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The Illinois Institute for Rural Affairs (IIRA) works to improve the quality of life for rural residents by partnering with public and private agencies on local development and enhancement efforts.



**Western Illinois
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Illinois Farm Ownership by Race and Farm Productivity

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Abstract

This paper explores the impact of producer's race on farm productivity. Data analysis suggests that: (i) minority farmers own farms that are less than 50 acres in size; the opposite is true for the White producers, 64% own more than 50 acres of farm land; and (ii) on average, farms operated by the Whites receive more conservation-programs payments and other federal program payments.

Introduction

In 2021, President Joe Biden promised to erase \$4 billion worth of debt to socially disadvantaged farmers who have been impacted by the USDA's discriminatory lending practices. However, a swarm of lawsuits from banks and white farmers alleging discrimination against them has stagnated the debt relief in court. Dana Cronin, KCUR News, May 18, 2022².

In the neoclassical theory of the firm³, the firm is represented by a production function – the technology that employs labor and capital for production. In agriculture, 'technology' has propelled firm productivity⁴ to grow at an average rate of 1.42% per annum, from

¹ Professor, Illinois Institute for Rural Affairs, Western Illinois University.

² <https://www.hppr.org/hppr-news/2022-05-18/black-farmers-have-lost-326-billion-worth-of-farmland-study-says>. It should be noted that white women are excluded from the definition of socially disadvantaged.

³ Penrose, E. (1959). *The Theory of the Growth of the Firm*. New York: Sharpe.

⁴ Multifactor productivity (MFP) is the measure; it measures aggregate output relative to aggregate inputs; see Athiyaman, A. (2019). Determinants of Economic Growth in Illinois: An Empirical Analysis. *Research Brief*, 1(2), 1-4. Available online: http://www.instituteintelligence.com/wp-content/uploads/2019/08/IL-Growth_2019_v1_2.pdf.

1910-2007⁵. The question is whether this growth was shared by producers of all backgrounds, for example, White, Black, and Asian. The news story suggests that the answer is likely to be a “no”. In the following pages we examine published data on Illinois agriculture to gain insights into the issue. If there is evidence that the race of the farmer impacts farm productivity, then we can theorize about race impacts on productivity and test propositions using a variety of data, including textual information.

Illinois Agriculture

Table 1 highlights some of the attributes of Illinois farms. For example, of the 72,651 farms in the state, a majority are crop farms (73%) and each farm harvests around 427 acres of crops. The producers are predominantly White (98%) and male (71%). The modal age group of the producer is 55-64 and a majority have lived in the farm for 10 years or more.

⁵ Alston, J. M. (2010). *Persistence Pays: U.S. Agricultural Productivity Growth and the Benefits from Public R&D Spending*. New York: Springer.

Table 1: Illinois Farms: Salient Attributes

Attribute	Value
Total number of farms	72,651
- Total acres	27,006,288
Number of crop farms	53,188
- Cropland acres	22,701,382
Total number of producers	118,141
- Male	84,134
- Female	34,007
Place of residence – on farm	74,788 (63% of all producers)
Primary Occupation - Farming	51,281 (43% of all producers)
10 years or more in present farm	88,287 (75% of total producers)
Producer Age	
- Under 25 years	1,406
- 25 - 34	8,452
- 35-44	12,764
- 45-54	19,959
- 55-64	32,986 (Modal value)
- 65-74	26,087
- 75 and Over	14,763
Producer Race	
- White	115,605 (98% of all producers)
- Hispanic	934
- African American	229
- Asian	160

Note: Data are from 2017 Census of Agriculture.

To explore farm productivity by race, we integrate data from the BEA, US Census of Agriculture and ACS Public Use Microdata Sample. Data are presented at two levels: macro analysis for all races, and meso or mid-tier analysis of productivity for each of the major racial divisions: White, African American, and Asian.

Macro Analysis

Table 2 shows farm earnings for 2017 and 2020. In 2020, product sales posted a 0.4% increase over the 2017 figures⁶; during the same period, government payments to farms increased by 371% - from \$540.5mil in 2017 to \$2.54bil in 2020⁷. Corporate

⁶ Product sales growth for the nation's farms registered a 2% growth from 2017 to 2020.

