)

2.6 Profitability of Organic Field Crops

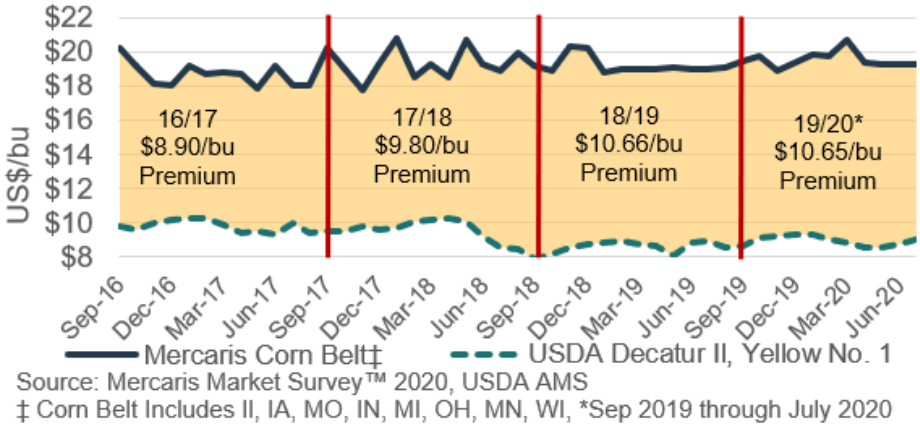
Mercaris, the leading independent firm on organic data collection, notes that certified organic commodities receive 1.5 to 4 times the prices of conventional commodities. The Organic Trade Association found that organic farm income has nearly doubled between 2012 and 2017; $400,603 is the gross average income for organic farms in 2017, up from $217,836 in 2016 (Association, News 2020). In the 2020 Mercaris Market Survey, dollars per bushel for U.S. #2 feed grade yellow corn was charted against reported dollars per bushel paid of certified organic cash corn. Findings included an average of $5.44 per bushel premium paid for organic corn over #2 feed grade yellow corn in the corn belt in the four year evaluation as illustrated in Figure 2.2 Corn Belt Comparison of #2 Yellow Corn and Certified Organic #2 Feed Grade Yellow Corn (Mercaris 2020).

Figure 2.2 Corn Belt Comparison of #2 Yellow Corn and Certified Organic #2 Feed Grade Yellow Corn



Comparatively speaking, and justification for the theory in this paper, in the same survey, #1 U.S. feed grade soybean cash prices over Decatur were compared to #1 certified organic feed grade soybeans. Figure 2.4 illustrates that in the same four-year analysis, an average of $10.00 per bushel premium was paid for certified organic soybeans over conventionally raised feedstuffs.

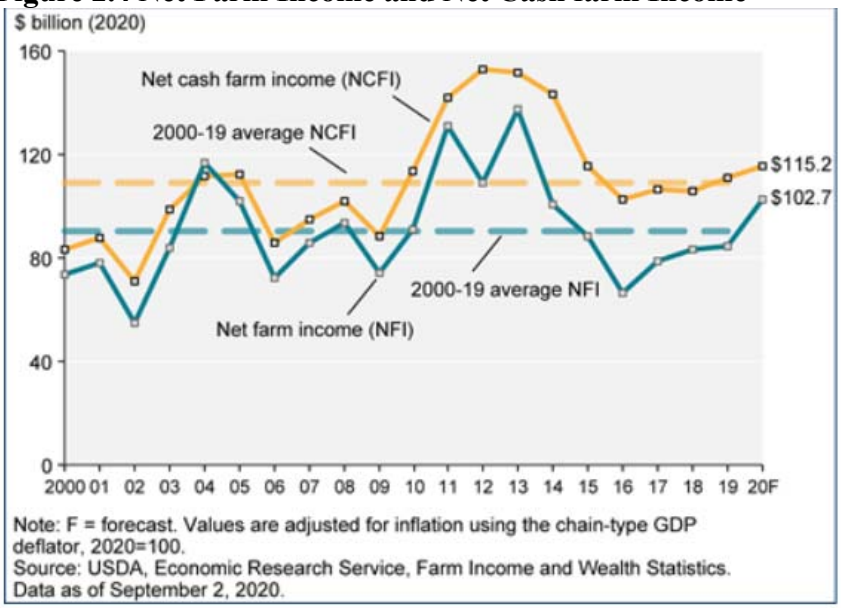
Figure 2.3 Corn Belt Comparison of #1 Feed Grade Yellow Soybeans and Certified Organic #1 Feed Grade Yellow Soybeans



Correlation between higher net farm income of certified organic cropland and farmland valuation has yet to be determined, as little consensus has been made in this analysis. In Janzen, Fuller, and Munkhnasan (2019) it is noted that the perception is that

longevity in the organic farmland offers perceived higher future income potential and thus, a greater impact on the price people are willing to pay for farmland. This can be analyzed against overall net farm income in the United States. While general net farm income and net cash income are trending higher, there is a lag in values year over year which is reason to evaluate the need for additional or diversification of farmland. With increasing cash receipts, one solution to lagging income or need for diversification is transitioning conventional ground to certified organic.

Figure 2.4 Net Farm Income and Net Cash farm Income



Even now, the U.S. is not meeting domestic demand for organic field crops. Mercaris' 2019 Organic and non-GMO acreage report shows that the U.S. increased all organic acres by more than 20 percent from 2011 to 2019. In 2019 there were 3.3 million acres of certified organic cropland. These 3.3 million acres represent a 14 percent increase from 2018 in organic field crop operations. Still, the reality is that the U.S. is a net importer of organic grain and oilseeds, drawing the assumption that the cost of transitioning acres while

steady, the markets are still volatile. Segmented consumer demand could be a deterrent to added growth in certified organic acres in the future.

Table 2.4 Total U.S. Organic Imports (millions f $), ranked by 206 values

Product	2011	2012	2013	2014	2015	2016	Est. Annual Growth Rate
1. Coffee	526.1	282.9	253.3	332.6	344.5	313.1	-4.28%#
2. Soybeans	41.8	90.2	110.2	184.2	240.2	250.5	40.63%
3. Bananas	-	-	258.8	122.6	198.4	209.9	11.49%#
4. Olive Oil	-	-	165.6	148.6	197.2	191.8	7.85%
5. Corn	-	-	36.6	35.7	112.7	160.4	111.09%
6. Wine	-	-	256.0	121.5	90.8	87.1	-28.55%
7. Honey	-	11.2	13.2	46.1	47.5	73.6	64.83%
8. Avocado	17.2	13.1	18.9	37.1	45.1	72.7	42.83%
9. Apples	5.7	12.1	14.9	29.8	67.8	63.7	33.63%
10. Bell Peppers	8.0	9.3	18.1	19.4	25.1	49.4	missing values
11. Sugar	-	-	-	-	-	47.7(1)	missing values
12. Almonds	-	-	16.7	41.6	58.7	39.6	31.77%#
13. Tea	37.2	34.8	42.1	31.4	37.8	39.6	0.93%#
14. Blueberries	2.9	3.5	6.0	6.2	8.4	25.4	missing values
15. Rice	24.4	25.4	30.1	24.1	24.4	22.1	-2.30%#
16. Mangoes	-	-	100.7	38.5	28.8	17.1	-38.73%
17. Pears	3.7	4.0	6.0	11.5	21.0	13.1	missing values
18. Durum Wheat	0.7	9.5	16.0	16.7	15.7	12.7	missing values
19. Ginger	-	-	9.6	19.0	12.2	10.7	0.16%#
20. Flaxseed Oil	-	-	2.4	5.5	6.9	9.0	67.41%
21. Garlic	-	-	1.4	2.7	2.0	5.0	missing values
22. Barley	-	-	-	-	-	0.8(1)	missing values
23. Quinces	-	0.2	0.0	0.1	0.0	0.0	missing values
Total	**667.7**	**496.3**	**1,376.8**	**1,274.8**	**1,585.1**	**1,714.4**	
Total for products tracked from 2013	-	-	**847.9**	**535.8**	**707.8**	**778.4**	

