THE DETERMINANTS AND IMPACTS OF FARMER ASSOCIATION MEMBERSHIP IN ALBAY, PHILIPPINES

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BIOGRAPHICAL SKETCH

Miguel Paje joined the master's program in the Charles H. Dyson School of Applied Economics in the fall of 2019. His research interests are focused mainly on agricultural economics, rural development, and natural resource management. Prior to pursuing his master's degree, Miguel was based in Manila, Philippines, where he worked in the Department of Environment and Natural Resources as a Project Coordinator in the Office of the Undersecretary for Policy, Planning, and International Affairs. There he worked as a liaison for the department and international organizations such as the United Nations, Asian Development Bank, and World Bank. Before working at the Department of Environment, Miguel also worked in the National Economic and Development Authority as an Environmental Economics Intern. There he conducted research on the optimal taxation of the extraction of mineral resources as part of the development of a new Philippine Mining Act.

Miguel graduated from the University of the Philippines Diliman in 2018 with a Bachelor of Science in Business Economics where he conducted an impact analysis of the social expenditure of mining operations using quasi-experimental methods for his undergraduate thesis.

Para sa bayan.

ABSTRACT

This paper examines the effects of Farmer Association membership on economic outcomes such as revenue, expectations of future profitability, access to credit, and access to various forms of insurance. This study also evaluates the factors which affect the probability of farmers joining these associations. In order to address the endogeneity between these outcomes and membership status due to the self-selecting nature of cooperative membership, the study employs propensity score matching methods in order to arrive at an estimate of the impact of farmer association membership. The study utilizes data collected using a survey instrument administered to 602 farmers across the municipalities of Camalig, Daraga, and Guinobatan in the province of Albay, Philippines. The results show that wealthier farmers, those in less remote areas, and those that have better access to information are more likely to join farmer associations. Finally, the members of these associations show higher levels of farm revenue and are more likely to have agricultural insurance. These findings emphasize the role of farmer association membership as conduits of government aid and technical knowledge.

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Table of Contents

Introduction

In many developing countries where much of the population resides in the rural sector, agricultural policies and institutional reforms play a key role in poverty alleviation. Farmers in developing countries must overcome constraints to production such as limited access to credit, formal crop insurance, and agricultural markets. All these factors may make it difficult for farmers to better their socio-economic status and improve their well-being.

In the Philippines, 68% of those in the Agricultural and Fisheries sector live below the poverty line (Family Income and Expenditure Survey, 2015). High poverty incidence in this sector is associated with lower quality of life indicators. On average, poor households which rely on agriculture for the majority of their income show indicators of lower standards of living such as low levels of education, lack of access to a community water system, and lack of access to electricity, among others (Reyes et.al, 2012). These, combined with poor infrastructure, and lack of extension services available to smallholder farmers, remain as hindrances to development in rural agricultural areas (Balisacan, 1998).

Collective action is often touted as a pathway to improving socio-economic outcomes among farmers. For example, recent research has shown a positive association between cooperative membership and improved socio-economic outcomes among farmers (Mojo et.al 2016, Verhofstadt and Maertens 2014, Fischer and Qaim 2012). Cooperatives and farmer associations allow farmers to collectively market their goods. This, in turn, gives them access to larger markets and increases their market power or their ability to command higher prices from

their buyers. Such institutions also enable farmers to pool resources and invest in farm machinery and farm infrastructure, which improves farm productivity and crop quality. Finally, cooperatives and associations also act as a means by which farmers can access services from government institutions such as educational programs, trainings, extension services, formal credit, and insurance programs (Araullo, 2006; Deriada 2005). However, the ability of these organizations to improve farmer outcomes rests on the ability of these organizations to be inclusive in their recruitment and effective in their management (Verhofstadt and Maertens, 2014).

This study focuses on the Philippines because of its high poverty incidence in the agricultural sector and the Philippine Government acknowledges the importance of cooperatives and associations in the development of the rural and agricultural sector. In fact, the government aims to expand economic opportunities for these kinds of organizations in the hopes of improving farm sector productivity, effectivity, and resilience (Philippine Government, 2021). However, a rigorous empirical analysis has yet to be done on whether collective action in the Philippines is indeed effective in improving farmer outcomes. This study aims to contribute to the existing literature by empirically estimating the impact of farmer association membership in Philippines on farmer economic outcomes such as revenue, expectations of future income, access to credit, and access to insurance.

To achieve this, the paper first provides a background of the agricultural sector and the set-up of farmer associations in the Philippines and more specifically, in the Province of Albay,

the focal region of the study. A conceptual framework is then developed, identifying the inputs and factors affecting both the economic outcomes and their membership in associations. The data was collected from 602 farmers across the Municipalities of Camalig, Daraga, and Guinobatan, all located in Albay Province. Social Capital Scores were developed using detailed information from a questionnaire adapted from the World Bank Integrated Questionnaire for the Measurement of Social Capital (SC-IQ) (Grootaert et.al, 2004). Information on farm production and other pertinent demographic information was collected through the survey. A propensity score matching model was employed to estimate the effect of association membership on various economic outcomes. This method allows us to estimate both the determinants of association membership and its impact on economic outcomes.

This study sheds light on the role of associations as a means of poverty alleviation and improving economic outcomes among farmers, and provide insights on how to improve policies concerning their management.

Farmer Associations in Albay, Philippines

Albay is a province in the southeast of Luzon island. Its economy is mainly driven by agricultural activity and over a quarter of the population lives below the poverty line (National Economic Development Authority, 2020). The major crops planted in Albay are coconut, rice, sugar, and abaca. Albay has also just recently grown to become the Philippines' largest producer of sweet potato, a high value specialty crop (Bicol Region Department of Agriculture, 2020).

In general, cooperatives and farmer associations in the Philippines aim to provide their members with support in improving input supply and production through the pooling of resources or capital and securing more (Araullo, 2006; Deriada 2005). Such organizations also aim to provide support in post-processing, marketing, and credit sourcing. Cooperatives in the Philippines are protected and managed in the accordance with Republic Act 6938 or the Cooperative Code of the Philippines (1990). Under this code, cooperatives are entitled to special benefits such as the preferential treatment in the allocation of fertilizers by government agencies. Such farmer organizations are normally the first to be approached by government agencies in the administration of trainings or extension services.

In the province of Albay, a more common form of collective action among farmers are the *barangay* or village farmer associations. Jan Pajara, an officer from the Albay Provincial Agricultural Office mentioned that these associations are formed by farmers in respective *barangays* to provide each other with technical support, ease of access to extension services, and priority in the dissemination of government support services. These groups differ from cooperatives by being less focused on the marketing of a single crop and function primarily to ensure better access to government services. However, farmer associations can engage in resource pooling and collective marketing if the leadership and its members choose to do so. Not all *barangays* have farmer associations as these are usually formed in more rural, less developed *barangays.* Membership in these associations is not just limited to farmers specializing in just one crop but they aim to provide support to all types of farmers. These groups are typically led

by the head of the *barangay* agricultural committee on the *barangay* council. (J. Pajara, personal communication, June 22, 2021)

When a an individual registers with the *barangay* office as a farmer they are encouraged to join their local farmer association but not all farmers opt to do so. There are no joining fees or monthly dues. However, members are expected to actively participate and attend the regular meetings of the association in order receive the full benefits of membership and be included in the lists to receive support. Given this, it is the case that farmer associations are made up of registered farmers only.

These farmer organizations are formed primarily with the purpose of ensuring better access to government services. Farmer groups can obtain support from the government by writing a letter to the provincial agricultural office requesting aid. This is usually done to obtain forms of physical capital that can be shared by the farmers in the association such as farm machinery or post-harvest processing facilities and equipment. The leaders of these organizations are often the first ones to be contacted by the government when disseminating planting and weather information. Additionally, the government often obtains databases with the information of member farmers in order to aid in the distribution of support services. Farmer associations also regularly receive free seeds and seedlings every season, the savings from which can be used to buy additional equipment and fertilizer. Farmers in these associations also receive advice from the local government on what crops to plant these season and are often encouraged to plant different high value crops alongside staple crops in order to smooth income and improve

food security. Member also obtain better access to markets. For rice and coconut, members of one farmer association often work with one buyer or trader per season therefor avoiding the costs associated with searching for a potential off-taker of their produce.

Despite all these benefits, not all farmers opt to join these associations. Individuals particularly who are less well-connected in the community and have less access to different sources of information are less likely to become members. Local government officers also mention that individuals do not join these associations because of the commitments and social pressure to participate that come with membership. Some of these aspects will be discussed in the analysis.

