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A Potential Sustainable Pathway for Community-Supported Agriculture in Taiwan: The Consumer Perspective in a Farmers' Market

Punnaros Pisarn ¹, Man-Keun Kim ² and Shang-Ho Yang ^{3,*}

¹ International Master Program of Agriculture, National Chung Hsing University, Taichung City 40227, Taiwan; ppunnaros@smail.nchu.edu.tw

² Department of Applied Economics (APEC) and Center for Society, Economy and the Environment (CSEE), Utah State University, Logan, UT 84322, USA; mk.kim@usu.edu

³ Graduate Institute of Bio-Industry Management, National Chung Hsing University, Taichung City 40227, Taiwan

* Correspondence: bruce.yang@nchu.edu.tw; Tel.: +886-4-2284-0491 (ext. 22)

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Abstract: Community Supported Agriculture (CSA) has become an alternative approach for small-sized farmers in many countries. However, CSA is a somewhat challenging concept in Taiwan because many CSA projects face difficulties and obstacles related to sustainability, so relevant literature is rare. This pilot study investigates a potential CSA program in a farmers' market to observe whether farmers' market consumers would like to participate or not. A total of 320 survey responses collected from a farmers' market were examined by an interval regression model. Results show that respondents are willing to pay and to be a CSA member of the farmers' market. This study identifies that consumers are willing to share the risks of upfront payment with farmers. The preferred length of the contract means that a compromise is made in order to implement the CSA program. The implications involving a flexible length of contract and the budget should be taken into consideration by farmers, farmers' market managers, and policymakers for devising promotion strategies, enrolling shareholders, and promoting CSA in Taiwan. Future study should focus on the consumer characteristics and factors affecting their decision to subscribe to CSA.

Keywords: Community Supported Agriculture; farmers' market; willingness to pay; risk-sharing; Taiwan

1. Introduction

Community Supported Agriculture (CSA) is a local farm production-marketing and partnership between farmers and consumers. This food production and subscribing to the ideal situation bring local farmers and consumers together to build cooperation and trust in order to create a solidarity economy [1]. It involves a subscription-based contract for the direct delivery of seasonal agricultural products from the farm [2], mainly small-scale farms [3–5]. The original principles of CSA consisted of four core values including: (1) the conservation of ecosystems and recovery of biodiversity [6]; (2) a farm work support and payment for the share in advance from members [3]; (3) a sufficient income from the CSA shares which compensates for the cost of farm production and the wages for farmers [7]; and (4) sharing the risks of losing of crops on a farm and profits from the farm. CSA benefits not only consumers and farmers but also society.

With respect to the origins and the development of CSA, according to the International Federation of Organic Agriculture Movements (IFOAM) [8], CSA emerged in Japan (which was a CSA-like system called Teikei) and in Switzerland in the 1970s. Haldy [9] claimed that in the 1990s, in Japan, there were 500 to 1000 Teikei groups. Each group ranged from 10 up to 5000 members delivering food products to

over one million Teikei customers. In Switzerland, there were three structures of the CSA system which were a cooperative, non-governmental organization (NGO), and individual farmers near city areas, offering over 10,000 members vegetables and farm products [10]. Afterwards, the CSA idea became widespread in the U.S., several countries within Europe, and around the world. The CSA principle had become increasingly popular in the U.S. in the 2000s. For example, the number of CSA farms in the year 2000 was around 1000 in the U.S. [11], and had increased to 1700 in 2005 [12]. As of 2009, there were over 3637 CSA farms in the U.S. [13]. The number of CSA rapidly increased to 12,617 farms in 2012 [2]. In the U.S., 7398 farms sold products through the CSA channel, which was valued at \$226 million (about 7%) of the \$3 billion in direct-to-consumer sales in 2015 [1]. In Europe, 2776 CSA farms provided food products for 472,055 consumers [10]. In brief, CSA management has been successful in many countries in the farm production and marketing system. Still, a high turnover ratio of CSA shareholders and inadequate shareholders retention have recently been seen to be the challenges of the CSA approach [2,14]. According to Chen and Yen [5], CSA in Taiwan started in 1980. Some CSA farms have capably run at the first stage but stopped operating because of a demand and supply issues [5]. The growth of CSA in Taiwan stagnated due to consumers' unawareness of CSA [9]. Comparing the above countries to Taiwan, CSA is fairly unheard of at the time of adoption amongst Taiwanese consumers; therefore, the initiative was unsuccessful.