Notes:

#: not statistically significant results; (1) – HS-coded since July 2016; "Missing values": Estimation problems due to excessive zeros or missing data points.

Data Source: USDA Foreign Agricultural Service's Global Agricultural Trade System (GATS)

Source: (Association, OTA Trade Report 2017, 28-30)

The need for this research is prevalent because of the scarcity and inconsistent placement of organic cropland. Modeled higher net farm income year over year on certified organic acreage compared to conventional acres implies the potential for organic land to command a higher market value.

CHAPTER III: THEORY

The economic information necessary to complete this analysis is based on the theory that certified organic cropland should be worth more dollars per acre in rent than non-organic land, taking into consideration factors like gross profit per acre, long-term rental agreements, if the ground is leased versus rented, if cash rent is fixed, if the ground is farmed on a cost share basis, or a mix of both. Additionally, in traditional commodity economics the type of commodity grown affects the gross revenue per acre. This logic applies when evaluating higher premium organic crops versus cash flow per acre in a rental agreement, the theory would be that the ground is worth more to both the landowner and farmer/operator.

CHAPTER IV: METHODOLOGY

4.1 Objectives

The objectives of this thesis are to utilize a standard linear regression model using ordinary least squares to determine whether or not the value of multiple independent variables such as gross crop revenues, total acreage, length of lease/rent agreements and mix of cropland (organic and non-organic) is statistically significant in predicting the dependent variable of values paid for certified organic cash rent. The results of the regression analysis will be used to calculate differences of the prices paid for organic cash rents based on the regionality and subjective desires of human nature. Variables measuring the following were used: x_{i1} non-organic cash rent per acre, x_{i2} total organic acres, x_{i3} total non-organic acres, x_{i4} commodity type, x_{i5} organic gross value per acre, x_{i6} difference of lease/own/rent ground, x_{i7} if the farmer has a mix of organic and conventional acres, x_{i8} length of lease, x_{i9} is cash rent higher because the ground is certified, x_{i10} structure of payments: fixed cash rent, crop share, or a mix of both, where i is survey respondent.

4.2 Survey

Together with Mercaris, "a data and trading company that focuses in helping clients capitalize on growing demand for organic and non-GMO foods by providing access and services tailored to the needs of the identity persevered agriculture sector" ((Mercaris 2020), a survey was conducted via electronic distribution. The survey was sent to over 4,000 individuals across the United States. Eligibility requirements for participation were clearly stated and only individuals that "own or operate certified organic cropland in the U.S." could participate. Parameters for receiving the survey were a valid email address, as acquired from the Mercaris database. Producers were encouraged to participate, and the first 50 respondents were gifted a $50 gift card. The 128-question survey was conducted

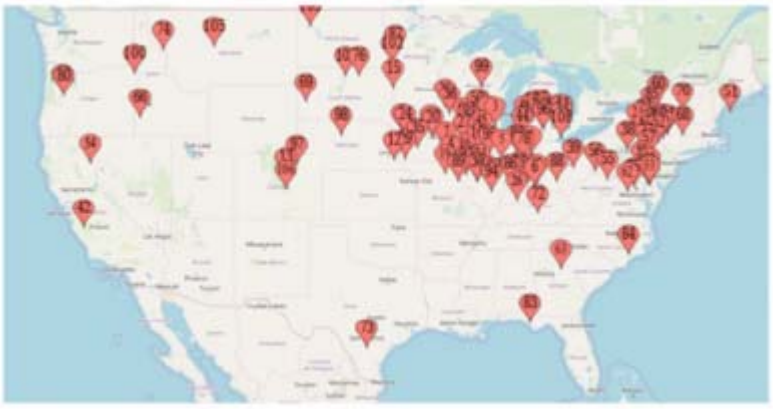
with a variety of multiple-choice questions, fill-in answers and qualitative data. The results of the analysis were derived from the survey data, with a sample of 109, of which 62 percent of the observations were located in the corn belt, 30 percent on the East Coast, and 8 percent from the High Plains or South East regions.

The goal of the survey was to verify cash rent prices being paid by organic farmers (owner operators, renters, both owned and rented ground). Data collaboration was intended to be self-reported via electronic submission to allow producers to self-report their organic production practices, and farm revenue/expenses statistics. Expectations from the report were to gather cash rent values being paid, if the survey participant owns or rents ground, or a mixture of both, how the commodities are marketed and what kind of products are grown, or livestock fed. Additionally, questions ranged from state, county and years in production, whom their organic certifier was/is, number of acres farmed, irrigated versus non-irrigated acres, expected gross revenue in sales, rates paid for cash rent on organic ground, and cash rent rates paid if also farming conventionally.

The survey asked growers if they thought their organic ground should be worth more than conventionally tilled soil with a yes/no answer and they were given a chance to expand on that thought. Qualitive data offered a chance for respondents to note their sentiments toward the value of the organic land they farm, and the organic land in their respective regions. From the original pool of 405 respondents, the data were narrowed to

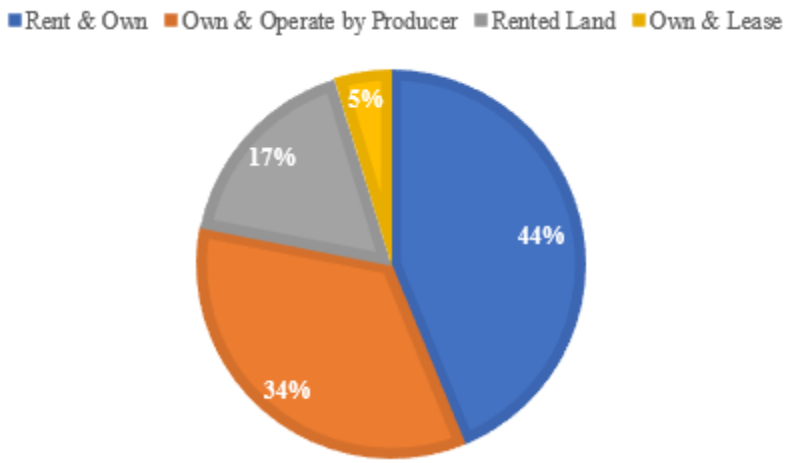
109 viable responses with most information pertaining to our study: cash rent values, gross sales, and type of crops grown.