⁷ For all US farms, government payments increased by 343%; from \$10.235bil in 2017 to \$45.29bil in 2020.

farms gained the most; their net income increased by 440%, from 2017 to 2020⁸.

Table 2: Farm Earnings: 2017 and 2020 (See Appendix 1 for Variable Definitions)

Description	2017	2020
Cash from Product Sales +	\$16,184,696,000	\$16,250,654,000
Other income	\$1,476,348,000	\$3,887,102,000
Government payments	\$540,517,000	\$2,545,624,000
Cash receipts and other income	\$17,661,044,000	\$20,137,756,000
Realized net income	\$1,588,364,000	\$4,989,091,000
Plus: Value of inventory change	\$387,341,000	\$715,849,000
Equals: Net income including corporate farms	\$1,975,705,000	\$5,704,940,000
Less: Net income of corporate farms	\$135,210,000	\$730,413,000
Plus: Statistical adjustment	\$1,000	\$9,000
Equals: Farm proprietors' income	\$1,840,496,000	\$4,974,536,000
Plus: Farm wages and salaries	\$411,259,000	\$431,411,000
Plus: Farm supplements to wages and salaries	\$96,832,000	\$126,742,000
Equals: Farm earnings	\$2,348,587,000	\$5,532,689,000

Source: BEA, Table SAINC45.

Note: +: Consist of the gross revenue received by farmers from the sale of crops, livestock, and livestock products and of the value of defaulted loans made by Commodity Credit Corporation (CCC) and secured by crops.

Table 3 highlights production costs for the 2017 and 2020 time periods; the ACGRs were computed using data for the 1969-2020 time period (Appendix 2). Overall, production expenses grew at a compound rate of 4% per annum; product sales grew at a rate of 3% and other income at 5%. If farm productivity is conceptualized as total output over total inputs, that is,

$$\frac{Y}{(I + L + K)}$$

where, Y = gross output, I = intermediate input, L = labor, and K = capital input, then productivity increased from 1.16 in 2017 to 1.29 in 2020⁹.

Partial productivity indices for labor and intermediate inputs are:

$$PP_{\text{Labor},2017} = \frac{Y}{L} = 13.68 \text{ and}$$

$$PP_{\text{Labor},2020} = \frac{Y}{L} = 16.13 ;$$

$$PP_{I,2017} = \frac{Y}{I} = 1.32 \text{ and}$$

$$PP_{I,2020} = \frac{Y}{I} = 1.49.$$

⁸ US corporate farms gained 240% in income from 2017 to 2020.

⁹ This is a proxy for TFP or total factor productivity; not all metrics for K are included in the analysis.

Table 3: Production Expenses, 2017 and 2020; ACGRs are for 1969-2020

Description	2017	2020	ACGR
Production expenses	\$16,072,680	\$15,148,665	4%
Feed purchased	\$1,000,000	\$788,720	2%
Livestock purchased	\$490,418	\$600,663	1%
Seed purchased	\$2,020,000	\$1,824,506	6%
Fertilizer and lime	\$2,850,000	\$3,056,120	5%
Petroleum products purchased	\$543,802	\$501,163	3%
Hired farm labor expenses	\$695,715	\$741,848	3%
All other production expenses	\$8,472,745	\$7,635,645	4%

Source: BEA, Table SAINC45.

In summary, government financial assistance played a major role in boosting overall farm productivity in 2020.

Meso Analysis

Majority of non-whites own farms that are less than 50 acres in size; for example, 63% of African Americans, 60% of Asians, and 90% of Pacific Islanders own less than 50 acres. The opposite is true for the Whites, 64% own more than 50 acres (Table 4). This disparity in farm size among races is reflected in farm outputs; a typical, minority farm gross less than \$10,000 in sales, including government assistance (Tables 4 and 5).