Due to the fact that Taiwan is an agricultural country, the sector plays a vital role in the local economy, and domestic farming production is crucial as a source of food [15]. In 2015, Taiwan had approximately 800,000 hectares under cultivation, accounting for over 20% of the total land area, with the GDP in the agricultural sector being 1.8% of national GDP [16]. The total value of agricultural production in 2015 was about NT\$500 billion, of which farm crops accounted for 48.8%, animal husbandry industries for 32.7%, fishery products for 18.4%, and forestry for less than 0.1% [16]. The Taiwanese government has promoted small-sized farmers, local farm products, farmers' market and organic cultivation, which could be connected to the CSA core concept [17]. By its characteristic, CSA could serve as a bridge between farmers, consumers, and the market in order to strengthen the industry value chain. However, uncertainty in domestic agricultural production is challenging for the CSA development, making consumers hesitant to share the risk of farming with farmers. Taiwanese plantations are frequently damaged with the geographical location with the tropical climate that is principally and regularly affected by the severe typhoons and pest and/or plant diseases epidemic [17]. With respect to the size of the arable land in the country, most farms are small-scale with an average farm size of 1.1 hectares and operated by families [16]. Thus, farmers have experienced problems supplying adequate quantity and varieties to satisfy consumers' demands. All these causes lead to a difficulty in boosting CSA that could hinder the concept of sharing the farming risks with farmers and consumers, which is uncommon and not familiar to Taiwanese consumers.

A farmers' market helps to embrace farmers, consumers, and community which enhances community engagement, develops a positive sense of community, and strengthens the local farming and food system [12]. National Chung Hsing University (NCHU) Organic Farmers' Market in Taichung city is one of the prosperous farmers' markets in Taiwan. NCHU Organic Farmers' Market is a certified organic market and attracts over 1500 regular customer members weekly who buy various local and seasonal food ingredients, vegetables, and fruits. Although there is a stagnant trend in the CSA market in Taiwan, we aim to study whether a farmers' market is a potential channel for the CSA to access and utilize a wide variety of other marketing channels. Moreover, according to Curtis [18], about 85% of the CSA members in Utah, U.S. not only join the CSA program but also shop at farmers' markets. However, whether farmers' market consumers want to participate in a CSA program in Taiwan is still an important research question that needs to be answered. Regarding consumers' preferences and the willingness to pay (WTP) for participating in the CSA in Taiwan, it is rare to find such information in the literature. Thus, the purposes of this research are to examine consumers' awareness and willingness to support the CSA and to estimate the WTP for the weekly share budget in participating in the CSA in NCHU Organic Farmers' Market.

2. Literature Review

Farmers have several marketing channels to directly sell their products to consumers, such as farmers' markets, roadside stands, online e-commerce, food box scheme, and CSA. Some may easily be misled by the meaning of a food box scheme that is the same as the CSA [19]; therefore, it is more important to clarify and share a thorough understanding of the food box scheme and CSA definitions. The food box scheme is delivering local farm products (in a box) to consumers without the membership payment and the mutual risk sharing with farmers, unlike CSA. The pricing within the food box scheme includes market prices of agricultural products, marketing cost, and services. On the other hand, CSA share price tends to support farms' production expenses that cover farmers' wages and expenses. Consumers can gain trust from the quality and safety of food, and allow farmers to increase value in the sales volume and prices of products [20]. For farmers, they receive payment in advance, which helps with cash flow, the demand size of the products, and the catering for consumers' needs, so the cost of marketing can be reduced compared to other marketing channels [21]. Thus, CSA is beneficial to the local communities as consumers provide reciprocal support with local farms to share the risks of farming and support local economies. Lass et al. [3] concluded that the benefits of CSA even extend beyond the monetary aspect, since food and farm education projects for community services from CSA farmers help to alleviate social issues, attaching the community to the farm, and reshaping the local food system appropriately. In this way, CSA leads to the building of social movements by improving the self-sufficient local economy and compacting social bonding in a greater community [7].