Figure 4.1 Location of Survey Respondents



These 109 respondents represent approximately 56,300 acres. Of these acres, 46 percent are a combination of owned and rented ground, 36 percent are owned and operated exclusively by the producer and do not pay for or charge cash rent, and 8 percent are owned by the producer, while also leasing some acres.

Figure 4.2 Ownership Structure



Cash rent structures were taken into consideration in this analysis based on the survey respondents. Of the 70 responses, 71 percent had a fixed cash rent lease, 17 percent used a share of output lease, and 11 percent applied a mix of both or had a different type of agreement. Seventy-five percent of the organic owner-operators that responded to the survey believe they can sell their land for higher value than original purchase price due to the organic certification. Sixty percent of the group reported higher net income since the land has been farmed organically.

Table 4.1 Survey Results - Types of Leases

Lease Types	Fixed Cash Rent	Share Output	Both	Other	Total
Lease	3	2	0	0	5
Rent	47	10	7	1	65
Total	50	12	7	1	70

Figure 4.3 Economic Regions

(USDA, National Agricultural Statistics Survices 2019)

4.3 Data Collection and Scope

All data was collected through the primary source of the collaborative survey with Mercaris, and analysis of the survey was conducted to collaborate seemingly economic and statistically relevant independent variables for the purpose of this analysis.

In variables requesting a non-numeric response, an assigned numeric value was given for statistical analysis of the data. Independent variable "should the ground be worth more because it is certified organic" was a Yes/No requested response in the survey. The addition of this in the model is to view the level of significance between human thought and actual prices being paid for certified organic cropland in the 109 survey respondents. In this data set each given certified organic commodity was assigned a numeric reference for ease of future analysis with varying commodities and their predictive values on certified organic cash rents. To evaluate the structure of ground ownership, numeric variables were assigned to answers of lease, own, rented ground. Self-reported data from the survey respondents offered a variety of gross revenue per acre figures, thus, to simplify the data a numeric value was assigned to evaluate the implied performance of the ground and corresponding commodity premiums. It was important to note if the respondents were exclusively farming certified organic ground, or a mix of non-organic and certified ground, this should show a potential linear relationship with knowledge of commodity premiums and gross farm revenues from certified organic land, thus increasing cash rents. With certified organic ground, one would anticipate a long-term lease/rental agreement as the inherent amount of time and dedication to the transition and maintenance of the certified organic acreage is significant, in comparison to non-organic land. The question was framed for the independent variable "did the landowner charge a higher cash rent because the land is certified organic?" Yes/No responses were collected. Finally, land rent/lease agreements

can vary based on comfort of both the landowner and operator, and results were analyzed based on the responses of fixed cash rent, crop share, or a combination of both methods.

CHAPTER V: STANDARD LINEAR REGRESSION MODEL USING ORDINARY LEAST SQUARES

5.1 Data Analysis

A standard linear regression using ordinary least squares (SLR/OLS) is used to determine a mathematical relationship between multiple independent variables and one dependent variable. Each one of the independent variables has been identified as a predictive indication on the value of the dependent variable. The model creates a relationship in the form of a straight line (linear) that best approximates all the individual data points. The population regression line for *p* explanatory variables x_1, x_2, ... is defined to be: $\mu\gamma = \beta 0 + \beta 1x1 + \beta 2x2 + \beta 3x3 + \cdots$ This line describes how the mean response μ_y changes with the explanatory variables. The observed values for y vary about their means μ_y and are assumed to have the same standard deviation (σ) (Yale 1997-98).

5.2 Standard Linear Regression Model

To determine whether the independent variables are statistically significant in predicting certified organic cash rent values, per observation the following model was used:

$$
\begin{aligned}
& y \\
& = \beta 0 + \beta 1(nonorganic\ cash\ rent\ per\ acre) + \beta 2\ (total\ organic\ acres) \\
& + \beta 3\ (total\ nonorganic\ acres\ ) + \beta 4\ (commodity\ type\ ) \\
& + \beta 5\ (organic\ gross\ value\ per\ acre\ ) \\
& + \beta 6\ (difference\ of\ lease/own/rent\ ground\ ) \\
& + \beta 7\ (if\ the\ farmer\ has\ a\ mix\ of\ organic\ and\ conventional\ acres) \\
& + \beta 8\ (length\ of\ lease) \\
& + \beta 9\ (is\ cash\ rent\ higher\ because\ the\ ground\ is\ certified) \\
& + \beta 10\ (structure\ of\ payments) + \varepsilon(stochastic\ error)
\end{aligned}
$$

5.3 Variable Definition

Dependent Variable

Certified organic cash rent values: this variable indicates the amount of cash rent that was reported paid by the survey respondent for certified organic cropland. Actual values as reported were used in this analysis.

Independent Variables and Expected Effects

Commodity Reference: In this data set each given certified organic commodity was assigned a qualifying variable as grain, oilseeds, or hay/pasture/forage. Using hay/pasture/forage as the base, if the commodity was a grain it was held independent of the others in this model. Commodities were reported in the survey as follows: corn, alfalfa, hay, hay/forage, hay/pasture, grass/alfalfa, grass/pasture/hay, pasture, oats, soybeans, rye, rye grass, rye grass/clover, hemp, wheat, white corn/blue corn, corn silage, dry beans, lentils. It is important to note the differences in commodity type for future analysis purposes. The commodities being evaluated in this study are exclusively feed grade commodities, with the exception of white corn and blue corn, which remain in the model as

they have similar agronomic requirements to #2 certified organic yellow corn and product that does not meet food grade specifications are sold to the feed market. The variables outlined in this segment could be easily substituted in future models for other commodities in regions where only food grade organic crops are grown, thus potentially having a greater statistical effect on rent values in those regions. It is expected that the commodity type will be economically and statistically significant to the prices being paid for cash rent.

Lease/Rent/Own: To evaluate the structure of ground ownership, numeric variables were assigned to answers of lease, own, rented ground with the following: Rent=0, Lease=0, Own=1, Lease/Own=2, Rent/Own=2. Although seemingly the same, the option for lease versus rent was included in the survey as appropriate response to account for differences in interpretation of operating agreements on land that is not owned by the survey respondent. Traditionally, leasing implies a longer term agreement, meaning over one year, and according to the National Ag Law Center, "In order to form a valid lease, the parties must typically include the following elements in their agreement: (1) the extent and boundary of the property to be leased; (2) a definite term that the lease will run; and (3) a definite rental rate. Stated more simply, a proper lease will generally describe the parties, the property, the rental rate, and the length of time it will run" (National Agricultural Law Center n.d.). Whereas rent implies the money paid by the tenant is more open ended and variable based on lack of formality in the rental contact. This is a gap in the survey and should be better defined for the survey respondents in the future. When a respondent was the owner of a portion of their certified organic acreage, and a renter/lease, those responses were accounted for with their own numeric value. This independent variable is expected to be

statistically significant, as operators that own more land than they rent would likely be willing to pay higher rent/lease rates than those that do not.

