U.S. farm households' participation in lending and financial markets

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Abstract:

This study explores the factors influencing farm households' participation in financial and/or lending markets. We use the Agricultural Resource Management Survey (ARMS) data from 2017 through 2020 to understand farm households' participation in financial and lending market during the last three years of volatility in the US equity and treasury bond market. We use a probit model to identify farm households' characteristics associated with participation in lending and financial markets. Our results indicate that relative to White farmers, Black or African-American and American-Indian or Alaska Native farmers are less likely to participate in lending and financial markets. We also find higher education level and primary operator's age enhances participation in the financial markets. Finally, we find higher government payments and gross farm income to enhance participation in lending and financial markets, however, debt obligations to decrease participation.

Introduction

This study explores the factors affecting farm households' participation in financial and/or lending markets. Even though farm households rely on income from lending and financial markets, little is known about the characteristics of participating farm households. Studies have extensively analyzed farm households' participation in futures market (Heifner et al., 1993, MacDonald et al., 2004, and Prager et al., 2020), but the participation in the financial and/or lending markets is relatively unexplored. Income from dividends (from investments in financial/equity markets) and interest (from lending, such as through US treasury bonds) is an important component of overall household income but can and does fluctuate.

Farm households derived six percent of their total off-farm income from interest and dividend income in 2020, which was an increase of two percentage points over 2019 (Litkowski and Giri, 2022). Nearly 96 percent of farm households derived some income from off-farm sources in 2019 (Giri et al., 2021), and interest and dividend income are one of the important components of off-farm income. The farm household's total income has implications not only for farm profitability and survivability but may also impact farm household consumption expenditures. Significant fluctuation in income from one important source can create volatility and uncertainty for both the household and the farm. Farm households' income volatility is the focus of many governmental policies. There was significant volatility in lending and equity markets in recent years. Therefore, better understanding the farm households' participation in the financial markets and lending is highly relevant and timely.

Recent volatility in financial markets and US Series I savings bonds rates

The US equity market has experienced significant fluctuation in recent years. Similarly, US Treasury bond rates, especially Series I savings bonds, which provide some protection from

inflation, have increased to record highs because of inflation (Treasury Direct, 2023a). Our data does not explicitly allow us to distinguish which equity market producers participated. Our data also does not explicitly state if producers bought US Treasury bonds. However, examination of popular US equity indices and Treasury bond rates allows us to show the volatility in financial markets and lending. Furthermore, it is more likely than not that producers might have participated in these equity indices. Finally, even if they had participated in equity markets via individual company stocks, they must have experienced similar volatility.

The Dow Jones, the S&P 500, and the Nasdaq Composite Index are three of the most tracked equity indices in the U.S. The Dow Jones is an index of 30 large industrial U.S-based blue-chip companies (Nasdaq, 2023). The Index includes financial services companies, computer companies, retail companies but excludes transportation and utility companies, which are included in separate indices. The Dow Jones does not take market capitalization into account (U.S. Securities and Exchange Commission, 2023).

The Standard & Poor's 500 Composite Stock Price Index is a capitalization-weighted index of 500 publicly traded companies in leading industries within the U.S. economy (U.S. Securities and Exchange Commission, 2023). Stocks in the index are chosen for market size, liquidity, and industry group representation. The S&P 500 tends to be broader than the Dow Jones to have a bigger representation of companies from various sectors and industry groups.

The Nasdaq Composite Index is comprised of stocks listed on the Nasdaq stock exchange and has a high concentration of U.S. and international tech companies (Nasdaq, 2023). The Nasdaq-100 narrows the field to the 100 largest most actively traded non-financial domestic and international securities.