Farming could encounter various risks, including production risk with unpredictable crop damage due to unfavorable weather and pests [22]. Meuwissen et al. [23] stated that the risk-sharing was based on the concept of independent pooling losses within collaborative contracts. If the expected total amount of losses remained the same, then the more people who participate, the lower losses each person could have [23]. A fixed forward-price contract is an agreement between a farmer and a customer that sets a product price before harvesting or marketing [23]. Yu et al. [24] explored the risk-sharing method and found that those who were CSA members never expected to receive money back. Even if there was a discount, the amount of the discount for the next season was not identified. Paul [7] carried out a comprehensive explanation of the risk-sharing such that farmers could handle the risks in farming by utilizing the short-run risk-sharing tactics during the season with CSA members. However, this might still lead to a difficulty sustaining farmers' welfare for the long-run [7]. Whether the CSA program is feasible to promote within the farmers' market may be associated with if consumers want to share the risk with farmers. This study relaxes the assumption that the risk-sharing of the CSA is 100% (do not ask for money back if farmers have a difficulty providing food products). It signifies that the risk-sharing of the CSA in Taiwan could have varied levels regarding consumer differences.

The WTP involved various factors affecting purchase determination [25]. The CSA share prices tended to be varied, corresponding to the type of shares such as full share, half share, working share, non-working share, and the number of people served by each share [3]. At the same time, the length of the CSA contract period might be different according to farm, region, or crop year. Regarding the growing season, CSA generally operated through the summertime in the U.S., whereas in a tropical area, like Taiwan, the planting season could run for an entire year. With respect to the monetary aspect regarding the WTP for the CSA share and length of contract, Tegtmeier and Duffy [26] mentioned that a full CSA share price generally cost about US\$429 and a half CSA share price is US\$282 for a 6-week season in the U.S. About 76% of the CSA share prices were fixed by farm owners. McGuirt et al. [27] found that a favorite share price was US\$8 for one CSA box per week, and some participants might prefer a US\$22 share price for twice a month, which was the maximum share price for the monthly affordable share price. However, Connolly and Klaiber [28] found that customers could give different expectations and share premiums for CSA from different states in the U.S. Yu et al. [24] discovered that experienced CSA customers had a WTP of US\$111 for 16 weeks, while new CSA customers were willing to pay significantly more, US\$180 per share for a 12-week period and over US\$250 per share for a 16-week period.

Regarding the potential attributes within the CSA, most literature revealed that quality attributes, such as freshness, nonchemical, local, and seasonal products, have positive effects on consumers' WTP [29–31]. Beyond the quality attributes of CSA, consumers were aware of and concerned about the beneficial impacts of CSA towards their health, especially the changes in healthy consumption behaviors, and society. Zepeda and Li [32] found that consumers prefer non-harmful and healthy fresh products from CSA farms. CSA members were able to enrich their quality of life, which correlated with the adjustment to an increase of nutrition knowledge, cooking habits, and better dietary intake [4,21]. Consistent with these, CSA members in North Carolina reported that crucial factors influencing the WTP for CSA were the enhancement of health and nutrition, the low usage of pesticides, and the support of local farms [33]. Furthermore, a previous study by Brehm and Eisenhauer [34] showed that CSA shareholders had the intent of supporting local farmers and the local economy. Regarding the social aspect, CSA assisted with building the relationship and trust among farmers and society [12,29,31]. Note that Yu et al. [24] provided the latest model and that which most resembles the authors' knowledge by adopting multiple-choice questions to estimate the WTP for a weekly CSA share price, the CSA contract length, and the risk-sharing mechanism.