Gross Revenue Per Acre: Self-reported data from the survey offered a variety of gross revenue per acre figures, thus, to simplify the data a numeric value was assigned to evaluate the implied performance of the ground and corresponding commodity premiums as follows: greater than $500 per acre= 0, less than $500/acre= 1, if a value was not given=2 (only three of the 109 respondents analyzed failed to report gross revenue per acre). Gross revenue per acre should affect the willingness of cash rent agreements to be higher, as it would be expected that higher cash rent values stem from higher gross revenue per acre.

Certified Organic or Non-Organic Crop Farming Practices: Identification of the respondents who were exclusively farming certified organic ground, or a mix of non-organic and certified ground, should show a potential linear relationship with knowledge of commodity premiums and gross farm revenues from certified organic land, thus increasing cash rents. Certified organic land only=0, mix of both non-organic and organic ground=1, with the base being certified organic land only for this analysis.

Length of Farmland Lease/Rent Agreement: Traditionally, the length of a farmland lease leads to loyalty due to extensive time spent in relationship development and commonality of understanding production practices (Williams 2018). With certified organic ground, one would anticipate a long-term lease/rental agreement due to certification requirements and organic crop cycle demands (2.6 Profitability of Organic Field Crops). For the purpose of this variable, agreements that are established for three years or more are the base variable due to the inherent amount of time and dedication to the transition and maintenance of the

certified organic acreage, in comparison to non-organic land. Lease/rent agreements reported as over three years=0, two to three years=1, one year or less=2.

Higher Cash Rent due to Certified Status: The question was framed for independent variable "did the landowner charge a higher cash rent because the land is certified organic?" Yes/No responses were collected, and assigned Yes=0, No=1. This trends in a similar fashion to independent variable x_{i1} in relationship to predicting human response to value of the certified organic cropland. However, this variable should seemingly have a greater statistical significance to predicting certified organic cash rents as it is the landowner that is charging for the certification status.

Agreement Type: Land rent/lease agreements can vary based on comfort of both the landowner and operator. If the agreement is solely fixed cash rent= 0, crop share=1, or a combination of both methods=2. It can be argued that this base of fixed cash rent could vary depending on regionality in future studies.

5.4 Model: Regression Analysis and Interpretation

Regression analysis is a form of inferential statistics which mean that data is taken from samples and generalizations are made about the population. The p-values help determine whether the observations observed in the sample also exist in the larger population. Each independent variable tests the null hypothesis that the variable has no correlation with the dependent variable. If there is no correlation, it relays that there is insufficient evidence to conclude that there is effect at the population level. P-values are expressed between 0 and 1. The smaller the p-value, the stronger the evidence that the null hypothesis should be rejected. A p-value less than 0.05 is statistically significant (Studenmund 2017, 127-129).

The statistical metric that is used to measure how much of the variation in outcome can be explained by the variation in the independent varies is the coefficient of determination (R-squared, R^2). R^2 increases as more predictors are added to the multiple linear regression model although the predictors may not be related to the outcome variable. R^2 values range from 0 to 1 and are usually stated as percentages. An R^2 of 100 percent means that all movements of the dependent variable are completely explained by the changes in the independent variable(s). The adjusted R^2 compares the descriptive power of the regression model that include multiple independent variables, or predictors. Unlike the simple R^2 where every independent variable increases the model, the adjusted R^2 compensates for the addition of variables, and only increases if the new term enhances the model above what would be obtained by probability and decreases when a predictor enhances the model less than what is predicted by chance (Studenmund 2017, 51-54).

5.4.1 Regression Analysis Interpretation

From the data retrieved from the survey, and results analyzed as referenced in section 5.1 Data Analysis, and section 5.3 Variable Definition, results, as articulated in the Goodness of Fit measures can be seen in Table 5.2. These results measure the linear regression equation and how well it fits the data.

Multiple R: The correlation coefficient in the Multiple R, or the square root of the R^2, is 0.5024, meaning a there is a moderate positive relationship to the variables identified in model, a perfect 1 would mean a perfect positive relationship, where a value of 0 would measure no relationship at all.

R2: The R^2, as discussed in section 5.4 Model: Regression Analysis and Interpretation, is the coefficient of determination or how many points fall on the regression line. The low R^2 percentage of 25.2410 percent means that 25.24 percent of the variation of dependent

variables, certified organic cash rents around the mean are explained by the independent variables, or only 25.24 percent of the values fit the model. Still, as outlined in the previous section, the R^2 is not the ideal analysis tool for this multiple linear regression as multiple independent variables were analyzed.

The adjusted R2: The adjusted R^2 results in 0.1676 percent confidence in the variables as analyzed. This factor adjusts for the number of terms in the model. Meaning, only 16.76 percent of the variation around the mean are explained by the independent variables, or only 16.76 percent of the values fit the model.

Standard Error: The estimate of the standard deviation of the error μ. 183.3084 shows the precision at which the regression coefficient is measured, or the slope of the regression equation. Because this result is large, it means the coefficient is likely different than 0.

Observations: 109 observations were analyzed in this model.

5.4.2 Interpretation of Regression Coefficients

The coefficients outline the variables given in the model. All variables are outlined in Table 5.1

Table 5.1 SLR Independent Variable Results

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	208.9670	79.2639	2.6363	0.0098	51.6501	366.2839	51.6501	366.2839
Non-Organic Cash Rents Per Acre	0.9774	0.3842	2.5442	0.0125	0.2149	1.7399	0.2149	1.7399
Organic Acres total	-0.0101	0.0145	-0.6963	0.4879	-0.0388	0.0186	-0.0388	0.0186
Non-Organic Acres Total	-0.0137	0.0354	-0.3877	0.6991	-0.0839	0.0565	-0.0839	0.0565
Organic Gross Value per Acre	-12.6264	36.0819	-0.3499	0.7271	-84.2390	58.9863	-84.2390	58.9863
Ground Ownership Structure: Lease/Rent/Own	-4.1821	27.0647	-0.1545	0.8775	-57.8980	49.5338	-57.8980	49.5338
Mix of organic and conventional acres in operation	-86.5423	50.5084	-1.7134	0.0898	-186.7875	13.7029	-186.7875	13.7029
Length of Lease or Rental Agreement	-39.6162	22.6708	-1.7475	0.0837	-84.6116	5.3791	-84.6116	5.3791
Higher Cash Rent because Ground Certified Organic?	-80.0634	40.6562	-1.9693	0.0518	-160.7548	0.6279	-160.7548	0.6279
Cropland Payment Structure	24.8189	26.8583	0.9241	0.3577	-28.4874	78.1251	-28.4874	78.1251
Grain	95.2978	47.7472	1.9959	0.0488	0.5328	190.0628	0.5328	190.0628
Oilseeds	142.2921	54.4163	2.6149	0.0104	34.2907	250.2934	34.2907	250.2934