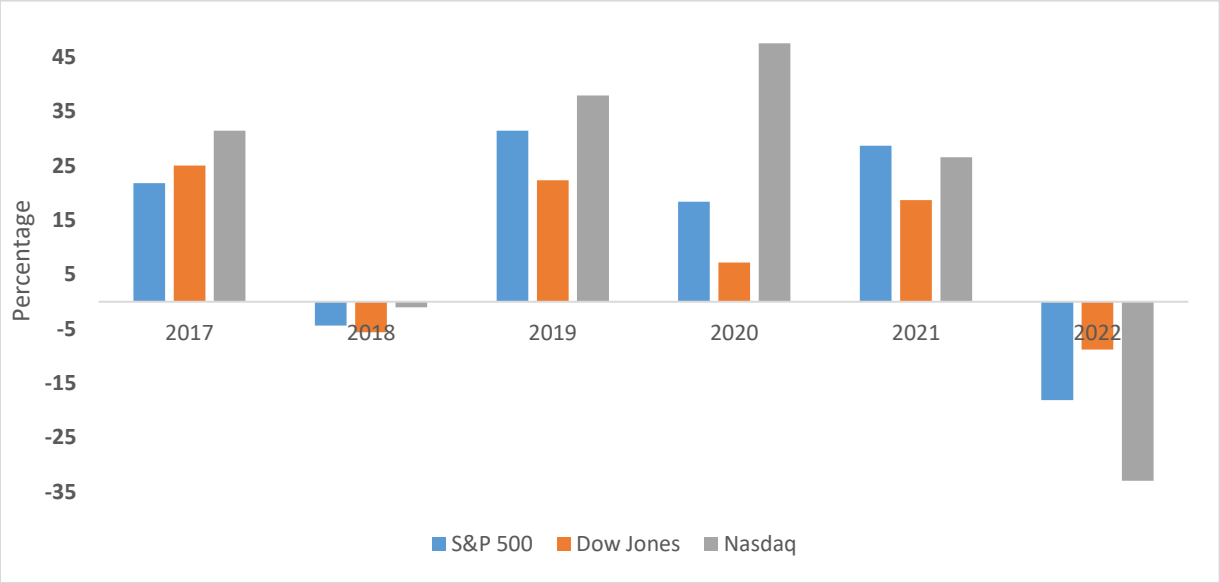
Figure 1 shows the total annual percentage change generated by dividends and price change of those three major US equity indices. Our analysis of the S&P 500 index shows that the

average return from 2017 through 2022 was 13 percent with a standard deviation of 20 percent. The coefficient of variation (CV), which measures variability relative to the mean, was 153 percent – which is unusually high. We observe the highest return of 31.49 percent in 2019 and lowest return of -18.11 percent in 2022, which contributed to the significant variation. The annual changes mask the month-to-month and day-to-day variation which was even higher.

Our analysis of the Dow Jones shows the average return from 2017 through 2022 was 10 percent with a standard deviation of 15 percent. The CV was extremely high at 148 percent – almost as much as for the S&P 500. We observe the highest return of 22.34 percent in 2019 and lowest return of -8.78 percent in 2022, which contributed to the significant variation. As with the S&P 500 the annual changes mask the month-to-month and day-today variation which was even higher.

Our analysis of the Nasdaq index shows that the average return from 2017 through 2022 was 18 percent with a standard deviation of 30 percent. The CV was highest among the three indices at 164 percent. We observe the highest return of 47.58 percent in 2020 and lowest return of -32.97 percent in 2022, which contributed to the highest variation. As with the other two indices the annual changes mask the month-to-month and day-to-day variation which was even higher.