In summary, there has been an abundance of research on the CSA in international literary works. The majority involve consumer studies on the preferences and motivations to participate in CSA, and the satisfaction when subscribing to the CSA initiative. A certain amount of the research on the WTP for partaking in the CSA program, using the choice experiment method, have been conducted. However, there are still gaps in knowledge regarding the exploration of the risk-sharing mechanism of losing of farm crops with farmers and utilizing the interval regression analysis of WTP for the CSA share price. Our preliminary study will emphasize the attributes mentioned above, allowing us to lessen the knowledge gap and increase our understanding of potential consumers' preferences, which will be explained below.

3. Data and Methodology

3.1. Questionnaire Design

The consumers' WTP for joining CSA is defined as a monetary value of willingness to budget to participate in the CSA in the farmers' market per share per week (in New Taiwanese Dollars, NTD). Since there is no price for the CSA share in the farmers' market, a contingent valuation with the payment card method is suitable and utilized in the survey [25]. The payment card method refers to an approach used to estimate consumers' willingness to pay, for which each respondent chooses a given range of values that represents one's maximum WTP value [35–37]. The survey questionnaire comprises five parts. Since this study focuses on those who usually come to shop at this farmer market, the first part begins with a screening question: "Have you visited the NCHU Organic Farmers' Market?" The "organic" farmers' market is merely the name of this farmers' market but it does not further state that the products in this CSA program are organic. Respondents who indicate that they never visit this farmers' market are excluded from the analysis. The second part inquiries about the respondents' background in grocery shopping. For instance, the primary grocery shoppers, eating out, frequency of cooking at home and purchasing vegetables and fruits in the farmers' market. The third part contains questions of attitudes towards the NCHU Organic Farmers' Market. The fourth part provides respondents with CSA and risk-sharing definitions. In the risk-sharing design, respondents are asked about their attitude if farmers' failed to provide food products in a certain week, and how consumers would like to share risk with farmers (0% risk-sharing means that farmers would need to refund all the share price or postpone the food share supply; 100% risk-sharing means that farmers keep all the share price or no need to postpone the food share supply; while 50% risk-sharing means that consumers would like to receive a 50% discount in the future share price or partially postpone the food share supply). Following the CSA experience, we ask the reasons to participate in the CSA in this farmers' market and about the budget to join CSA, the CSA contract length (in weeks), and the

percentage willingness to share the farm risk with farmers. The last part inquires about respondents' socio-demographic information.

As a result, the length of contract, the willingness to share risk, and the willingness to pay for CSA share budget are the major hypotheses to be examined. Thus, this study attempts to test the null hypotheses as follows:

- (a) the willingness to share risk has no relationship with the length of contract;
- (b) the willingness to pay for CSA share budget has no relationship with the length of contract;
- (c) the willingness to pay for CSA share budget is not influenced by demographic factors;
- (d) the willingness to pay for CSA share budget is not influenced by consumption factors;
- (e) the willingness to pay for CSA share budget is not influenced by the reasons to visit NCHU farmers' market;
- (f) the willingness to pay for CSA share budget is not influenced by CSA experience factors;
- (g) the willingness to pay for CSA share budget is not influenced by the reasons to join CSA in NCHU farmers' market.

These hypotheses would help us to identify the issues regarding whether the CSA system in a farmers' market can be a potential sustainable solution in Taiwan.