Table 5.2 Regression Statistics for Table 5.1

Regression Statistics	
Adjusted R Square	0.1676
Standard Error	183.3084
Observations	109

Coefficients: the least square estimates, or the linear relationship between the *y* and x measures the distance from the data points to the regression line. In this case, there are multiple outliers in the data causing negative, or disproportionate effects on the least square estimates. The p-value of length of lease is 0.0837 causing some statistical significance of this coefficient as somewhat useful to this model. With a coefficient of -39.6162, it tells us that as the length of lease increases, value of cash rent should decrease, based on the data in this model. Conversely, non-organic cash rent produced a 0.125 p-value, and coefficient of 0.9774, causing the model to reflect a 0.9774 change in the intercept when non-organic cash rents are factored into the model. To evaluate the validity, reference Figure 5.2, and Figure 5.3. The given model intercept of 208.9670 or base of this model explains that hay/forage/pastureland (and all other variables at $0) is worth $208. Specifically, while rents can never be less than zero, based on the survey data and predictive nature of this model, this independent variable is illustrated when the length of the lease increases, organic cash rent values decrease, holding all other variables constant. This result coincides with the research of Taylor & Featherstone (2018), in that likely the social capital of the long-term rent agreement prohibits higher cash rental rates over time.

This model suggests that an inverse relationship exists when an operation has a mix of organic and conventional acres, and gross value per acre. These negative coefficients decrease the independent variable. While little predictive value can be derived from the p-values of the commodity type identifiers, these variables are statistically significant to this model with 0.488 (Grain) and 0.0104 (Oilseeds) p-values, and positive coefficients of 95.2978, 142.2921 respectively, leading to positive relationship in the regression when these variables are used in the predictive model. Using Hay/Forage/Pasture the base.

Figure 5.1 Coefficients of the Model

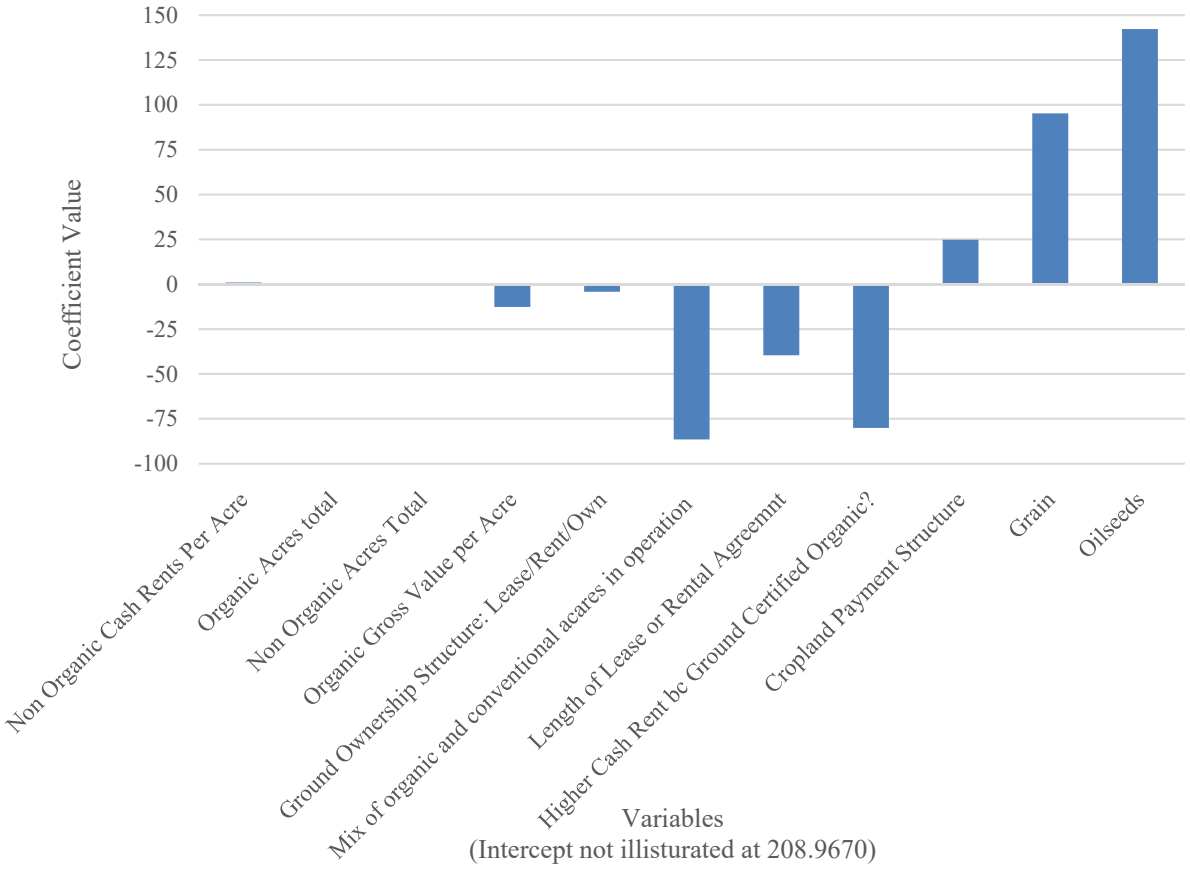


Figure 5.2 Length of Lease vs. ($220) Non-Organic Cash Rent Polynomial 2 example

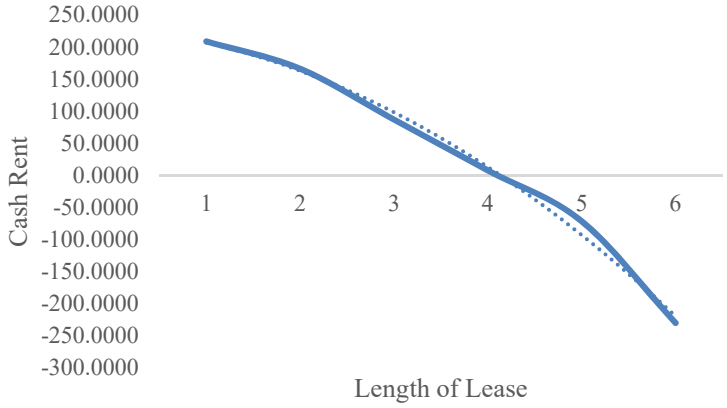
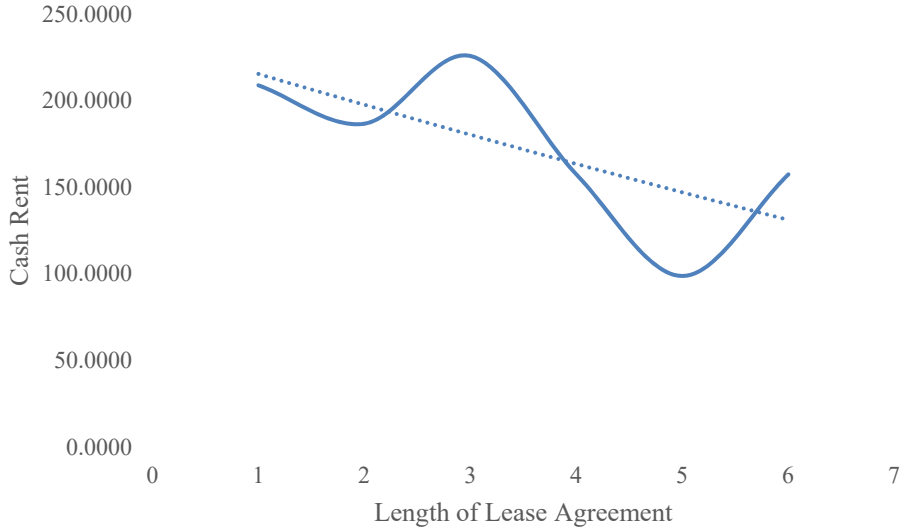