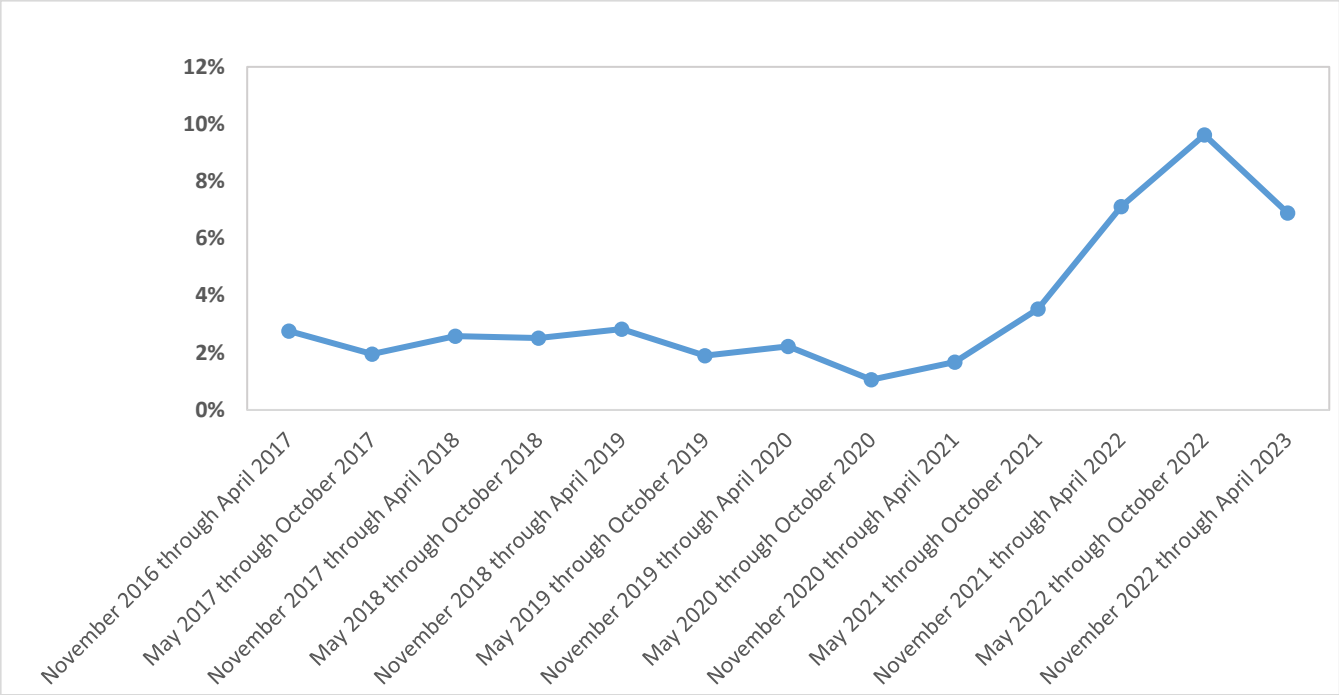
Figure 1. Annual returns from three major U.S. benchmark indices



Data source: (Slickcharts, 2023)

The US Treasury Series I bond enables holders to earn both a fixed rate of interest and a rate that changes with inflation (Treasury Direct, 2023a). The inflation rates are set twice a year and the current combined rate (inflation and fixed rate) for savings bonds was 6.89 percent (for bonds issued November 2022 through April 2023) (Treasury Direct, 2023b). The current rate and (recent) previous rates are significantly high and show a marked increase from the 1.06 percent for bonds issued from May 2020 through October 2020. The CV for the rates from the period of November 2016 through April 2017 to November 2022 through April 2023 is 72.17 percent, indicating a significant dispersion from the mean.

Figure 2. Earnings or composite rate of the US Treasury Series I bond



Source: Treasury Direct, 2023b

The rest of the paper describes empirical method, data used, the results of the study, and conclusions.

Method

A producer is more likely to participate in the financial market and lending if the expected benefit of participation is higher than non-participation. If U_j and U_0 indicate producer's expected benefit of participation and non-participation in the financial market, respectively, then a producer participates in the financial market if the net benefit of participation is positive. However, demographic characteristics such as age, gender, and race and financial characteristics such as adjusted gross income can affect participation in the financial market.