3.2. Data Collection

The weekly number of consumers visiting NCHU farmers' market is about 1200–1500. Most farmers' market consumers are registered as a member who can also become a royal customer in the farmers' market. In order to explain the potential CSA consumers in a farmers' market, those who often come to this farmers' market are the targeted respondents for this study. Thus, if respondents did not visit this farmers' market before and they are not the major grocery shoppers at home, they will be screened out. A field intercept survey, using a tablet running with the SurveyMonkey (i.e., web-based platform), was adopted and sampled in the NCHU Organic Farmers' Market. We randomly collected the on-site survey data from the market consumers during July and August 2019. The non-probability sampling method was utilized since we merely targeted the customers in this market; therefore, not all of the population had an equal opportunity to participate in the study. However, they might not be able to represent the population because they do not rely upon the probability theory [38,39]. In other methods, a nonprobability sampling, i.e., snowball sampling or chain sampling, was applied [40]. A web-based survey link was disseminated through the Line application, a free messaging app on electronic devices primarily used in East Asian countries, the NCHU Organic Farmers' Market Facebook page, and Facebook Messenger application. Participants were briefly explained the purpose of this pilot study and randomly acquired a 7–11 gift card valued NTD 50 (about US\$1.67) as an incentive upon completion of the survey a month afterwards. Respondents took around five minutes on average to complete the survey. A total of 642 questionnaires were collected with a 51% complete response rate. Of this group, 329 participants qualified for the target audience research. Afterwards, 9 void responses were omitted due to missing data values, and finally, 320 responses were valid for the study.

3.3. Empirical Model

3.3.1. ANOVA F-Test

In order to examine the relationship between willingness to share the farm risk and the length of the CSA contract, an ANOVA test was applied. A two-way scatter plot was generated with the LOWESS line, which stands for locally weighted scatterplot smoothing, also known as moving regression line. The smoothed values are obtained by running a regression using a few data near each point for the willingness to share risk (1 = full risk-sharing, 0 = no risk-sharing) against the length of contract (duration of the CSA subscription in weeks). Full risk-sharing meant that a shareholder agreed to share the risk of production failure without asking for refunds of the upfront payment. Partial risk-sharing

meant that the shareholder would like to have a discount for future CSA participation or to postpone the food share supply.

3.3.2. Interval Regression Model

This study aims to elicit the WTP, i.e., the CSA share budget, by using the survey data. In the survey, access to the precise budgetary value is limited and does not have any reference price in the farmers' market. Therefore, after the discussion with the farmers' market manager with regards to the feasible share price, the following budget ranges are presented in the survey: NTD 300 or less (US\$10 or less), NTD 301–600 (US\$10 to US\$20), NTD 601–900 (US\$20 to US\$30), NTD 901–1200 (US\$30 to US\$40), NTD 1201–1500 (US\$40 to US\$50), and NTD 1501 or above (US\$50 or above). It is noted that one U.S. Dollar is equivalent to about NTD 30. These ranges are based on the consideration of both the average expenditure for fresh products in the market and the prior studies of vegetable pricing in Taiwan [41,42].

The amount of budget is represented by two values, the lower and the upper limits, and the quantitative outcome is grouped into intervals. Utilizing the interval regression model is appropriate in this case where outcomes have interval censoring, indicating that we observe an outcome variable which falls into a specific class interval but does not observe the exact value of the observation [43]. Following Wooldridge [44], we suppose that y^* is a latent variable (the exact amount of budget) and is determined by

$$y^* = x\beta + \varepsilon \quad (1)$$

Here the cut points are lower and upper limits of each interval, and define

$$\begin{aligned} y &= 0 & \text{if } y^* \leq \text{NTD300} \\ y &= 1 & \text{if } \text{NTD300} < y^* \leq \text{NTD600} \\ & \vdots \\ y &= J & \text{if } y^* > \text{NTD1500} \end{aligned} \quad (2)$$

which is equivalent to the ordered logit (or probit) model with the cut point fixed [44]. The vector x includes explanatory variables that affect respondents' WTP such as socio-economic and demographic status, grocery shopping behaviors, and CSA experiences. The term ε is an error term.

Moreover, we calculated the mean WTP using the estimates to provide more meaningful and understandable insights. The mean WTP was calculated using the following equation.

$$\text{Mean WTP}_k = \sum_{j=1}^J \hat{\beta}_{jk} \bar{x}_{jk} \quad (3)$$

where k indicates the case, CSA Budget Higher, Same Budget as CSA, CSA Budget Lower, or All Sample; the j represents the individual participants; the \bar{x}_j shows the average j th independent variable and $\hat{\beta}_j$'s are the estimated parameters.