Impact Evaluation of Collaborative Action Among Farmers

Much research has been done on the impact evaluation of cooperative membership and other forms of collective action on farmer outcomes in the developing world. Many of these studies also discuss the determinants of farmer group membership and the factors that affect the farmers' decisions to join these groups. Wealthier farmers are often shown to sort themselves into joining cooperatives and associations (Yismaw et.al, 2019, Fischer & Qaim 2011, Verhofstadt & Maertens 2014). Some studies have also shown that farmers with more years of education are more likely to join these groups (Mojo et.al 2017, Verhofstadt & Maertens 2014, Zheng et.al 2012). Farmers with larger land holdings are also more likely to become members of cooperatives and farmer groups (Fischer & Qaim 2011, Mojo et.al 2017). Distance to the market of center of business is shown to have a negative effect on group membership (Fischer & Qaim

2011, Verhofstadt & Maertens 2014). Finally, farmers who own cellular phones and have greater access to different sources of information are also more likely to join such organizations (Fischer & Qaim 2011, Mojo et.al 2017).

With regard to the impact of farmer group membership on farmer outcomes. Most studies provide evidence of positive impacts of group membership on farmer incomes. (Fischer & Qaim 2011, Mojo et.al 2017, Nkechi & Onugu 2015, Verhofstadt & Maertens 2014). Cooperative membership was also shown to have positive effects on poverty reduction, asarmers in cooperatives were less likely to be below the poverty threshold (Verhofstadt & Maertens, 2014).

The vast majority of these studies employed non-experimental methods of estimation in evaluating the impact of farmer group membership on farmer outcomes. This is due to the absence of baseline data before treatment participants joined farmer associations (Hernández-Aguilera et. al, 2018). Such studies made use of propensity score matching techniques to account for the endogeneity between the treatment and outcome, and for the selection bias in association membership (Fischer & Qaim 2011, Mojo et.al 2017, Verhofstadt & Maertens 2014). This method involves the estimation of probabilities that a farmer is a member of a cooperative based on a set of observable characteristics. Member and non-member farmers are then matched according to these probabilities and differences among matched farmers are estimated on the outcomes of interest (e.g. income, access to credit, etc.).

This study aims to investigate whether results from previous studies hold in the Philippine setting. For the purposes of this study we focus on membership in *barangay* or village farmer associations and estimate the impact of these on various economic outcomes of farmers in the province of Albay. This study makes use of propensity score matching methods previously used in similar research, conditioning on observable characteristics to reduce the selection bias in arriving at our estimates.

Conceptual Framework

Farmers join groups and cooperatives based on a certain set of unobserved selection criteria. Previous research and anecdotal evidence from field studies identify factors inducing or dissuading farmers into joining farmer associations. This non-randomness in the selection of group members poses a challenge to the analysis of association participation impacts. Given this, a framework of inputs and outputs is developed. These inputs constitute the factors that affect the output variables of interest but are also associated with farmer group membership. These inputs are long-term stocks of human, physical, and social capital which result in more short-term socio-economic impacts (Hernández-Aguilera et. al, 2018). In implementing this framework to the analysis we are able to derive an estimate of the socio-economic impacts of farmer association membership independent of other factors that could affect these outcomes, by conditioning on these inputs.

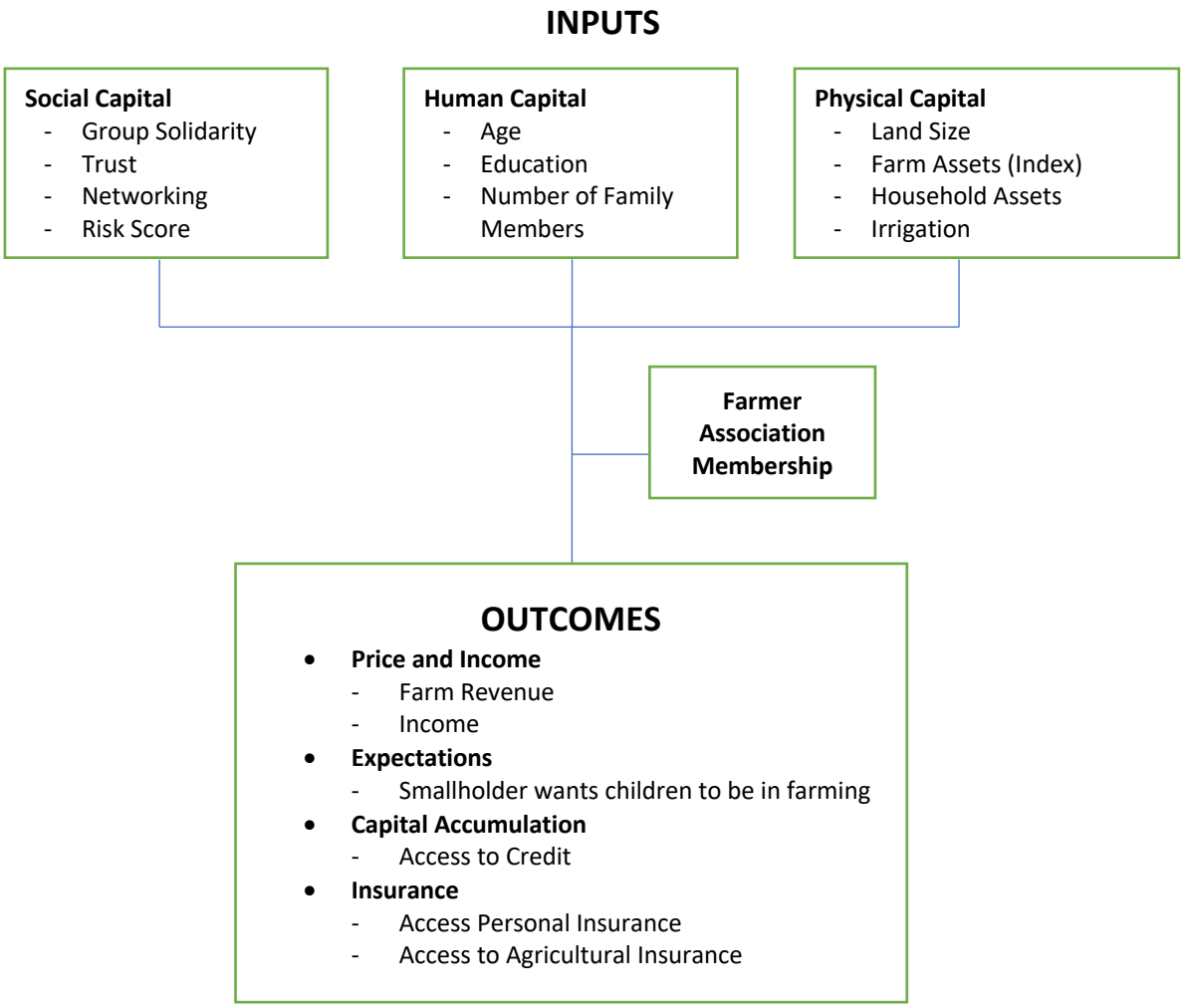
This study hypothesizes that farmer association membership positively affects our set of outcome variables independent of the inputs we condition upon. This association is illustrated

visually in figure 1. The set of outcome variables examined includes farm revenue, expectations of future profitability, access to credit, and access to insurance. This is possible through better access to information, training programs, and farm inputs provided by the government and non-profit organizations. The free inputs provided by the government in the form of seeds, fertilizer, and capital machinery enables farmers to increase productivity. Farmers also receive training in farm management and are encouraged to diversify the types of crops they plant.

Inputs

In developing the set of inputs or explanatory variables we relied on existing literature (Fischer & Qaim 2011, Verhofstadt & Maertens 2014) and on anecdotal evidence on what motivates farmers to join farmer associations as well as what could affect the outcome variables of interest. Higher level of human capital is often associated with increased productivity, better managerial ability and consequentially, improved socio-economic outcomes (Cammeraat et.al 2021, Feder et.al 1985). In this study, education and age are both used as proxies for levels of human capital. Physical capital in the form of cash, household wealth, and farm assets enable farmers to innovate and consider different approaches to farm management such as joining farmer associations (Boahene et.al 1999). Liquidity and wealth endowment are important factors in a farmer's decision to take-up an innovative approach to business or financial products. There is a positive association between cash liquidity and probability of a household to demand an innovative financial service such as various forms insurance and credit schemes (Cole et.al, 2013).

Figure 1. Conceptual Framework – Farmer Association Membership



Source: Author's creation

Social Capital in the form of network connectedness and access to information are often associated with participation in community initiatives and influences the decision of farmers to join and participate in the farmer associations (Fischer & Qaim 2011, Verhofstadt & Maertens 2014). Perceptions on risk and uncertainty is also considered to be a factor affecting the uptake of an innovation or service (Feder et.al 1985).