Figure 5.3 Length of Lease (5 years) vs. Variable Non-Organic Cash Rent Example



Standard Error: the measure of spread in the data; 183.3084 reflects a large standard error in this data and the values are highly statistically insignificant, likely due to a multitude of reasons, including, but not limited to sample size, variation in response, or how an individual operation factors gross revenue per acre.

P-values: P-values reflect the marginal statistical significance levels of this data set, and ultimately in this case, the vast variation in the data set as a predictive tool. Table 5.3 shows that the level of significance for this data is extremely low, 0.0837, causing all the p-values to reflect essentially irrelevant data. But the p-value in length of lease and non-organic cash rent per acre variables allow for a consideration in rejecting the null hypothesis in each of those situations.

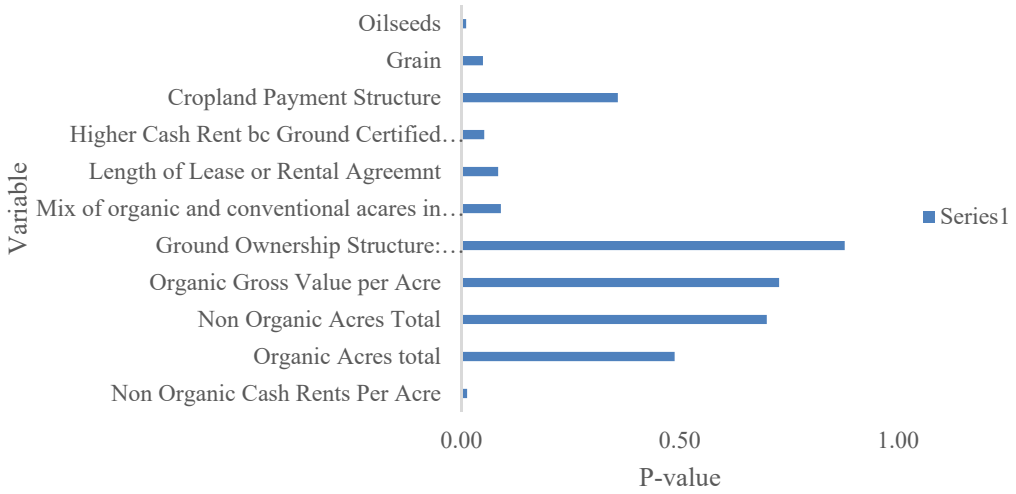
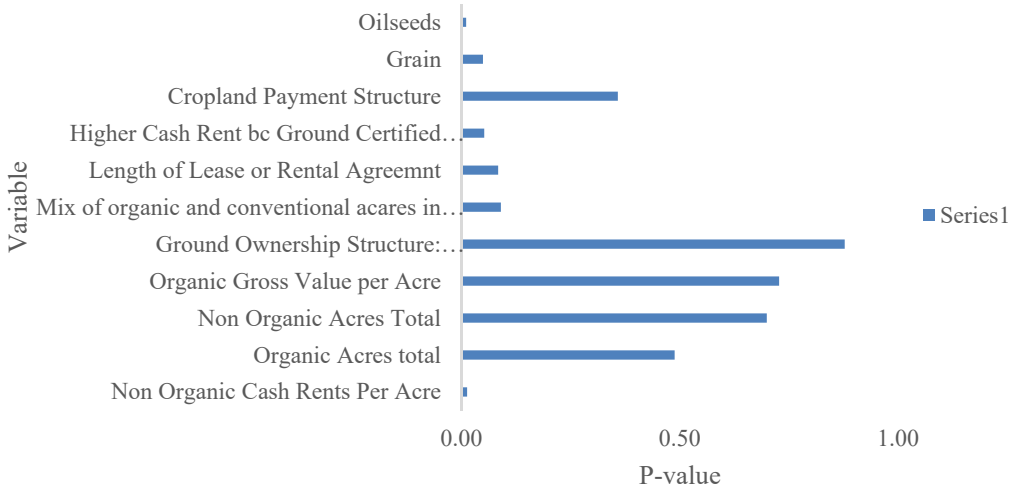


Figure 5.4 SLR P-value Results



CHAPTER VI: CONCLUSION

Finally, this chapter evaluates the summary and review of limitations and future considerations for this research.

6.1 Summary

In summary, is perception reality in organic cash rent scenarios? Well, the verdict is still out. However, the data analyzed in this paper illustrates the variation in organic cash rents and the valuation of certified organic acres in several regions throughout the United States. Unsurprising, cash rents vary for a variety of reasons that are challenging to analyze in predictive models. The standard errors in this data set and low adjusted R^2 show that while 109 observations are somewhat valuable, there is need to continue the research and dive deeper into predictive methods of research. It is important to note that based on survey results, commodity type, as expected should have a positive statistical effect on the predictive model, using hay/pasture/forage as a base. Additionally, tracking with the findings of Taylor & Featherstone (2018), length of lease has a negative impact to price paid for cash rent. Whereas mix of organic and conventional acres, and the subjective result in "did the landlord expect higher cash rent because it was certified organic?" were highly uncorrelated to the higher cash rent values. Future research on perception versus reality of organic land valuation is needed as the results generated in this study are somewhat inconclusive to conclude the question.

6.2 Limitations and Considerations of Research

Due to the vagueness of several questions and lack of response to various questions, there is cause for needed continued exploration on this topic. Untraceable factors like human emotion and decision-making processes are unaccounted for, and likely cause for variations in the data. Additionally, weather, economic variables like taxes and cash flow

were not evaluated; these combined with the variables analyzed could play further into the data set in future research. This research topic warrants further exploration with a variety of additional variables.

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APPENDIX A

A.1 Survey Description

The 128 question survey was conducted to generate response from willing participants from across the United States. The first 50 respondents were gifted a $50 gift card for their efforts. The purpose of this survey was to collect information regarding production practices, acreage, values paid for farmland, experiences of the farmers and opinions about certified organic farmland and its value to the landowners and farmers. The survey was sent via the established database of the Mercaris firm with over 400 willing respondents. Of those, 109 viable data sets were analyzed.