4. Empirical Results

4.1. Descriptive Analysis

Definitions of variables and descriptive statistics were presented in Table 1. The majority of respondents (72%) were female with an average age of around 44. These consumers matched our targeted consumer group who often buy grocery shopping for the family. The average income was NTD 63,000 (approximately US\$2100) per month, which was slightly higher than the national average of NTD 52,000. Close to 70% of respondents were married and most of the participants (77%) were living in the city. About 63% of respondents answered that they were primary grocery shoppers.

Most of them (90%) visited the NCHU Organic Farmers' Market frequently, and more than half of them (56%) were members of the NCHU Organic Farmers' Market. On average, participants bought fresh produce three times per week and cooked at home seven times per week, respectively, which was in line with Lang [45]. The major reasons for participants to shop at the NCHU Organic Farmers' Market were (i) supporting locally produced food (55%), (ii) food safety guaranteed (49%), (iii) trust in the university (49%), iv) market location is near neighborhood (27%), and v) bringing children there (16%). About half of the customers in the NCHU Organic Farmers' Market were aware of CSA. However, those who heard about the CSA were a much smaller group than females (72%); this might denote that the CSA was not considerably popular in Taiwan. Eighteen percent of them had joined the CSA before and wanted to continue for years to come. Although almost 60% of them never joined the CSA, they planned to join the CSA in the near future. The reason why more respondents would join the CSA than have heard of one could be that they were interested in the CSA as it was a novel product in the market. In addition, the principle of the CSA probably met their demands and conformed to their attitudes [46,47]. Supporting local farmers, sharing the risk with farmers via the CSA, and economizing on food shopping and expenditure were the primary reasons respondents were interested in participating in the CSA.

Table 1. Descriptions of the Variables and Descriptive Statistics ($N = 320$).

Variables	Descriptions	Mean	Std. Dev.
Demographic Background			
Female	DV; if the respondent female = 1, 0 o.w.	0.72	0.45
Age	CV; the average age of respondents	44.19	13.05
Income	CV; the average monthly income of respondents (NTD 1000)	62.81	35.53
Married	DV; if the respondent is married = 1, 0 o.w.	0.69	0.46
City	DV; if the respondent lives in a city = 1, 0 o.w.	0.76	0.42
Suburb	DV; if the respondent lives in a suburb = 1, 0 o.w.	0.08	0.27
Consumption Background			
Primary grocery shopper	DV; if the respondent is a primary grocery shopper at home = 1, 0 o.w.	0.63	0.48
Freq. to buy vegetables and fruits	CV; the average frequency of buying vegetables and fruits in a week	2.93	2.25
Freq. of cooking	CV; frequency of cooking at home in a week	7.24	4.53
Freq. to visit NCHU Farmers' Market	CV; frequency of visits to NCHU Organic Farmers' Market in a half year	13.15	10.31
Member of NCHU Farmers' Market	DV; NCHU Organic Farmers' Market member = 1, 0 o.w.	0.56	0.50
Reason to Visit NCHU Organic Farmers' Market			
Safety confirmed	DV; if the respondent visits farmers' market is due to the factor of safety confirmation = 1, 0 o.w.	0.49	0.50
Support local food	DV; if the respondent visits the farmers' market because of supporting local food = 1, 0 o.w.	0.55	0.50
Bring kids	DV; if the respondent visits the farmers' market because of bringing kids for the experience = 1, 0 o.w.	0.16	0.37
Live around	DV; if the respondent visits the farmers' market because of living close to the market = 1, 0 o.w.	0.27	0.45
Trust from university	DV; if the respondent visits the farmers' market because the trust is related to the university = 1, 0 o.w.	0.49	0.50

Table 1. Cont.