We hypothesize that there is variation in producers' participation based on race and education level. Our outcome variable, participation in financial market and/or lending, is binary,

thus, to test the hypothesis, we employ one of the widely used limited dependent variable model-probit model. The functional form of the probit model is specified as follows (Green, 2018):

$$y*_i = \boldsymbol{\beta} \boldsymbol{X'}_i + \varepsilon_i \quad (1)$$

Where, $\boldsymbol{\beta}$ is $K \times 1$ parameter vectors to be estimated and $\boldsymbol{X'}_i$ is $1 \times K$ vector of producers' observed characteristics (race, education, age, gender, marital status, farm operator's household gross cash farm income, government payments, and debt obligations). (See summary statistics in table 2). The response variable $y*_i$ is a latent variable which is not observed directly. The latent variable is determined by observed characteristics of producers and unobserved error terms (ε_i). We only observe an outcome, participation in the financial market and/or lending (y_i), which is an indicator variable and defined as follows:

$$y_i = \begin{cases} 1, & \text{if } y*_i > 0 \\ 0, & \text{Otherwise} \end{cases} \quad (2)$$

The indicator variable (y_i) shows two possible outcomes. If a producer participated in the financial market and/or lending, $y_i = 1$ and 0 otherwise. From (1) and (2) we have the following probability form (Green, 2018):

$$Pr(y_i = 1|\mathbf{X}) = \phi(\boldsymbol{X'_i \beta}) \quad (3)$$

$$Pr(y_i = 0|\mathrm{X}) = 1 - Pr(y_i = 1|\mathrm{X})$$

$$= 1 - \phi(\boldsymbol{X'_i \beta}) \quad (3')$$

Where ϕ is a cumulative distribution function (cdf) and ensures the probability bounds, $0 \leq Pr \leq 1$.

The parameters ($\boldsymbol{\beta}$) are estimated using probit command in STATA 17 (Statacorp, 2021). Unlike linear regression models, we cannot interpret parameter estimates directly in a probit model. Instead, we can only interpret the sign of estimated coefficients. A positive sign indicates producers are more likely to participate, and a negative indicates that they are less likely. To

interpret the sign and magnitude of effect of each explanatory variable, we estimate the marginal effects as follows (Green, 2018):

$$\frac{\partial \mathrm{P}(\mathrm{y}_i)}{\partial \mathrm{X}_i} = \phi(\boldsymbol{X'}_i\boldsymbol{\beta})\boldsymbol{\beta} \quad (4)$$

All notations in equation (4) are as defined previously.

Data

We use Agricultural Resource Management Survey (ARMS) data from 2017 through 2020 to capture the recent volatility. The ARMS collects data on both interest and dividends earned, but does not identify the source (i.e., which equity index or indices or company(ies) the producer participated in). The ARMS is the U.S. Department of Agriculture's primary source of information on the production practices, resource use, and economic well-being of America's farms and ranches (ARMS, 2022). The ARMS includes data on producer's financial and demographic characteristics, including the level of education, race, farm income, and debt obligations. There are a total of 65,082 observations in this analysis.

Summary statistics

Table 1 presents the summary statistics of variables used in our empirical model. Farm households can participate exclusively in financial markets to earn dividend income (along with gaining capital appreciation)—but the data only captures dividend income. Farm households can alternatively participate just in lending and earn interest income. They also can participate in both financial markets and interest income. It is more likely that risk averse households will participate in lending, which has a guaranteed return, while (relatively) more risk seeking households will participate in dividend-earning financial markets. Therefore, we categorized farm households into three distinct groups to construct our outcome variables, those who participate in financial markets only (and generated dividend income only), those who

participated in lending (and generated only interest income), and those who participated in either or both. We categorize farm households into three groups because we hypothesize that different socioeconomic and farm characteristics may have different influences on their risk seeking behavior that could be reflected by earning interest income, dividend income, or both. Our data indicate that half (50.3%) of the farm households participated in interest income only, 43.7% of farm households participated in dividend income only, and slightly more than half of the farm households (54.2%) participated in either interest income, or dividend income, or both.