Table 4: White versus Minority Producers: Farm Characteristics

Attribute	American Indian	Asian	African American	Pacific Islander	White
Number of farms	105	128	156	21	72,299
Size (acres):					
> 1-9	22(21%)	20(16%)	52(33%)	3(14%)	7,913(11%)
> 10-49	40(38%)	57(44%)	47(30%)	16(76%)	17,800(25%)
> 50-179	30(29%)	29(23%)	28(18%)	2(10%)	19,114(26%)
> 180-499	3(3%)	8(6%)	17(11%)	0	12,223(17%)
> 500 +	10(9%)	14(11%)	12(8%)	0	15,249(21%)
Ownership:					
> Owned	101	124	142	15	66,294
Economic Class:					
> <\$1,000	26(25%)	29(23%)	38(24%)	8(38%)	6,861(9%)
> \$1000-2499	12(11%)	8(6%)	25(16%)	1(5%)	7,023(10%)
> \$2500-4999	16(15%)	28(22%)	11(7%)	0	7,156(10%)
> \$5000-9999	22(21%)	11(8%)	20(13%)	7(33%)	7,718(11%)
> \$10000-24999	8(8%)	14(11%)	15(10%)	1(5%)	7,954(11%)
> \$25000-49999	4(4%)	6(5%)	17(11%)	4(19%)	5,580(8%)
> \$50000+	17(16%)	32(25%)	30(19%)	0	30,007(41%)
Commodity Credit Corp. Loans	0	4	0	0	959
Cons. Reserve ¹	30	31	21	3	25,288
Other Fed Payments	28	36	32	2	39,623
Legal Type:					
- Household	105	120	144	21	68,218
- Ltd. Co.	9	11	15	0	2,473
# of Households ²					
- one	98	98	129	20	54,754
- More than one	7	30	27	1	17,545

Note: 1 = Conservation reserve, Wetland reserve, Farmable wetlands, or Conservation reserve enhancement programs payments;

2 = Farms by number of households sharing in net income of operations.

Source: 2017 Census of Agriculture.

Table 5 shows the average “other income” receipts for farms owned and/or operated by different races. On

average, farms operated by the Whites received more conservation-programs payments and other types of federal program payments. Farms run by

Asians had the highest average Commodity Credit Corp. loans. Overall, African Americans had the least amount

of conservation program payments and 44% less than the Whites in other federal farm program payments.

Table 5: Other Farm Income Classified by Producers' Race: Average Values

	American Indian	Asian	African Americans	Pacific Islanders	White
CCC loan assistance	0	\$8,578	0	0	\$1,576
Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement Programs payments	\$1,305	\$1,156	\$1,058	NA	\$1,984
Other Federal farm program payments	\$610	\$3,133	\$2,929	NA	\$5,201

Note: NA = Not Available.

Although farm productivity data for races are unavailable¹⁰, it is possible to gain some insights into farm productivity using concepts from the strategy literature¹¹. Think of each farm as receiving a cost function on entry and there is causal ambiguity as to what factors of production drive farm success. I contend that a college educated producer should have the necessary skills to gain access to information on costs of inputs and selling prices of outputs, and thus would overcome any causal ambiguity related to productivity¹². Now the question becomes, how is human capital distributed across the races.

Data from the ACS Public Use Microdata Sample, 2020, were used to address the question¹³. Self-employed persons in agriculture were the unit of analysis. Only two racial groups were represented: Asian and White. As shown in Table 6, a majority of self-employed, Asian producers had less than high school education. In contrast, 60% of White farmers, both male and female, had at least some college education and 34% of the college-educated had agriculture degrees. This suggests that minority producers lag behind White producers on productivity.

¹⁰ 2017 Census of Agriculture doesn't provide information to estimate farm productivity by producer's race. In fact, as far as I am aware, there is little or no published data on the subject.

¹¹ See Andres, K. R. (1971). *The Concept of Corporate Strategy*. Homewood, IL: Dow Jones Irwin.

¹² Athiyaman, A. (2019). Determinants of Sustainability and Human Capital. Research

Brief, 1(6), 1-20. Available online: http://www.instituteintelligence.com/wp-content/uploads/2019/08/HumanCapital_IL_v1_6.pdf.

¹³ The analysis was limited to Illinois; a total of 420 records representing 27,636 cases were used in the analysis.