Outputs

We take a multi-faceted perspective when examining the socio-economic outcomes associated with farmer association membership. Membership in farmer associations and cooperatives have been shown to increase farm revenue among members (Verhofstadt & Maertens 2014). Beyond revenue and income we examine outcomes that affect the farmers' long-term economic well-being and have a lasting impact on the productivity of their enterprise. We also look at outcomes such as expectations of the future, access to credit, and access to insurance. Such outcomes are essential factors in providing pathways for farmers to improve their standard of living.

Access to crop insurance has been shown to increase farm investment despite farmers initially being thought to be liquidity constrained (Karlan et.al, 2014). Crop insurance in the Philippines is especially important because of the country's vulnerability to climate change and natural disasters. More specifically, Albay lies on the eastern seaboard of the Philippines, the region which bears the brunt of the country's typhoons, exposing farmers to great risk of crop failure from flooding, strong winds, and heavy rains.

Ideally, farmer organizations in the Philippines are tasked with providing support to members in accessing credit from formal sources, thus we should expect a positive association between membership and credit access (Galang, 2020). Access to credit is proven to increase long-term agricultural performance by providing liquidity to purchase the inputs required to improve productivity (Osabohien, Mordi, and Ogundipe, 2020).

Finally following Hernández-Aguilera et. al (2018), we use the desire for an individual to have their children to also continue working as farmers as a proxy for future expectation of the profitability of farming.

Data & Methods

We collected data through a household survey applied to 602 participating farmers, among which 375 were members of farmer associations and 227 were non-members. The data collection was done from July to August 2020 and was spread across the three municipalities of Daraga, Camalig, and Guinobatan. Farmers were given a cash token of Php 300 or around USD 6 as compensation for their time and effort in going to the survey site. However, due to missing values In variables of interest 81 observations were dropped from the sample. This yielded a final sample of 521 farmers. 340 of which were members of farmer associations and 181 were not.

The household survey consisted of three parts, a demographic and production questionnaire, a risk behavior questionnaire, and social capital module. The demographic and production questionnaire collected data on basic household and farm information as well as information on yields, prices, and farm assets. The second part of the survey asked questions about perceptions on risk. A hypothetical lottery question was also asked which involved the farmers choosing from a set of risky prospects, each with increasing variance and expected gain. Finally, a questionnaire assessing levels of social capital was used to develop social capital scores. This used a multi-faceted approach and enabled us to evaluate different forms of social capital. The questionnaire was adapted from the Integrated Questionnaire for the Measurement

of Social Capital (SC-IQ) (Grootaert et.al, 2004). The SC-IQ enabled us to develop scores for different aspects of social capital mainly the following: networks, trust and solidarity, collective action and cooperation, information and communication, social cohesion and inclusion, empowerment and political action. These scores enabled us a more discrete approach to evaluating the effect of social capital and break down its role in the decision of a farmer to join a farmer group.

Input Variables

Social Capital Variables

Using the SC-IQ, six scores were developed, each measuring a distinct aspect of Social Capital. The instrument that was used enabled us to measure the multi-dimensionality of Social Capital, mainly the number and characteristics of groups that an individual could rely on and the quality of the relationships these individuals have with these groups or institutions (Grootaert et.al, 2004).

The *Networks Score* allows us to measure the extent of which individuals are linked to different groups and the different contributions or benefits they bring and receive from them. The *Collective Action and Cooperation Score* measures the level of engagement they have with networks and how willing they are to contribute to different groups. The *Information and Communication Score* measures the number of potential sources of market and public information of an individual. The *Social Cohesion and Inclusion Score* measures the amount of perceived differenced and level of fractionalization in a community, both of which are factors

which may lead to conflict in a community. The *Empowerment and Political Action Score* measures the extent to which individuals are content with their ability to influence aspects of society greater than themselves and their ability to make their grievances be heard in the broader communities (Grootaert et.al, 2004).

In addition to these measures of Social Capital we also condition on the distance of the household to the municipality or town center. Distance to the town center is often associated with cooperative membership and better outcomes by being a proxy for improved access to the market and various sources of information.

Human Capital Variables

As measures of the level of human capital among households we include the age and education of household heads. Age serves as a proxy for human capital because we expect age to be associated with gained knowledge and skill from work experience. Such knowledge can be applied in improving farm output. Additionally, we include the number of the individuals in a household as a measure of the amount of available labor the farm household has at its disposal. We expect that the more members a farm household has, the larger the amount of human capital available that can be applied on the farm.

Physical Capital Variables

In conditioning for various forms of physical capital we use measures of household wealth and farm assets. We construct these measures using Principal Component Analysis (PCA) which enables us to use various assets and develop more comprehensive measures of household

wealth and farm asset endowments. PCA allows us to reduce the number of variables into just one dimension. This involves using the ownership status of certain assets, in this case binary variables. These variables are then weighted using a covariance matrix and an index is developed using these weights (Filmer and Pritchett, 2001).

The selection of household assets was based on the Proxy Means Test conducted by the National Statistical Coordination Board (NSCB) to compute predicted income for the administration of Social Welfare Programs in the Philippines (Tutor, 2014). The selection of farm assets on the other hand was chosen based on farm equipment commonly specified by officers from the provincial agricultural office.

Output Variables

The different outcome variables we examine are farm revenue, household monthly income, access to insurance, capital accumulation, and expectations of the future. Farm revenue was specified by using self-reported prices and yields. Access to insurance are binary variables signifying whether an individual subscribes to private insurance, government issued health insurance, and public agricultural insurance. Variables related to capital accumulation are the total amount of loans taken out in 2019 in thousands of pesos and whether they took out a loan in 2019. The final outcome variable we specify is whether or not farmers desire for their children to continue on as farmers in the future.

Empirical Methods

To measure the impact of cooperative membership on our outcomes of interest we employ a propensity score matching strategy. This method is often used in the non-experimental impact evaluation of farmer organization membership. This is done to account for the systemic differences between members and non-members due to the self-selecting nature of membership based on initial economic statuses and capital endowments of farmers (Yismaw et.al, 2019, Fischer & Qaim 2011, Verhofstadt & Maertens 2014).

The basis of such causal inference strategies is the Potential Outcomes Framework (Rubin, 2005). This is illustrated in equations 1 and 2. To arrive at a causal estimate of farmer organization membership we must infer the outcome of the treatment unit had they never been treated or in this had they never become members of the association. For each farmer i, denote membership status as C_i, where $C_i = 1$ if the farmer is a member of a farmer association and $C_i = 0$ if they are not. The outcomes of each of the types of farmers are $Y_i(1)$ if they for member farmers and $Y_i(0)$ for non-member farmers. Thus, the potential outcomes for each type of farmer are as follows:

Equation 1:

$$Y_i(C_i) = \begin{cases} Y_i(0), & if\ C_i = 0 \\ Y_i(1), & if\ C_i = 1 \end{cases}$$

The motivating idea behind causal inference is to estimate in difference of the outcomes those who have been treated and their outcomes had these same individuals not been treated at

all. This is called the Average Treatment on the Treated (ATT). We express this in terms of expectation:

Equation 2:

$$\underbrace{E[Y_i(1) \mid C_i = 1] - E[Y_i(0) \mid C_i = 0]}_{\text{Observed Difference}} = \underbrace{E[Y_i(1) - Y_i(0) \mid C_i = 1]}_{\text{ATT}} + \underbrace{E[Y_i(0) \mid C_i = 1] - E[Y_i(0) \mid C_i = 0]}_{\text{Selection Bias}}$$

On the left-hand side is the observed difference from the data. The first expectation term on the right-hand side is the Average Treatment Effect on the Treated (ATT). The final two terms on the right are the outcomes of those that are actually treated had they not been treated minus the outcomes of those not treated. This is called the selection bias. If those individuals who are treated were to have greater or lesser outcomes regardless of whether they had been treated or not, then the selection bias term is non-zero and the estimate of impact which we observe is biased.

To arrive at a non-experimental estimate of the ATT, propensity score matching relies on two assumptions: *Conditional Independence* & *Overlap*. *Conditional Independence* assumes that once we condition for all observable characteristics attributing to the selection bias, the assignment of treatment is as good as random and is independent of the outcomes (Imbens, 2004). *Overlap* assumes that provided that treatment and control individuals have the same levels of covariates, they have the same probability of being assigned treatment (Caliendo and Kopeinig, 2008).

Given the input variables we have specified in the abovementioned framework we compute for propensity scores (PS), or the probability that a farmer is a member of a

cooperative (C = 1) given these observable characteristics (X). We do this using a logit illustrated in equation 3 model incorporating municipality fixed effects (α_b). Each farmer, denoted by *i,* has an estimated propensity score regardless of if they are actually members of a cooperative. We restrict our analysis to a portion of the sample with common support. We do this to ensure a more balanced sample of comparable member and non-member farmers. This is done to ensure that there is no evaluation bias in our analysis (Heckman et.al, 1997).