Variables	Descriptions	Mean	Std. Dev.
CSA Experience and Decision			
Heard CSA	DV; if the respondent has heard about CSA = 1, 0 o.w.	0.52	0.50
Will join CSA (joined before)	DV; if the respondent will join CSA in farmers' market because of joining before = 1, 0 o.w.	0.18	0.39
Will join CSA (no experience)	DV; if the respondent will join CSA in farmers' market, but they have never participated before = 1, 0 o.w.	0.58	0.49
Reason to Join CSA in NCHU Organic Farmers' Market			
Support local farmers	DV; if the respondent can support local farmers through CSA = 1, 0 o.w.	0.88	0.32
Share the risk via CSA	DV; if the respondent can share risks with farmers through CSA = 1, 0 o.w.	0.76	0.42
Save money on food purchase	DV; if the respondent can save money on food purchases through CSA = 1, 0 o.w.	0.39	0.48

Note: DV and CV refer to the dummy variable and continuous variable, respectively. The abbreviations (Std. Dev. and o.w.) mean "Standard Deviation" and "otherwise", respectively.

4.2. The ANOVA F-Test

Regarding the relationship between the willingness to share risk and the length of contract, the Ordinary Least Square (OLS) regression test for the overall sample showed no significant level between the willingness to share risk and the length of contract. This implies that the length of contract does not significantly influence the willingness to share risk. The null hypothesis (a) was not rejected. Moreover, the ANOVA F-test for Figure 1 demonstrated that willingness to share the risk and the length of contract were still positively correlated (F statistics = 9.29, p -value = 0.0001). Figure 1 also showed that 4 weeks to 12 weeks of the contract lengths were relatively preferred. Besides, at a 24-week CSA contract length, respondents also showed insubstantial preferences to join CSA. Following the LOWESS curve in Figure 1, on average, respondents' willingness to share the risk was 65% to 70% (100% = full risk-sharing, 0% = no risk-sharing) with a 4 to 12-week long CSA contract. However, the LOWESS line over the 12-week contract exhibited a slightly declining trend corresponding to the willingness to share risk. This implied the potential CSA contract length in Taiwan ought to range from 4 to 12 weeks to maximize the risk-sharing.

The relationship between the WTP joining CSA and the length of the CSA contract was also contrasted and examined. The OLS regression test showed that both factors between the WTP and the length of CSA contract showed a positively significant level difference. The null hypothesis (b) is successfully rejected. This means that the length of CSA contract could positively affect the WTP joining CSA. Figure 2 contained a two-way scatter plot of the WTP against the contract length (duration of the CSA subscription in weeks) to examine the relationship between these two variables. The LOWESS line demonstrated that both were positively correlated (F statistics = 3.48, p -value = 0.001). This implies that customers with longer CSA contracts tended to spend more on the CSA budget. This finding is in line with the result by Yu et al. [24] and Connolly and Klaiber [28], who showed that customers gave higher expectation and WTP for a greater CSA share length. In addition, from 4 to 12 weeks and 24 weeks of the CSA arrangements, respondents had preferences to budget up to approximately NTD 600–700 (US\$20–23.33) and NTD 900 (US\$30) for a week, respectively.