We include socioeconomic and farm characteristics of farm households as explanatory variables in our empirical model (see table 1). Data indicate that a majority of farm households are white (96.2%), and other races, Black or African-American 1.3%, American-Indian, or Alaska Native 1.9%, Asian 0.3%, and Native Hawaiian or Other Pacific Islander 0.1%. We hypothesize higher level of education leads to a higher rate of participation in the financial market and/or lending. Data indicate that more than one-third of primary operators (35%) completed high school education, nearly one-third (31.8%) of primary operators have completed undergraduate or more (four years or more) education, and slightly more than a quarter (27.8%) of primary operators have some college education. Only 5.1% of total producers have less than a high school education. The average age of the primary farm operator is 60 years old. Most of the primary operators are male (86.1%). We do not have a priori to the gender of the operator in financial market participation. Married couples may have more financial resources, so we hypothesize that they are more likely to participate in the financial market. Data indicate that 79.9% of primary operators are married.

We hypothesize that farm households who have higher gross cash farm income are more likely to participate in the financial market and/or lending. The average gross cash farm income is $147,553. Likewise, we hypothesize that if farm households have received government

payments, they are more likely to participate in the financial and/or lending market. Nearly one-third of farm households received government payments. We do not have a priori to debt obligations and participation in the financial and/or lending market. Data indicate that nearly one-third (30.2%) of farm households have debt obligations.

Table 1: Summary statistics of the variables used in probit model (N=65,082)

Variables	Description	Mean	Standard deviation
A. Dependent variables			
Interest only	=1 If farm households have interest income, 0 otherwise	0.503	0.500
Dividend only	=1 If farm households have dividend income, 0 otherwise	0.437	0.496
Interest only or dividend only or both	=1 If farm households have either interest or dividend or both income, 0 otherwise	0.542	0.498
B. Explanatory variables			
Race	Primary operator's race		
White		0.962	0.189
Black or African American		0.013	0.115
American-Indian or Alaska Native		0.019	0.137
Asian		0.003	0.062
Native Hawaiian or Other Pacific Islander		0.001	0.028
Education	Primary operator's highest level of education		
Less than high school		0.051	0.222

Completed high school		0.350	0.477
Some college		0.278	0.448
Completed 4 years or more		0.318	0.466
Age	Primary operator's age in years	60.976	13.313
Gender	Dummy=1, if primary operator's gender is male, 0 otherwise	0.861	0.346
Marital status	Dummy=1, if primary operator is married, 0 otherwise	0.799	0.400
Gross cash farm income	Operator's gross cash farm income ($)	147,553	892.569
Govt. Payments	Dummy=1, if farm operations received government payments, 0 otherwise	0.324	0.468
Farm debt	Dummy=1, if farm operations have debt obligations	0.302	0.459

Source: USDA, Economic Research Service calculations using data from the 2017-2021 Agricultural Resource Management Survey (ARMS).

Results and discussions

Table 2 shows parameter estimates of our empirical model. As stated earlier, we have three binary outcome variables: farm households having interest income only (model 1), farm households having dividend income only (model 2), and farm households having interest income or dividend income or both (model 3). The multicollinearity among explanatory variables was tested using the variance inflation factor (VIF). The mean VIF was less than the suggested threshold of five, which indicated that multicollinearity is not an issue in our empirical model.

Our results indicate that relative to White farmers, Black or African-American and American-Indian or Alaska Native farmers are less likely to participate in interest income (model 1) and interest income or dividend income or both (model 3). Only American-Indian or Alaska Native are less likely to participate in the dividend income (model 2). Higher education level enhances participation in the financial market. Relative to the less-than-high school education, those who completed high school, have some college degree, or completed four years or more are more likely to participate in all three cases, interest income only, dividend income only, and interest income or dividend income or both.