Equation 3:

$$\text{PS} = (\text{C} = 1|\text{X})$$

$$\text{PS} = \Pr(\alpha_b + \beta_1 X_{i,Human\ Capital} + \beta_2 X_{i,Physical\ Capital} + \beta_3 X_{i,Social\ Capital} + \epsilon_i)$$

Member and non-member farmers are either matched or grouped together according to their propensity scores. Differences in outcomes are then estimated between member or treated Y(1) and non-member or control Y(0) farmers.

Finally, one must take into consideration that PSM results are sensitive to the matching method used (Caliendo and Kopeinig, 2008). For the purposes of this study, we use the following matching algorithms and compare the estimates produced: kernel matching, nearest neighbor matching with 1 neighbor, and nearest neighbor matching with 3 neighbors.

Results

Comparison of Member and Non-member Farmers

First, we compare the outcomes among member and non-member farmers. Table 1 shows the mean level of our outcomes between the two groups in our sample. Of the 521 farmers in the total sample, 340 were members of farmer associations and 181 were non-members. The estimated differences in table 1 are results of a two-sample t-test. It is important to note that these estimates are purely an assessment of the mean levels of the outcome variables and do not condition on any covariates.

Between association member and non-member farmers, those that are members of farmer associations have a higher levels of farm revenue. A higher proportion of these farmers also have access to agricultural insurance. Table 1 indicates that 24.1% of association members in the sample have access to agricultural insurance versus just 8.3% among non-members in the sample. Within our sample, member farmers are 15.8% more likely to have agricultural insurance than non-member farmers. Both these results are significant at the 1% level.

TABLE 1: Mean levels of outcomes among member and non-member farmers

	(1) Non-Members N = 181	**(2) Association Members N = 340**	**Difference**
Variable	Mean/SE	Mean/SE	(1)-(2)
Log of Farm Revenue	9.302	9.732	-0.431***
	[0.105]	[0.065]	
Log of Monthly Income	8.521	8.516	0.005
	[0.047]	[0.040]	
Access to PhilHealth	0.514	0.556	-0.042
	[0.037]	[0.027]	
Access to Personal Insurance	0.105	0.129	-0.024
	[0.023]	[0.018]	
Access to Agricultural Insurance	0.083	0.241	-0.158***
	[0.021]	[0.023]	
Expectations (Wants children to become farmers)	0.536	0.588	-0.052
	[0.037]	[0.027]	
Took out a loan in 2019	0.503	0.565	-0.062
	[0.037]	[0.027]	
Total amount loaned in 2019 in thousands of Pesos	11.355	29.309	-17.954
	[2.525]	[14.902]	
Total amount saved in 2019 in thousands of Pesos	0.785	0.761	0.024
	[0.256]	[0.200]	

The value displayed for t-tests are the differences in the means across the groups.
***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

The left panel of table 3 shows the difference in means of the covariates in our framework between the two groups before matching. These differences were also estimated using a two-sample t-test.

A higher proportion of non-member farmers finished school at the level of high school, and this difference is significant at the 5% level. Higher proportions of individuals finished college and vocational studies, however these results are not statistically significant. The estimates show that a larger proportion of member farmers tend to be older, have larger land

holdings, and a larger number of children, but these differences are not statistically significant. Based on these results, member farmers have higher levels of household wealth, showing higher levels of the asset index. This is statistically significant at the 5% level. The amount of farm assets are not different among treatment and control groups. However, the treatment group has a higher proportion of farmers with irrigation in their farmland. This is significant at the 1% level. With regards to social capital, farmers in associations have higher collective action and cooperation and information and communication scores on average. On average, member farmers in the sample live about 1 kilometer closer to the town center and this difference is significant at the 1% level. Finally, in the sample, a higher proportion of farmers from the municipality of Daraga are non-member farmers.

Determinants of Association Membership

The first step to propensity score estimation is calculating the propensity scores upon which control and treatment units will be matched on. In columns 1 and 2 of table 2 we can see the results of the logit regression used in estimating these propensity scores.

Columns 3 and 4 of table 2 show the marginal effects of each of the covariates on the probability of belonging to a farmer association. The marginal effects indicate that a one unit increase in the Household Asset Index will increase the probability of becoming a member of an association by 4.6%.

TABLE 2: Logit Regression Results in the Estimation of Propensity Scores

INPUT VARIABLE				
Logit Regression Results from estimation of Propensity Scores N =495	**(1) Coefficient**	**(2) Std. Error**	**(3) Marginal Effect**	**(4) Std. Error**
Education Level				
No Educ (Omitted)				
College	-0.085	0.653	-0.017	0.132
Grade School	0.060	0.596	0.012	0.119
High School	-0.144	0.610	-0.029	0.122
Vocational	1.336	1.237	0.204	0.161
Age	0.012	0.009	0.002	0.002
Number of Children	0.001	0.045	0.002	0.009
Land Size in Hectares	0.031	0.031	0.0002	0.006
Household Asset Index	0.231**	0.109	0.046**	0.021
Farm Asset Index	1.604	72.063	0.321	14.420
Irrigation	0.458**	0.222	0.092**	0.044
Social Capital Scores				
Networks Score	0.034	0.028	0.007	0.006
Trust & Solidarity Score	0.001	0.018	0.0001	0.004
Collective Action and Cooperation	0.038	0.041	0.008	0.008
Information and Communication	0.060*	0.034	0.012*	0.007
Social Cohesion & Inclusion	-0.023	0.034	-0.005	0.007
Empowerment & Political Action	0.046	0.062	0.009	0.012
Distance to Municipality Center (km)	-0.032	0.033	-0.006	0.007
Municipality				
Camalig (Omitted)				
Daraga	-0.746**	0.330	-0.149*	0.068
Guinobatan	-0.697**	0.269	-0.138***	0.052
CONSTANT	-1.196	7.910		

* $p < 0.1$; ** $p < 0.05$;*** $p < 0.01$

In evaluating the impact of this index on the probability of becoming a member of a cooperative, one must take into consideration that the Household Asset Index is a normalized

index around 0, with a minimum value of -0.790 and a maximum value of 1.264. If we evaluate the rate of change at a smaller scale, a change of 0.1 results in a 0.46% change in the probability of joining an association. This result is significant at a 5% level.

The presence of any amount of irrigation on a farmer's land, increases the probability of a farmer being a member of an association by 9.2%. This is significant at the 5% level. Irrigation in the Philippines is most often associated with rice planting. Since many of the farmers in village farmer associations commercially plant rice this may partly explain the increased proportion of member farmers in the sample with access to irrigation. Furthermore, as shown earlier member farmers tend to live in less remote areas, about a kilometer closer to the municipal center. Irrigation and drainage networks in the Philippines tend to be present in less remote areas, just a few kilometers outside the main commercial areas but not in very remote areas. This illustrates the problem of the lack of coverage of irrigation networks in more remote areas and to farmers in more rural areas far from provincial hubs of commerce.

Additionally, a one point increase in the information and communications score increases the probability of a farmer to join a village farmer association by 1.2%. This result holds at a 10% level of significance. This is also consistent with anecdotal evidence illustrated in earlier sections where village officers cite a lack of understanding of the benefits of these associations among those who choose not to join in. The information and communication score measures the amount of possible sources of information an individual could obtain market and regulatory information. Given that registration in the farmer database relies on the farmers' knowledge of its benefits, farmers who are not adequately informed may not be incentivized to register and

Table 3: Balance tables of covariates before and after matching

INPUT VARIABLE	**Before Matching**			**After Matching**		
Estimates from Kernel Matching	Control Mean N = 181	Treatment Mean N = 340	p>|t|	Control Mean N = 157	Treatment Mean N = 314	p>|t|
Education Level						
No Educ (Omitted)						
College	0.126	0.130	0.886	0.124	0.127	0.916
Grade School	0.390	0.457	0.166	0.477	0.463	0.712
High School	0.447	0.351	0.042**	0.359	0.358	0.984
Vocational	0.006	0.025	0.158	0.013	0.013	0.987
Age	53.277	55.028	0.146	54.373	55.02	0.509
Number of Children	3.786	3.994	0.401	4.106	4.052	0.796
Land Size in Hectares	1.104	1.808	0.241	1.244	1.345	0.719
Household Asset Index	-0.118	0.109	0.020**	0.047	0.086	0.636
Farm Asset Index	-0.108	0.037	0.115	-0.108	-0.108	0.357
Irrigation	0.396	0.521	0.009***	0.524	0.524	0.982
Social Capital Scores						
Networks Score	11.956	12.444	0.198	12.258	12.443	0.546
Trust & Solidarity Score	45.365	45.941	0.357	45.942	45.912	0.952
Collective Action and Cooperation	9.1509	9.6366	0.062*	9.465	9.619	0.473
Information and Communication	12.679	13.283	0.062*	13.417	13.215	0.447
Social Cohesion & Inclusion	8.692	8.531	0.581	8.487	8.599	0.636
Empowerment & Political Action	8.308	8.556	0.146	8.601	8.531	0.601
Distance to Municipality Center (km)	5.411	4.329	0.003***	4.167	4.318	0.474
Municipality						
Camalig (Omitted)						
Daraga	0.252	0.161	0.018**	0.155	0.160	0.872
Camalig	0.453	0.375	0.105	0.398	0.388	0.796

* $p < 0.1$; ** $p < 0.05$;*** $p < 0.01$

Differences estimated using a two-sample t-test

eventually join farmer organizations. As mentioned earlier, membership in village farmer organizations is heavily associated with being a registered farmer as new registrants may opt in to joining such organizations.