A.2 Survey Questions (As conducted via SurveyMonkey electronic system)

Eligibility

You are only eligible to take this survey if you own or operate certified organic farmland in the United States. You must complete the entire survey and click "done" on the last page to be eligible for a chance to win one of fifty $50 American Express gift cards.

* 1. Do you own or operate a certified organic farm in the United States (where at least a portion of your owned or operated acres are certified organic)?

Yes No

Basics

If you own or rent organic farmland in more than one location - please fill out this survey for your largest/primary parcel of land only.

* 2. In what ZIP code is your organic farm located? (enter 5-digit ZIP code; for example, 00544 or 94305)

* 3. In which county is your organic farm located?

* 4. Who is your organic certifier?

* 5. In 2019 did you:

Rent or lease organic land **from** others? (You are an organic operator)
Rent or lease organic land **to** others? (You are an organic landowner)
You **own** organic land that you operate yourself
You **own** organic land where you operate some land, **and** lease out some land to others
You **own** some organic land that you operate yourself, **and you rent** some organic land from others

Organic Operator - Farm Composition

* 6. In 2019, did the farmland that you **rented or leased from others** consist of entirely organic acres or a mix of organic and non-organic acres?

Organic Acres Only
A mix of both organic and non-organic acres

Organic Landowner - Farm Composition

* 7. In 2019, did the farmland that you **own and rent to others** consist of entirely organic acres or a mix of organic and non-organic acres?

Organic Acres Only
A mix of both organic and non-organic acres

Organic Owner-Operator

* 8. In 2019, was did your farm consist of only organic acres, or both organic and non-organic acres?
Organic Acres Only
A mix of both organic and non-organic acres

Organic Operator - Organic Only

* 9. How many acres were rented or leased for cash? Include fruit, nut, berry, vineyard, nursery, and hay land (enter 0 if none):

Non-irrigated, organic
cropland
Irrigated Cropland
Total

Which crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 10. Crop 1

Crop Name
Acres Harvested/Will be
Harvested
Total Production
Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

11. Crop 2 (optional)

Crop Name
Acres Harvested/Will be
Harvested
Total Production
Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

12. Crop3(optional)

Crop Name
Acres Harvested/Will be
Harvested
Total Production

Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)
Estimated Gross Value of Sales

13. Crop4(optional)

Crop Name
Acres Harvested/Will be
Harvested
Total Production
Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

15. If you produced more than 5 crops, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

* 16. Do you pay a fixed cash rent or a share of output?

Fixed Cash Rent

Share of Output

Other (please specify)

* 17. What did you pay in cash rent for **organic irrigated** farmland ($/acre) in 2019? (Please enter a number, ex: If you paid $321/acre please enter 321). Enter 0 if you have no irrigated farmland.

* 18. What did you pay in cash rent for **organic non-irrigated** farmland ($/acre) in 2019? (Ex: If you paid $321/acre please enter 321). Enter 0 If you have no non-irrigated farmland.

* 19. What is the length of your lease with the landowner? (in years)

20. What are the other terms of your lease beyond cash rent owed, if any? (ex, profit share, rent based on yield, etc.)

21. Does the landowner charge a higher cash rent because the land is certified organic?
Yes, No Other (please specify)

22. Please explain your answer to the previous question:

* 23. In your opinion do you believe the organic farmland you operate is accurately assessed/valued by land appraisers, financial institutions, etc.? Yes No

24. Please explain your answer to the previous question:

Organic Operator - Organic & non-Organic

* 25. How many **organic** acres of cropland were rented or leased for cash? Include fruit, nut, berry, vineyard, nursery, and hay land (enter 0 if none)
Organic, non-irrigated
Organic, irrigated
Organic Total

* 26. How many **non-organic** acres of cropland were rented or leased for cash? Include fruit, nut, berry, vineyard, nursery, and hay land (enter 0 if none)
Non-organic, non-irrigated
Non-organic, irrigated
Non-organic total

Which **organic** crops were harvested or will be harvested on this operation in 2019? Please list crops in

order of highest total acres to least acres.

* 27. Crop 1

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)
Harvested (bu/mt/ lb./cwt/ etc.)

28. Crop2(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

29. Crop3(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

30. Crop4(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

31. Crop 5 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

32. If you produced more than 5 organic crops, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

Which **non-organic** crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 33. Non-Organic Crop 1

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

34. Non-Organic Crop 2 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

35. Non-Organic Crop 3 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

36. If you produced more than 3 non-organic crops, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

* 37. Do you pay a fixed cash rent or a share of output?

Fixed Cash Rent
Share of Output
Other (please specify)

* 38. Did you pay different cash rental rates for **organic** vs. **non-organic** land in 2019?

Yes, No Other (please specify)

* 39. If you paid the **same** cash rental rate for both organic and non-organic farmland, please enter that rate below. (Please enter a number, ex: If you paid $321/acre please enter 321). Enter 0 if not applicable.

2019 non-irrigated Land ($/acre) dollar value only
2019 irrigated Land ($/acre) dollar value only

* 40. If you paid different rates for organic vs. non-organic land in 2019 - please enter those rates below. Please enter a number (ex: If you paid $321/acre please enter 321). Enter 0 if not applicable.

Organic, non-irrigated

Organic, irrigated
Non-Organic, Non-Irrigated
Non-organic, Irrigated

* 41. What is the length of your lease with the landowner in years?

42. What are the other terms of your lease beyond cash rent owed, if any? (ex, profit share, rent based on yield, etc.)

43. Did the landowner charge a higher cash rent because the land is certified organic?

Yes, No Other (please specify)

44. Please explain the answer provided to the question above:

* 45. In your opinion do you believe the organic farmland you operate is accurately assessed/valued by land appraisers, financial institutions, etc.? Yes No

46. Please explain the answer provided to the question above:

Organic Landowner - Organic Only

* 47. How many acres of organic land did you rent or lease to others for cash in 2019? Include fruit, nut, berry, vineyard, nursery, and hay land (enter 0 if none)

Organic, non-irrigated cropland
Organic, irrigated cropland
Organic total

Which crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 48. Crop 1

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

49. Crop 2 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

50. Crop3(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated

Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

51. Crop4(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

52. Crop5(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

53. If there were more than 5 crops produced on your operation, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

* 54. Do you charge a fixed cash rent or a share output?

Fixed Cash Rent

Share of Output

Other (please specify)

* 55. What did you charge in cash rent for **organic, irrigated farmland** ($/acre) in 2019? (enter 0 if you do not own irrigated farmland; please enter a number, ex: If you paid $321/acre please enter 321).

* 56. What did you charge in cash rent for **organic, non-irrigated farmland** ($/acre) in 2019? (enter 0 if you do not own non-irrigated farmland; please enter a number, ex: If you paid $321/acre please enter 321).

* 57. What is the length of the lease you have with your operator? (in years, please enter number only)

58. What were the other terms of your lease beyond cash rent owed, if any? (ex, profit share, rent based on yield, etc.)

* 59. Did you charge a higher cash rent then you would have for non-organic land because the land is certified organic?