The effect of the age of the primary operator is positive, indicating primary operators are more likely to participate in the financial and/or lending market with increasing age. Results indicate that male farm operators and married operators are more likely to participate in interest income or dividend income or both. Results indicate that higher gross cash farm income and higher government payments enhance the participation of farm households in financial and/or lending markets. We find that if farm operations have debt obligations, they are less likely to participate in the interest income.

Table 2: Parameter estimates of the Probit model

	(1) Interest only		(2) Dividend only		(3) Interest or Dividend or Both	
	Coefficients	Std. error	Coefficients	Std. error	Coefficients	Std. error
Race						
White (base category)						
Black or African-American	-0.227*	(0.116)	-0.064	(0.042)	-0.249**	(0.116)

American-Indian or Alaska Native	-0.551***	(0.114)	-0.164***	(0.034)	-0.565***	(0.104)
Asian	-0.109	(0.128)	-0.050	(0.059)	-0.153	(0.125)
Native Hawaiian or Other Pacific Islander	0.299	(0.332)	-0.054	(0.127)	0.222	(0.338)
Education						
Less than high school (base category)						
Completed high school	0.187**	(0.070)	0.062**	(0.027)	0.190***	(0.069)
Some college	0.234***	(0.061)	0.085***	(0.024)	0.242***	(0.063)
Completed 4 years or more	0.435***	(0.067)	0.167***	(0.026)	0.448***	(0.068)
Age	0.017**	(0.007)	0.002***	(0.000)	0.018**	(0.007)
Age square	0.001	(0.000)	0.001	(0.000)	0.001	(0.000)
Gender	0.080	(0.051)	0.017	(0.021)	0.092*	(0.053)
Marital status	0.046	(0.033)	0.011	(0.011)	0.064*	(0.033)
Gross cash farm income	0.001***	(0.001)	0.001***	(0.000)	0.001***	(0.000)
Govt. Payments	0.186***	(0.026)	0.062***	(0.011)	0.224***	(0.025)
Farm debt	-0.148***	(0.039)	-0.011	(0.015)	-0.045	(0.040)
R-square	0.039		0.037		0.043	

***, **, and * refer to the significance at 1%, 5%, and 10 % levels, respectively. Figures in parenthesis indicates standard errors.

Source: USDA, Economic Research Service calculations using data from the 2017-2021 Agricultural Resource Management Survey (ARMS).

The estimated coefficients in table 2 only indicate the direction of the effect of each explanatory variable on participation in the financial market. We estimate the marginal effects of each regressor (keeping other covariates at their mean) to interpret both signs and magnitudes of the effect of each explanatory variable. Table 3 reports the marginal effects estimated from the probit model. Results indicate that relative to White, Black or African-American and American-Indian or Alaska Native are 8.8%, and 20.5% less likely to participate in interest income, keeping other variables at their mean. Likewise, the same are 9.6% and 21.3% less likely to participate in the interest income or dividend income, or both. Further, we find that American-Indian or Alaska Native are 16.4% less likely to participate in the dividend income, keeping other covariates at their mean. The Asian producers were also less likely to participate but the results were not statistically significant.

As we hypothesized, the effect of education is positive and significant to enhance the participation of farm households in the financial and/or lending market. Relative to the less than high school education, results indicate that primary operators who completed high school, have some college degree, or completed four years or more are 7.2%, 9%, and 16.8% more likely to participate in interest income, respectively, keeping other covariates at their mean. Likewise, the same education level enhances participation in dividend income by 6.2%, 8.5%, and 16.7%, respectively. Further, the same education level enhances the likelihood of participation in interest income or dividend income or both by 7.3%, 9.4%, and 17.2%, respectively. We find a strong effect as education levels increase for increased participation in financial and/or lending market.

We find that an increase of one year in the primary operator's age has a small positive effect (<1%) on enhancing participation in the financial and/or lending market. If farm operators are male, they are 3.5% more likely to participate in interest income or dividend income, or both.

Likewise, we find that married farm operators are 2.5% more likely to participate in interest income or dividend income, or both.