Finally, the municipality a farmer came from also has an impact on the probability of whether or not a farmer is a member of an association. Those from Daraga are 14.9% less likely to be a member of an association than those from Camalig and those from Guinobatan are 13.8% less likely to be members than those from Camalig. These results are significant at a 10% and 5% level respectively. These differences, may be a factor of imbalance in the distribution of member and non-member farmers when sampling from the three municipalities. It is important to note that in our sample, Camalig had the highest number of member-farmers among other municipalities with 149 out of the 197 farmers from Camalig being members of village farmer associations.

Matching and Covariate Balance

After computing the propensity scores, farmers are matched according to four different matching algorithms in order to test robustness according to matching method: nearest neighbor matching, three-nearest neighbors matching, and kernel matching.

One nearest neighbor matching is done for each unit of observation in treatment group by finding the nearest unit in the control group with the closest propensity score. Three nearest neighbor matching is done in the same manner but instead finds the three nearest units in the control group with the closest propensity scores. Kernel matching is done by matching a treatment unit with all possible units in the control group with propensity scores within a certain range or caliper. Kernel matching puts larger weights on observations with smaller distances from the treatment unit being matched. All methods are done with replacement,

which means that a single control unit could be used multiple times. This ensures that all treatment units are able to be matched in order to reduce bias (Dehejia & Wahba, 2002).

After matching, balance testing is done to verify if matching was done effectively. Ideally, a balance of covariate levels across member and non-member farmers in the sample should be achieved. This means that mean levels of covariates should not be different between the treatment and control groups. The left panel of table 3 shows the mean differences between treatment and control groups before matching. These differences were discussed in the preceding sections. The right panel shows the difference in covariates after kernel matching was implemented. Kernel matching proved to be the most effective in balancing covariates across groups. Mean levels of covariates among treatment and control groups are not seen to be statistically different. The results of the post-matching t-tests for the one nearest neighbor and three-nearest neighbors matching methods are shown in Appendix 1. These matching methods are shown to be less effective in balancing covariates. When one nearest neighbor matching was implemented, the treatment group had a higher proportion of farmers who finished vocational schooling as their highest level of educational attainment. The difference in the proportions across the two groups is 1.3% and this is significant at a 5% level. When three-nearest neighbors matching was implemented the proportion of farmers who finished grade school as their highest level of educational attainment was 6.9% higher in the control group. This is significant at a 10% level. These concerns make it difficult to interpret the Average Treatment on the Treated (ATT) results which make use of these two matching methods due to the violation of the assumption of *overlap.*

FIGURE 2.A Standardized bias before and after One Nearest Neighbor Matching

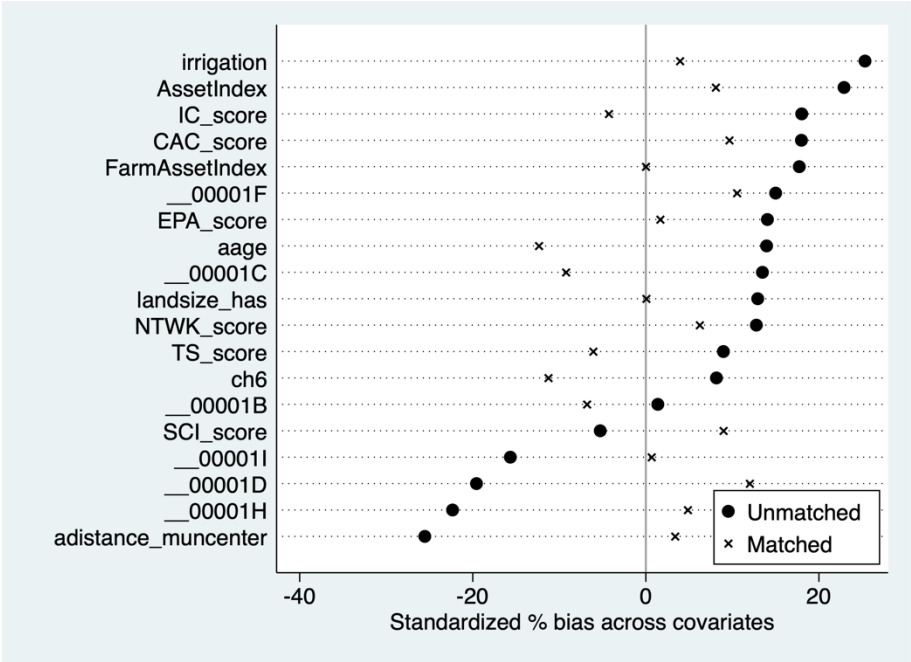


FIGURE 2.B Standardized bias before and after Three Nearest Neighbor Matching

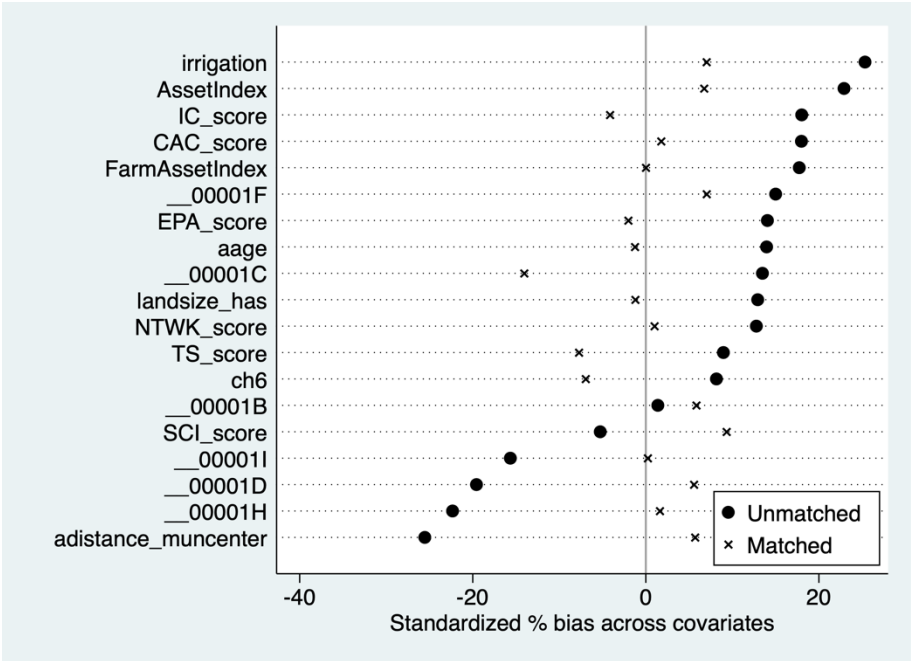
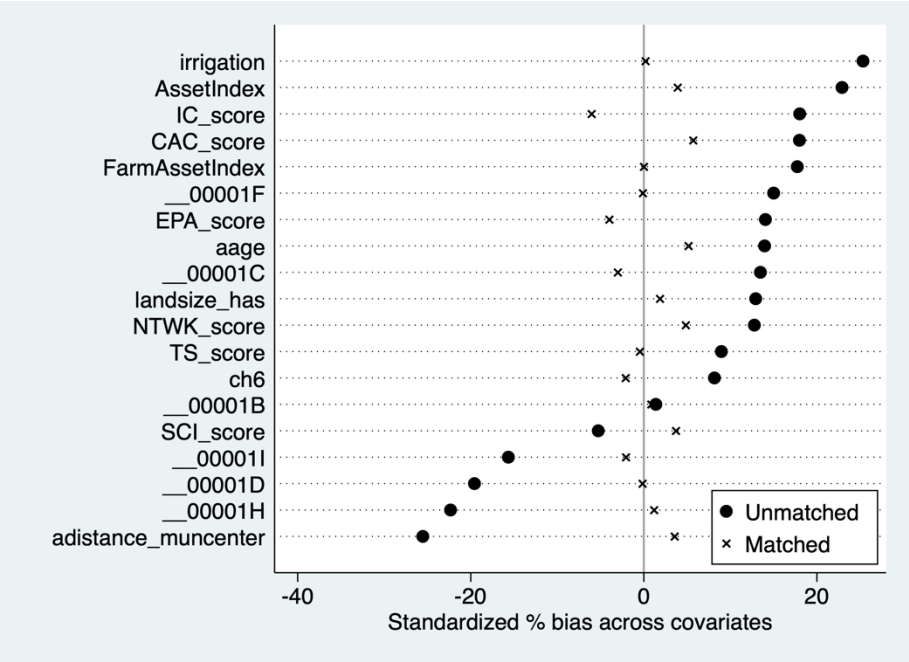