Yes

No

Other (please specify)

60. Please provide more details on the answer to your previous question

* 61. In your opinion do you believe the organic farmland you own is accurately assessed/valued by land appraisers, financial institutions, etc.? Yes No

62. Please provide more details on the answer to your previous question

Organic Landowner - Organic & Non-organic

* 63. How many **organic** acres of cropland were rented or leased to others for cash in 2019? Include fruit,

nut, berry, vineyard, nursery, and hay land (enter 0 if none)

Organic, non-irrigated
Organic, irrigated
Organic Total

* 64. How many **non-organic** acres of cropland were rented or leased to others for cash in 2019? Include fruit, nut, berry, vineyard, nursery, and hay land (enter 0 if none)

Non-organic, non-irrigated

Non-organic, irrigated

Non-organic total

Which **organic** crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 65. Organic Crop 1

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

*66. OrganicCrop2(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

*67. OrganicCrop3(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

68. OrganicCrop4(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

69. Organic Crop 5 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

70. If there were more than 5 organic crops produced, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

Which **non-organic** crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 71. Non-Organic Crop 1 (Updated)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

72. Non-Organic Crop 2 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

73. Non-Organic Crop 3 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

74. If there were more than 3 non-organic crops produced, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop:

* 75. Do you charge a fixed cash rent or a share output?

Fixed Cash Rent

Share of Output

Other (please specify)

* 76. Did you charge different cash rental rates for **organic** vs. **non-organic** land in 2019?

Yes, No Other (please specify)

* 77. If you charged the **same** cash rental rate for both organic and non-organic farmland, please enter that rate below. (Please enter a number, ex: If you charged $321/acre please enter 321). Enter 0 if not applicable.

2019 non-irrigated Land ($/acre) dollar value only

2019 irrigated Land ($/acre) dollar value only

* 78. If you charged **different** rates for organic vs. non-organic land in 2019 - please enter those rates below. Please enter a number (ex: If you paid $321/acre please enter 321). Enter 0 if not applicable.

Organic, non-irrigated
Organic, irrigated
Non-Organic, Non
Irrigated
Non-organic, Irrigated

* 79. What is the length of your lease with the land operator in years?

80. What were the other terms of your lease beyond cash rent owed, if any? (ex, profit share, rent based on yield, etc.)

* 81. Did you charge a higher cash rent because some or all the land is certified organic?

Yes, No Other (please specify)

82. Please explain your answer to the question above:

* 83. In your opinion do you believe the organic farmland you own is accurately assessed/valued by land appraisers, financial institutions, etc.? Yes No

84. Please explain your answer to the question above:

Organic Owner/Operator - Organic Only

* 85. What is the total number of **organic** acres farmed?

Irrigated farmland
Non-irrigated farmland
Total

Which **organic** crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 86. Crop 1 (Updated)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

87. Crop 2 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales

Production Expenditure (cost of production, dollars per planted acre)

88. Crop3(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

89. Crop4(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

90. Crop5(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

91. If you produced more than 5 crops, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

* 92. How many years has this farm been certified organic? Please enter a number only.

* 93. Did you purchase this farm before or after it was transitioned to organic?

Before it was transitioned, and then I transitioned it to organic

After someone else already transitioned it to organic

I purchased it while it was still in the 3-year transition period

Other (please specify)

94. Please explain your answer to the question above:

95. If you transitioned this farm to organic yourself - do you believe you can sell it or rent it for a higher price because it is organic? Yes No

96. Since transitioning your land, has net operating income **increased** or **decreased**? By how much per year?

* 97. Do you believe your land is more valuable than comparable non-organically farmed land because you are a certified organic operation? Yes, No Other (please specify)

98. If yes, why?

99. If you were to rent your **irrigated, organic** land to an organic operator, on a per acre basis, how much would you charge and why? (Skip if your land is non-irrigated).

100. If you were to rent your **non-irrigated, organic** land to an organic operator, on a per acre basis, how much would you charge and why? (Skip if your land is irrigated).

Organic Owner/Operator - Organic & non-Organic

* 101. What is the total number of **organic** acres farmed?

Irrigated farmland
Non-irrigated farmland
Total

* 102. What is the total number of **non-organic** acres farmed?

Irrigated farmland
Non-irrigated farmland
Total

Which **organic** crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 103. Organic Crop 1

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

104. OrganicCrop2(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

105. OrganicCrop3(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

106. OrganicCrop4(Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales

Production Expenditure (cost of production, dollars per planted acre)

107. Organic Crop 5 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

108. If you produced more than 5 crops, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

Which **non-organic** crops were harvested or will be harvested on this operation in 2019? Please list crops in order of highest total acres to least acres.

* 109. Non-Organic Crop 1

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

110. Non- Organic Crop 2 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

111. Non- Organic Crop 3 (Optional)

Crop Name
Acres Harvested/Will be Harvested
Total Production Harvested (bu/mt/ lb./cwt/ etc.)
Acres Irrigated
Estimated Gross Value of Sales
Production Expenditure (cost of production, dollars per planted acre)

112. If you produced more than 3 crops, please list crop name, acres harvested, total production harvested, acres irrigated, gross value of sales, and production expenditures for each additional crop

113. Why do you choose to have both organic and non-organic farmland? What is the difference in net operating income between the two operations?

* 114. Did you purchase this land before or after the organic acres were transitioned?

Before they were transitioned, and then I transitioned them to organic
After someone else already transitioned them to organic
I purchased it while it was still in the 3-year transition period
Other (please specify)

* 115. How many years has the organic portion of your farmland been certified organic? (please enter a number only)

116. Please explain further:

117. Since transitioning your land, has net operating income **increased** or **decreased**? By how much per year?

118. If you transitioned this farm to organic yourself - do you believe you can sell it or rent it for a higher price because it is organic? Yes No

* 119. Do you believe your organic land is more valuable than comparable non-organically farmed land because you are a certified organic operation? Yes, No Other (please specify)

120. If you were to rent your **irrigated, organic** land to an organic operator, on a per acre basis, how much would you charge and why? (Skip if your land is non-irrigated).

121. If you were to rent your **non-irrigated, organic** land to an organic operator, on a per acre basis, how much would you charge and why? (Skip if your land is irrigated).

122. Please explain your answer to the question above:

Optional questions & contact information

Providing your contact information is optional; however, if you would like to be registered to receive a gift card, please provide your name, email, mailing address, and phone number. Your personal information will be kept confidential.

123. Do you currently have additional acres that are in transition to organic? If yes, how many?

124. Do you believe your rented or owned organic land is worth more than land nearby that is not farmed organically? If yes, why do you believe this?

125. Have you ever received more or less favorable terms from a bank or another financial institution due to the organic certification of your farmland? Please explain.

126. Contact information for gift card

Full Name
Address
Address 2
City/Town
State/Province -- select state --
ZIP/Postal Code
Email Address
Phone Number

127. Are you open to being contacted further by someone from Mercaris to ask you additional questions for this study over the phone or via email? Yes No

128. Are you interested in receiving a **free** bi-weekly price report from Mercaris for organic producers covering corn, soy, and wheat? Yes No