Results indicate that if gross farm income increases by $1 million, then farm operators are 2.9%, 3.6%, and 3.4% more likely to participate in interest income, dividend income, and interest income or dividend income or both, respectively, keeping other covariates at their mean. Likewise, if farm operations received government payments, they are 7.2%, 6.2%, and 8.6% more likely to participate in the interest income, dividend income, and interest income or dividend income or both, respectively. Further, we find that if farm operations have debt obligations, they are 5.7% less likely to participate in interest income investments.

Table 3: Marginal effects of each explanatory variable estimated from the Probit model

	(1)	(2)	(3)
	Interest only	Dividend only	Interest or Dividend or Both
Race			
White (base category)			
Black or African-American	-0.088*	-0.064	-0.096**
American-Indian or Alaska Native	-0.205***	-0.164***	-0.213***
Asian	-0.042	-0.050	-0.059
Native Hawaiian or Other Pacific Islander	0.114	-0.054	0.083
Education			
Less than high school (base category)			
Completed high school	0.072**	0.062**	0.073***
Some college	0.090***	0.085***	0.094***

Completed 4 years or more	0.168***	0.167***	0.172***
Age	0.003***	0.002***	0.004***
Gender	0.031	0.017	0.035*
Marital status	0.018	0.011	0.025*
Gross cash farm income	0.029***	0.036***	0.034***
Govt. Payments	0.072***	0.062***	0.086***
Farm debt	-0.057***	-0.011	-0.017

***, **, and * refer to the significance at 1%, 5%, and 10 % levels, respectively.

Source: USDA, Economic Research Service calculations using data from the 2017-2021 Agricultural Resource Management Survey (ARMS).

Sensitivity Analysis

We perform two sub-sample sensitivity analyses to estimate the marginal effects of education within the same race and across different races. Table 4 shows the marginal effect of education within each race. For White primary operators, relative to less than high school education, results indicate that primary operators who have a high school education are 8.6%, 7.2%, and 8.6% more likely to participate in lending (generating interest income), financial/equity markets (generating dividend income), and either or both, respectively. Likewise, relative to less than high school, some college education enhances the likelihood of participation in lending (generating interest income), financial/equity markets (generating dividend income), and either or both by 10%, 9%, and 10.2%, respectively. Similarly, farm operators having four years or more education are 17.9%, 17.8%, and 18.2% more likely to participate in lending (generating interest income), financial/equity markets (generating dividend income), and either or both, respectively relative to those with less than high school education. We do not find a significant effect of education level on participation in the financial and/or lending market among Black or

African-American, and American-Indian or Alaska Native. Contrary to our expectations, the effect of higher education level (completed high school and some college, relative to less than high school) is negative for Asian farm operators, which might be an interesting area for future research.

Table 5 reports the marginal effects of the same level of education across different races. Relative to White, results indicate that having the same level of education, completed high school, Black or African-American are 15.2%, 12.7%, and 17.6% less likely to participate in lending (generating interest income), financial/equity markets (generating dividend income), and either or both respectively. Likewise, for the same level of completed high school education, relative to White, American-Indian or Alaska Native are 31.7%, 25.7%, and 32.9% less likely to participate in lending (generating interest income), financial/equity markets (generating dividend income), and either or both, respectively. For some college education, relative to White, American-Indian or Alaska Native are 17.8%, 11.4%, and 17.5% less likely to participate in the lending (generating interest income), financial/equity markets (generating dividend income), and either or both, respectively. Likewise, for the same level of college education, relative to White, Asian are 20.5%, 16.5%, and 23.9% less likely to participate in the lending (generating interest income), financial/equity markets (generating dividend income), and either or both, respectively. However, for the same level of college education, relative to White, Native Hawaiian or Other Pacific Islander are 27.5%, 38.9%, and 27.9% more likely to participate in lending (generating interest income), financial/equity markets (generating dividend income), and either or both, respectively. For the completed four years or more category, relative to White, American-Indian or Alaska Native are 14.6%, 12.7%, and 4.9% less likely to participate in lending (generating interest income), financial/equity markets (generating dividend income), and either or both, respectively.