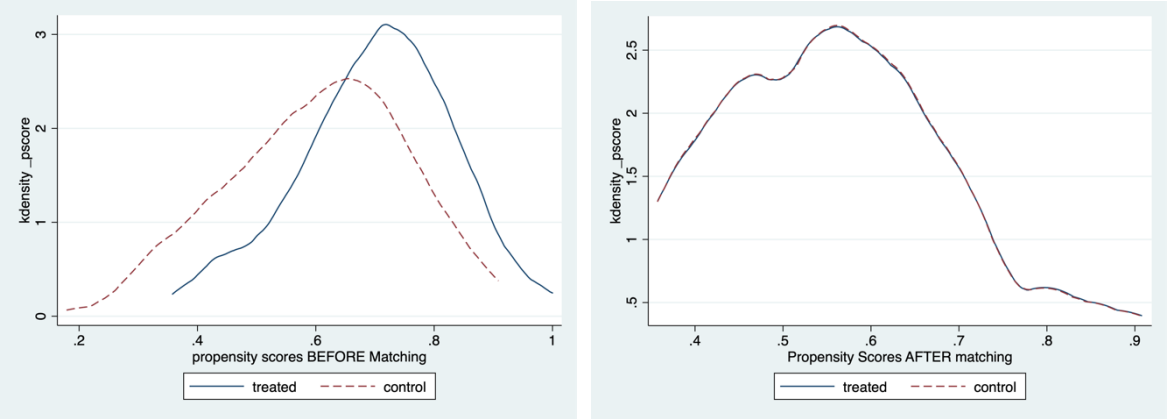
FIGURE 2.C Standardized bias before and after Kernel Matching



Figures 2.A to 2.C shows a graphical representation of the distribution of the standardized bias before and after matching. The standardized bias is the difference in means of a covariate between treatment and control groups divided by the standard deviation. All matching methods reduced the standardized bias across covariates bringing them closer towards zero. As shown again in Figure 1.C, kernel matching was the most effective in balancing covariates as it resulted in the least variation in the standardized bias post-matching.

Figure 3 shows the distribution of propensity scores before and after each matching methods were implemented. This shows that after matching was implemented, observations in the treatment were well matched with observations in the control group with similar propensity scores or only from the area of common support.

FIGURE 3 Distribution of Propensity Scores Before and After Matching



Impact of Association Membership

Table 4 presents the Average Treatment on the Treated Effects of membership in village farmer associations. These estimates are conditioned on the observable characteristics in the abovementioned framework and include municipality fixed effects. Three matching methods were used, single nearest neighbor matching, three nearest neighbor matching, and kernel matching to test the robustness of the results to matching algorithm used. Across matching methods improved access to agricultural insurance was statistically significant. Increase in the log of farm revenue was only significant when three nearest neighbor matching and kernel matching was implemented.

TABLE 4. ATT Estimates of Village Farmer Association Membership

Outcomes	(1) Single Nearest Neighbor Matching		(2) Three Nearest Neighbor Matching		(3) Kernel Matching	
Log of Farm Revenue	0.215		0.399	**	0.343	**
	(-0.222)		(0.176)		(0.160)	
Log of Monthly Income	-0.006		-0.025		-0.028	
	(0.094)		(0.075)		(0.078)	
Access to PhilHealth	0.003		0.020		0.008	
	(0.069)		(0.068)		(0.055)	
Access to Personal Insurance	0.036		0.018		0.014	
	(0.047)		(0.664)		(0.038)	
Access to Agricultural Insurance	0.169	***	0.172	***	0.163	***
	(0.047)		(0.038)		(0.040)	
Expectations (Wants Children to be Farmers)	0.055		0.083		0.077	
	(0.070)		(0.063)		(0.059)	
Took out a loan in 2019	-0.059		-0.088		-0.042	
	(0.079)		(0.061)		(0.058)	
Total amount loaned in 2019 thousands of Pesos	-7.847		-6.238		-2.753	
	(6.752)		(6.103)		(5.498)	
Total savings in 2019 in thousands of Pesos	-0.501		-0.139		-0.205	
	(0.674)		(0.610)		(0.495)	

* $p < 0.1$; ** $p < 0.05$;*** $p < 0.01$

Estimates are obtained using the *psmatch2* command in Stata and standard errors are estimated using a bootstrap with 100 replications

Standard Errors are in parentheses.

Improved Access to Agricultural Insurance

Table 4 shows that farmers are 16.3-17.2% more likely to subscribe to agricultural insurance if they are members of a farmer association. As mentioned in earlier sections, farmers

in farmer associations are also registered in the provincial registry of farmers as official agricultural workers, entitling them to the option of purchasing agricultural insurance. Non-member farmers, a majority of whom are unregistered with the registry may not be able to avail of the option to purchase insurance.

Additionally, previous literature shows that the decision to purchase insurance is dependent on the level of financial literacy, awareness of the risks associated with farming, and basic knowledge of financial products (Cole et.al, 2013). All these are dependent on the level of access to information one has. Network effects may also have a role to play in this result. Experimental results from a study conducted in rural China showed that a having an individual subscribing to crop insurance in an uninsured farmer's network makes the farmer has the same effect on the likelihood that the farmer would also take-up crop insurance as a 13% reduction in price (Cai et.al, 2014). Farmers in an association tend to associate closely with each other and exchange knowledge and best practices about farming. Seeing a fellow farmer in such a network may influence the decision of a farmer to demand insurance and induce them to also take up the insurance product.

TABLE 6: Difference in Means of Rice and Coconut Quantities and Prices

	(1) Non-Members N = 181	(2) Cooperative Members N = 340	Difference
	Mean/SE	Mean/SE	(1)-(2)
Quantity of Rice Produced in Kilograms	1463.499	1995.347	-531.848
	[254.872]	[207.864]	
Price of Rice per Kilogram (in PhP)	15.017	14.769	0.248
	[0.507]	[0.305]	
Quantity of Coconut Produced in Kilograms	2110.573	2047.010	63.564
	[648.912]	[378.853]	
Price of Coconut per Kilogram (in PhP)	14.041	11.691	2.350**
	[0.859]	[0.700]	

The value displayed for t-tests are the differences in the means across the groups.
***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Increase in Farm Revenue

The estimated impact of farmer association membership on farm revenue is significant at a 5% level when three nearest neighbor matching and kernel matching is implemented. Given these results, we see that farmer association membership increases farm revenue by 34.3-39.9%. The variable measuring farm revenue was constructed by multiplying the reported prices and quantities of all the crops planted by the farmer and taking its logarithmic transformation.

In our analysis, there were no statistically significant differences in the prices and quantities of the most common cash crops planted by most farmers in Albay, rice and coconut. These crops are those most commonly sold in markets for commercial purposes. This holds even when conditioning for different covariates. However, the results of a two-sample t-test shown in table 6 done to test for the difference in means for the price and quantities of coconut and rice among member and non-member farmers shows that on average, member farmers report lower

prices for the sale of coconut. Despite these results farmers from associations still show higher revenue.

Table 7. Cumulative Distribution of number of high-value crops planted by group

Count	Non-Member	Association Member
0	81.9%	72.5%
1	9.25%	12.8%
2	4.8%	9.1%
3	3.1%	3.7%
4	0.45%	1.6%
5	0.45%	0.3%
	100% N = 227	100% N = 375

One possible explanation for the higher revenue reported by member farmers is the number of high-value crops besides rice and coconut planted. Table 7 shows the cumulative distribution of the number of high-value crops planted by farmers across member and non-member groups in the sample. It shows that association member farmers, on average, plant more high-value crops than non-member farmers. This difference is not statistically significant when tested in a two-sample t-test for difference in means but could form part of the explanation as to why association farmers have higher revenues despite lower prices from coconut sales and no differences in rice prices or quantities. Part of the reason why this may be true is due to the local government's efforts in encouraging farmers to plant a more diverse set of crops in order to improve food security and smooth income. Such efforts include the distribution of different seeds for planting high-value food crops and the administration of

training programs teaching farmers the importance of crop diversification. Such high value crops garner higher prices in the market and can be consumed by the farm household as part of their everyday food intake. Access to such programs puts association member farmers at an advantage over non-members in

Conclusion

This paper examined the determinants of farmer association membership and its impact on the economic outcomes of farmers. It employed a framework by which various forms of inputs in the form of social capital, human capital, and physical capital influence these outcomes and assess the impact of association membership in addition to these inputs. In line with previous studies, the results show that wealthier farmers tend sort themselves into joining farmer associations (Yismaw et.al, 2019, Fischer & Qaim 2011, Verhofstadt & Maertens 2014). It is estimated that a 0.1 point increase in a wealth index constructed from a basket of various household assets increases the probability of joining a farmer association by 4.6%. The presence of irrigation on the farm also increases the probability of joining a cooperative. Additionally, a key result of this study is that greater access to information increases the probability of joining an association. A one-point increase in the computed Information and Communication score increases the chances of joining an association by 1.2%.