Table 6: Human Capital: Asian and White Self-Employed in Agriculture

Race	Level of Education	%
Asian, Male (N=240)	Less than high school	59
	High school diploma	41
White, Male (N=23,006)	Less than high school	5%
	High school diploma	34%
	Some college	17%
	Associate degree	18%
	Bachelor's degree and higher	25%
White, Female (N=3,027)	Less than high school	5%
	High school diploma	36%
	Some college	29%
	Associate degree	15%
	Bachelor's degree and higher	15%

Summary and Conclusion

This paper explores variations in agricultural productivity among Illinois farmers of different races. Data from the 2017 Census of Agriculture, BEA, and ACS PUMS were used to gain insights into the topic. Results of data analysis suggest that:

1. Of the 72,651 farms in the state, a majority are crop farms (73%); the producers are predominantly White (98%) and male (71%);
2. Majority of minority, non-white farmers own farms that are less than 50 acres in size; the

- opposite is true for the Whites, 64% own more than 50 acres of farm land;
3. On average, farms operated by Whites receive more conservation-programs payments and other federal program payments;
 4. African Americans receive the least amount of conservation program payments and 44% less payments than Whites of all other federal farm program payments, and

-
5. Human capital is low among minority farmers; a majority of self-employed, Asian farmers (producers) has less than a high school education; in contrast, 60% of White farmers, both male and female, has at least some college education.

Lack of data on minority farmers is a major constraint to learn about the impact of producer's race on farm productivity, econometrically. We know that farm size and agricultural income are lower for African Americans, Asians, and other minorities. We also know that human capital is a determinant of productivity and that the level of education is lower among minorities. Other than these correlates, nothing could be said about systemic barriers such as racial bias that could nullify the impact of, for example, knowledge, skills, and assets of racial minorities on business success. Research is needed to fill this gap in knowledge.

Appendix 1: Income and Production Expenses: Key Variables and their Definitions

Variable	Definition
Cash receipts from marketing	Consist of the gross revenue received by farmers from the sale of crops, livestock, and livestock products and of the value of defaulted loans made by Commodity Credit Corporation (CCC) and secured by crops.
Government payments	Federal government payments to farm operators consist of deficiency payments under price support programs for specific commodities, disaster payments, conservation payments, and direct payments to farmers under federal appropriations legislation. The estimates of government payments are based on USDA national and state estimates of direct government payments.
Production expenses	Farm production expenses consist of purchases of feed, livestock and poultry, seed, fertilizer, agricultural chemicals and lime, and petroleum products; labor expenses; machinery rental and custom work; animal health costs; and all other expenses including depreciation. BEA adjusts the USDA state estimates of production expenses to account for methodological differences in the treatment of depreciation and to conform to BEA definitions and classifications.
Value of inventory change	The value of inventory change is the estimated value of the net change in the farm inventories of livestock and crops that are held for sale during a given calendar year. This estimate is added to the estimate of realized net income so that the estimate of farm proprietors' income for a given year will include only the farm income from production during that year, or from "current" production.

Appendix 2: Annual Compound Growth Rates: Income and Production Expenses

Description	ACGR (1969-2020)
Cash receipts from marketing	3%
Cash receipts: Livestock and products	1%
Meat animals and other livestock	1%
Cattle and calves	1%
Hogs and pigs	2%
Sheep and other livestock	1%
Dairy products	1%
Poultry and poultry products	2%
Cash receipts: Crops	4%
Total grains	4%
Corn	4%
Oats	-2%
Sorghum	4%
Wheat	3%
Soybeans	4%
Other grains	3%
Hay, silage, etc.	4%
Fruits and nuts	2%
Forest and maple products	NA
Tobacco	NA
Cotton	NA
Other crops	4%
Other income	5%
Government payments	5%
Imputed and miscellaneous income received	6%
Production expenses	4%
Feed purchased	2%
Livestock purchased	1%
Seed purchased	6%
Fertilizer and lime (incl. ag. chemicals 1978-fwd.)	5%
Petroleum products purchased	3%
Hired farm labor expenses	3%
All other production expenses	4%
Value of inventory change	NA
Value of inventory change: livestock	1%
Value of inventory change: crops	NA
Value of inventory change: materials and supplies	NA
Derivation of farm proprietors' income and earnings	NA
Cash receipts and other income	4%
Less: Production expenses	4%
Equals: Realized net income	3%
Plus: Value of inventory change	NA
Equals: Net income including corporate farms	4%

Appendix 2: Annual Compound Growth Rates: Income and Production Expenses

Description	ACGR (1969-2020)
Less: Net income of corporate farms	8%
Plus: Statistical adjustment	-2%
Equals: Farm proprietors' income	4%
Plus: Farm wages and salaries	3%
Plus: Farm supplements to wages and salaries	6%
Equals: Farm earnings	4%

Note: ACGR computations are based on exponential growth rates.