Overall, from our sub-sample analysis, results indicate that the effect of education is strong among White farm operators relative to other races. Among the different education levels, relative to less than high school, completed four years or more education has the highest positive marginal effect to enhance the likelihood of participation in the financial and/or lending market for White farm operators. Further, for the same level of education, American-Indian or Alaska Native are less likely to participate (have the highest negative marginal effect) in the financial and/or lending market relative to White farm operators.

Table 4: Sensitivity analysis: marginal effect of education within the same race (relative to the less than high school education)

Race		Completed high school			Some college			Completed 4 years or more		
		Interest	Dividend	Either or Both	Interest	Dividend	Either or Both	Interest	Dividend	Either or Both
White	Less than high school (Base category)	0.086***	0.072**	0.086***	0.100***	0.090***	0.102***	0.179***	0.178***	0.182***
Black or African-American		-0.095	-0.112	-0.101	0.010	0.050	0.064	0.129	0.043	0.141
American-Indian or Alaska Native		-0.271	-0.242	NA	-0.121	-0.083	NA	0.008	-0.020	NA
Asian		-0.309**	-0.208	-0.287**	-0.391***	-0.196	-0.339***	-0.247	-0.020	-0.181

***, **, and * refer to the significance at 1%, 5%, and 10 % levels, respectively.

Source: USDA, Economic Research Service calculations using data from the 2017-2021 Agricultural Resource Management Survey (ARMS).

Table 5: Sensitivity analysis: marginal effect of races within the same level of education (relative to White)

	Black or African-American			American-Indian or Alaska Native			Asian			Native Hawaiian or Other Pacific Islander		
Education level	Interest	Dividend	Either or Both	Interest	Dividend	Either or Both	Interest	Dividend	Either or Both	Interest	Dividend	Either or Both
Completed high school	-0.152**	-0.127**	-0.176**	-0.317***	-0.257***	-0.329***	-0.002	-0.0.054	-0.034	-0.254	-0.209	-0.299
Some college	-0.056	0.026	-0.017	-0.178**	-0.114*	-0.175**	-0.205***	-0.165**	-0.239***	0.275**	0.389***	0.279*
Completed 4 years or more	-0.034	-0.080	-0.049	-0.127	-0.146**	-0.137*	-0.059	0.003	-0.053	0.176	-0.160	0.140

***, **, and * refer to the significance at 1%, 5%, and 10 % levels, respectively.

Source: USDA, Economic Research Service calculations using data from the 2017-2021 Agricultural Resource Management Survey (ARMS).

Conclusion

Our results indicate that farm operator's socioeconomic and farm characteristics influenced their participation in the financial and/or lending market. We find that 1) relative to White farm operators, Black or African-American and American-Indian or Alaska Native farm operators were 9.6% and 21.3% less likely to participate in the financial and/or lending market. 2) Relative to the less than high school education, farm operators who completed a high school, have some college degree, and completed four years or more were 7.2%, 9%, and 16.8% more likely to participate in the financial and/or lending market. 3) White farm operators who completed four years or more education had the highest positive influence (18.2%) in enhancing participation in the financial and/or lending market. We did not find a statistically significant positive effect of education among other races. 4) For the same level of education, all other races; Black or African-American, American-Indian or Alaska Native, and Asian; except Native Hawaiian or Other Pacific Islander, were less likely to participate in the financial and/or lending market.

We also found that farm operators who have a higher gross cash farm income and who received government payments were more likely to participate in the financial and/or lending market. We also find that farm operators were less likely to participate in the lending market (earning interest income) if they have debt obligations.

Our findings might have implications to several stakeholders, such as producers, extension economists, and policymakers. Estimating the impact of volatility of returns from the financial and/or lending market on farm household income and elasticity of farm household consumption are interesting areas for future research.

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