The results of the impact evaluation show that farmers are 16.3-17.2% more likely to subscribe to agricultural insurance if they are members of a farmer association. The study also shows that member farmers also make 34.3-39.9% in terms of farm revenue. These results are

consistent with previous non-experimental causal inference studies done using the same techniques in propensity score matching (Mojo et.al 2016, Verhofstadt and Maertens 2014, Fischer and Qaim 2012).

A common theme arising from the results of this paper is the ability of access to information to influence the decision of farmers to join their village farmer association and in-turn improve their economic outcomes. Greater access to information on the benefits of farmer associations incentivizes membership and in-turn further increases the amount of information available to these farmers to improve outcomes. The findings show that information reinforces the path dependencies towards better farm performance and improved standards of living. This further stresses the importance of equity and inclusivity in the dissemination of information of government programs. The results emphasizes the role of farmer associations as conduits of government aid and technical knowledge. This study shows that going beyond the impact of training and aid programs, policy makers should examine the depth and breadth of their reach as well as recognize the importance of grassroots institutions such as farmer associations as catalysts of rural development.

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Appendix

Appendix Table 1: Post-matching balance of covariates

INPUT VARIABLE	**One Nearest Neighbor**			**Three Nearest Neighbors**		
Estimates from Kernel Matching	Control Mean N = 159	Treatment Mean N = 322	p>|t|	Control Mean N = 159	Treatment Mean N = 322	p>|t|
Education Level						
No Educ (Omitted)						
College	0.150	0.127	0.414	0.107	0.127	0.453
Grade School	0.508	0.463	0.259	0.532	0.463	0.085*
High School	0.300	0.358	0.122	0.331	0.358	0.480
Vocational	0.000	0.013	0.045**	0.004	0.013	0.247
Age	56.57	55.02	0.109	55.020	55.178	0.869
Number of Children	4.339	4.052	0.182	4.229	4.052	0.392
Land Size in Hectares	1.342	1.345	0.992	1.412	1.345	0.822
Household Asset Index	0.006	0.086	0.325	0.019	0.086	0.413
Farm Asset Index	-0.108	0.037	0.323	-0.108	-0.108	0.549
Irrigation	0.505	0.524	0.629	0.490	0.524	0.390
Social Capital Scores						
Networks Score	12.205	12.443	0.442	12.405	12.443	0.901
Trust & Solidarity Score	45.303	45.921	0.434	46.409	45.912	0.324
Collective Action and Cooperation	9.358	9.619	0.062	9.571	9.619	0.817
Information and Communication	13.358	13.215	0.599	13.354	13.215	0.608
Social Cohesion & Inclusion	8.326	8.599	0.249	8.315	8.599	0.236
Empowerment & Political Action	8.502	8.531	0.831	8.567	8.531	0.790
Distance to Municipality Center (km)	4.174	4.318	0.486	4.077	4.318	0.240
Municipality						
Camalig (Omitted)						
Daraga	0.140	0.160	0.498	0.153	0.160	0.824
Camalig	0.384	0.388	0.934	0.387	0.388	0.978

* $p < 0.1$; ** $p < 0.05$;*** $p < 0.01$

Differences estimated using a two-sample t-test

Appendix 2: Household Survey

Participant ID (filled out by enumerator): _____

1. Date (M/D/Y): _____
2. Name: _____
3. Municipality: _____ Barangay: _____
4. Birthday
5. Occupation:
   ___ FARMER ___Other:_____
6. Are you a member of any agricultural cooperative?
   YES _____ NO _____
   If no, please skip to question 8.
7. Name Cooperative: _____
8. What year did you join the cooperative?
   YEAR: _____
9. Were your parents farmers?
   YES _____ NO _____
10. Do you consider that your children work in any other sector besides farming?
    YES _____ NO _____

DEMOGRAPHIC AND HOUSEHOLD INFORMATION

11. Please provide the following information about you (Member A) and the other members of your family that live in the farm

Household Member	Gender (M/F, male or female)	Age	Highest Level of Education	Are they a dependent or are they earning income? (Yes or No)
Member A (You)				
Member B				
Member C				
Member D				
Member E				
Member F				
Member G				

Member H				
Member I				
Member J				
Member K				
Member L				
Member M				
Member N				
Member O				
Member P				
Member Q				
Member R				
Member S				

12. Does your house have a toilet and running water? (eg. flush toilet, shower, faucet)
    YES _____ NO _____

13. Does your house have a septic tank?
    YES _____ NO _____

14. Is your home located on the farm which you cultivate?
    YES _____ NO _____

15. Are you renting your home?
    YES _____ NO _____

16. Do you have access to the following utilities?

Utilities	**Select all that apply**
Electricity	
LPG	
Connection to piped water or water supply	
Garbage Collection	
Internet	
Cable TV	
Non-cable TV	
Radio	

17. Do you have any of these assets in your household?

Assets	**Please check if you own these assets**	**Please Indicate total number of units if owned in household**
Car (Auto, jeep, etc.)		

Motorcycle		
Tricycle		
Television		
Landline Phone		
Cell Phone		
Laptop Computer		
Desktop Computer		
Refrigerator		
Gas Stove		
Airconditioning		

18. What mode of transportation do you usually use to get to the municipal center?

Vehicle	Select one
Personal Car	
Personal Motorcycle	
Personal Tricycle	
Carabao	
Bicycle	
Public Tricycle	
Public Jeep	
Public Bus	
Other:	

19. How far is your home from the municipal center in time and distance?
    Estimated distance in kilometers: _____ Km
    Estimated distance in time: HOURS_____ MINUTES_____

20. Do you connect to the internet from a place other than your farm?
    YES _____ NO _____

21. How much of the food your household consumes regularly is produced on the farm?

Amount	Select one
None	
Less than half	
About half	
More than half	
Almost all	

FINANCIAL INFORMATION

22. Did you save in 2019?
YES _____ NO _____, if yes please specify amount: Php_____
If no, please proceed to question 21

23. What method of savings do you use?

Savings Method	Select all that apply
Savings or Checking Account	
Save with cooperative or farmers bank	
Keep the money in the house	

24. Do you have any of the following?
CREDIT CARD _____ DEBIT CARD _____

25. Did you take out any loans in 2019?
YES _____ NO _____
If no, please proceed to question 29

26. On how many occasions did you take out a loan in 2019?
No. of times:_____

27. What is the total amount of money you loaned in 2019?
Amount: Php_____

28. Where did you obtain the loans?

Loan Source	Select all that apply
Private National Bank (BDO, BPI, etc)	
Private Rural Bank	
Farmers Bank	
Government Bank	
Government Lending Program	
Cooperative	
Relatives or Friends	
Informal Credit (Loan shark, etc.)	
Other:	

29. What is the allocation of the total amount loaned?
PERSONAL or HOUSEHOLD: Php_____
FARM or AGRICULTURAL: Php_____

30. Mayroon ba kayong PhilHealth?
    OO _____ HINDI _____

31. Do you have personal or agricultural insurance? Please check those that apply:
    PERSONAL INSURANCE: _____
    AGRICULTURAL INSURANCE: _____

INCOME AND FARM PRODUCTION INFORMATION:

32. On average your monthly household income from both agriculture and non-agriculture sources is in this interval (please indicate before February 2020 income):

Income bracket	Select one
Less than 5000 pesos	
Between 5000 pesos and 10 000 pesos	
Between 10 000 pesos and 15 000 pesos	
Between 15 000 pesos and 20 000 pesos	
Between 20 000 pesos and 25 000 pesos	
Between 25 000 pesos and 30 000 pesos	
Between 35 000 pesos and 40 000 pesos	
Between 45 000 pesos and 50 000 pesos	
Between 55 000 pesos and 60 000 pesos	
Above 60 000 pesos	

33. How much of the following crops did you harvest in 2019?

Check all that apply	Crop	Amount (in kilograms)	Price Per Kilogram Sold	Please check box if main crop
	Coconut			
	Abaca			
	Rice			
	Corn			
	Sugarcane			
	Banana			
	Mango			
	Pineapple			

If other crops were harvested, please enumerate below:

Crop	Amount (in kilograms)	Price Per Kilogram Sold

34. Please enumerate the non-farm sources of income you have obtained in the previous year (2019) and the amount you received from each activity (eg. foreign remittances from family, construction work, driving public vehicles, service industry, tourism, sari-sari store)

Source of Income	Amount Earned

35. Around what percent of your income came from non-farm sources in 2019? (Answer 0 if none)
    Amount in percent:_____%

36. How much land do you cultivate in hectares?
    Area: _____ Hectares

37. Is your farm land irrigated?
    YES _____ NO _____
    If yes, how many percent of your land is irrigated?: _____%

38. What is your ownership status over the land you cultivate?

Land Tenure	Select one
Own the land (titled)	
Own the land (untitled or informal)	
Leasing the land (rent)	
Leasing the land (crop sharing agreement)	
Combination (mix of owned land and rented land)	

39. If you both own and rent the land you cultivate, how much of the land do you actually own?
    Area: _____ Hectares

40. Did you hire (with pay) any individuals to work on your farm in 2019?

YES _____ NO _____
If yes, please indicate the number of individuals: _____

41. Did any of the members of your household work on your farm in 2019?
YES _____ NO _____
If yes, please indicate the number of individuals: _____
If any, how many of these individuals were your children?: _____

42. Where do you sell the harvest of your main crop?

Buyer	Check those that apply	Percentage
Cooperative		
Middlemen		
Local Market		
Exporter		
Loan Payment		
Personal Consumption		

43. Do you own any livestock?
YES _____ NO _____, if yes please specify amount: Php_____
If no, please proceed to question 3

44. Which forms of livestock do you own?

Animal	Please check if you own these assets	Number of heads owned
Carabao		
Horse		
Pig		
Chicken		
Cow		
Goat or sheep		
Fish		

If you currently own any other forms of livestock not mentioned above, please enumerate them below:

Animal	Number of heads owned

45. What farm equipment do you own? Please check all which apply.

Equipment	Please check if you own these equipment	Please Indicate total number of units if owned
Warehouse		
Hand Tractor		
Four Wheel Tractor		
Rotary Shredder		
Subsoiler		
Mouldboard Plough		
Offset Disc Harrow		
Rotary Cultivators/Rotavators		
Ridgers/Bed Formers		
Levelling Blade		
Floating/Turtle Tiller		
Conventional/Pneumatic Seed Drill		
Rice Transplanters		
Hand Seeder		
Handheld & Knapsack Sprayer		
Rice combine/Stripper Harvester		
Maize Picker/Husker Harvester		
Grain Dryer (Mobile)		
Grain Dryer (Batch)		
Water pump		

Appendix 3: Household Survey Social Capital & Risk Module

Participant ID (filled out by enumerator): _____ IDENTIFYING INFORMATION

1. Date (M/D/Y): _____
2. Name: _____
3. Municipality: _____ Barangay: _____
4. Birthday:

Networks

5. About how many *close* friends do you have these days? These are people you feel at ease with, can talk to about private matters, or call on for help.

   Number: _____

6. If you suddenly needed a small amount of money [RURAL: enough to pay for expenses for your household for one week; URBAN: equal to about one week's wages], how many people beyond your immediate household could you turn to who would be *willing* to provide this money?
   1. No one
   2. One or two people
   3. Three or four people
   4. Five or more people
7. Of those people, how many do you think are currently *able* to provide this money? Number: _____
8. Are most of these people of similar/higher/lower economic status?

   a. Similar b. Higher c. Lower

9. If you suddenly had to go away for a day or two, could you count on your neighbors to take care of your children?
   a. Definitely
   b. Probably

c. Probably not d. Definitely not

10. If you suddenly faced a long-term emergency such as the death of a breadwinner or harvest failure how many people beyond your immediate household could you turn to and would be willing to assist you?
    1. No one
    2. One or two people
    3. Three or four people
    4. Five or more people

11. [IF NOT ZERO] Of those people, how many do you think are currently *able* to assist you?

    Number: _____

12. In the past 12 months, how many people with a personal problem have turned to you for assistance?

    Number: _____

13. [IF NOT ZERO] Are most of these people of similar/higher/lower economic status?

    a. Similar b. Higher c. Lower

Trust and Solidarity

In every community, some people get along with others and trust each other, while other people do not. Now, I would like to talk to you about trust and solidarity in your community.

14. Generally speaking, would you say that most people can be trusted, or that you can't be too careful in your dealings with other people?
    1. Most people can be trusted
    2. You can't be too careful
15. In general, do you agree or disagree with the following statements?

	1. Agree strongly 2. Agree somewhat 3. Neither agree nor disagree 4. Disagree somewhat 5. Disagree strongly
A. Most people who live in this village/neighborhood can be trusted.	
B. In this village/neighborhood, one has to be alert or someone is likely to take advantage of you.	
C. Most people in this village/neighborhood are willing to help if you need it.	
D. In this village/neighborhood, people generally do not trust each other in matters of lending and borrowing money.	

16. Now I want to ask you how much you trust different types of people. On a scale of 1 to 5, where 1 means a very small extent and 5 means a very great extent, how much do you trust the people in that category?

	1. To a very small extent 2. To a small extent 3. Neither small nor great extent 4. To a great extent 5. To a very great extent
A. People from your ethnic or linguistic group/race/caste/tribe	
B. People from other ethnic or linguistic groups/race/caste/tribe	
C. Shopkeepers	
D. Local government officials	
E. Central government officials	
F. Police	
G. Teachers	
H. Nurses and doctors	
I. Strangers	

17. Do you think that over the last five years*, the level of trust in this village/neighborhood has gotten better, worse, or stayed about the same?

1. Gotten better
2. Gotten worse
3. Stayed the same

18. How well do people in your village/neighborhood help each other out these days? Use a five point scale, where 1 means always helping and 5 means never helping.
    1. Always helping
    2. Helping most of the time
    3. Helping sometimes
    4. Rarely helping
    5. Never Helping
19. If the village/neighborhood, would you contribute time or money to the project? a community project does not directly benefit you, but has benefits for many others in
    1. I will contribute time
       Amount in hours per week:_____
    2. I will contribute money Amount in Php: _____

Lottery

20. In this section you are presented with a list of **six lotteries.** You are asked to **enter**

one lottery. You don't pay anything to enter the lottery.
Each lottery consists of a toss of a fair coin, **with equal probabilities of getting a**

low and a high payoff.

Which lottery would you enter?

1. Lottery 1
2. Lottery 2
3. Lottery 3
4. Lottery 4
5. Lottery 5
6. Lottery 6

Lottery (50/50 chance)	Low payoff ($)	High payoff ($)	Expected return ($)
Lottery 1	42	42	42
Lottery 2	36	54	45
Lottery 3	30	66	48
Lottery 4	24	78	51
Lottery 5	18	90	54
Lottery 6	3	105	54

Risk

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21. Accepting greater production risks to increase the chance of higher profits is important to me

1. Strongly disagree
2. Moderately disagree
3. Agree
4. Moderately agree
5. Strongly agree

---

22. I am more likely to take risks with new agricultural technologies (mechanical or management practices or input use) before I see good results on other farms

1. Strongly disagree
2. Moderately disagree
3. Agree
4. Moderately agree
5. Strongly agree

23. I am willing to take risks with new management practices before I see good results in other farms

1. Strongly disagree
2. Moderately disagree
3. Agree
4. Moderately agree
5. Strongly agree

---

24. Diversifying my crop (including livestock) mix in order to reduce risk is important to me

1. Strongly agree
2. Moderately agree
3. Agree
4. Moderately disagree
5. Strongly disagree

25. Having different Fields or farms at different locations (geographic diversification) is important to me

1. Strongly agree
2. Moderately agree
3. Agree
4. Moderately disagree
5. Strongly disagree

26. I would consider growing more risky crops if I had (or have) greater access to irrigation

1. Strongly disagree
2. Moderately disagree
3. Agree
4. Moderately agree
5. Strongly agree

27. I would, or do, sell my agricultural products over a period of time rather than at harvest in order to reduce market price risk (diversified marketing)

1. Strongly agree
2. Moderately agree
3. Agree
4. Moderately disagree
5. Strongly disagree

28. I have (or would if I could) made some non-farm investments in new business in order to diversify household income.

1. Strongly agree
2. Moderately agree
3. Agree
4. Moderately disagree
5. Strongly disagree

29. I am willing to ACCEPT more risk in all aspects of life relative to my peers (other farmers that you know)

1. Strongly disagree
2. Moderately disagree
3. Agree
4. Moderately agree
5. Strongly agree

30. In general, I believe that I TAKE more risks in all aspects of life than my peers.

1. Strongly disagree
2. Moderately disagree

c. Agree

4. Moderately agree
5. Strongly agree

31. In your opinion, do you think saving is important?

1. Strongly unimportant
2. Moderately unimportant
3. important
4. Moderately important
5. Strongly important