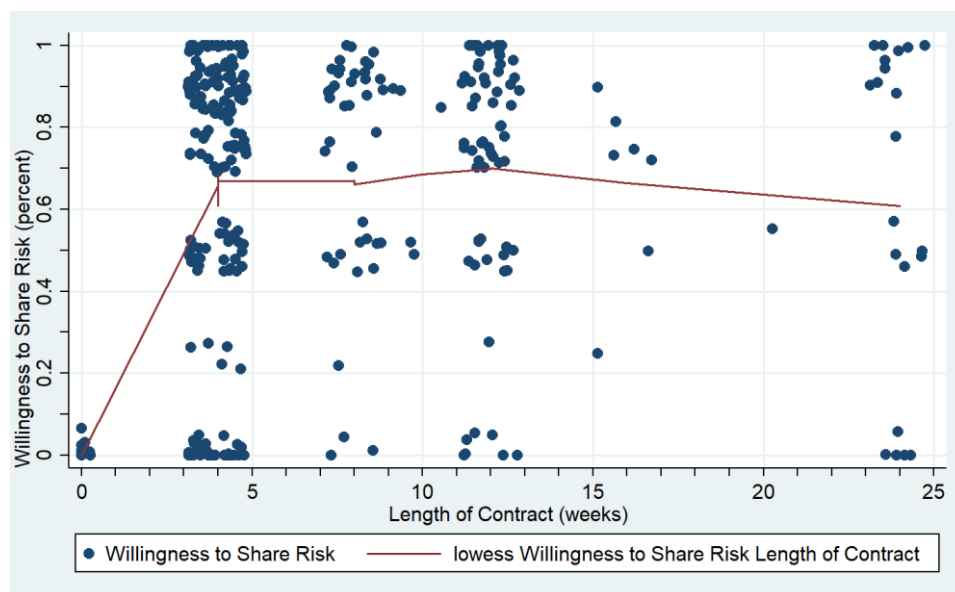


Figure 1. The Relationship between Willingness to Share Risk and the Length of the Community Supported Agriculture (CSA) Contract.

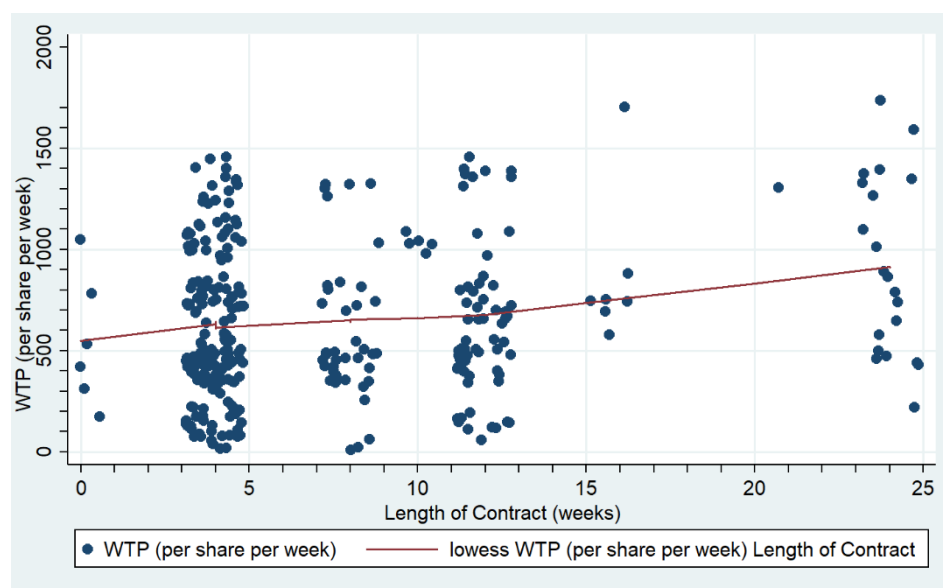


Figure 2. The Relationship between Budget to Join CSA and the Length of the CSA Contract.

4.3. The Interval Regression Analysis of WTP

In order to evaluate how respondents would budget to participate in the CSA in the farmers' market, this study adopted the interval regression model to estimate the WTP. Since respondents had existing purchasing patterns in the farmers' market, the WTP estimation should consider the potential bias that the WTP elicitation might not easily differentiate from their original purchasing patterns. Therefore, the original usual purchasing expenses were compared to the budget that consumers are willing to pay for the CSA in the farmers' market. The WTP estimations were segmented into three independent groups: (1) CSA Budget Higher; (2) Same Budget as CSA; and (3) CSA Budget Lower. The "CSA Budget Higher" meant that respondents willingly budget higher than their spending in the farmers' market; the "Same Budget as CSA" meant that the WTP was about same as their spending in the farmers' market; and the "CSA Budget Lower" meant that the WTP was lower than their spending. Among respondents, 88 participants (28% of survey respondents) were likely to spend more for CSA

than what they spent in the farmers' market, while 106 respondents (33%) were willing to pay about the same amount as spending in the farmers' market for joining CSA. A total of 126 respondents (39%) set their budget for the CSA at less than what they spent in the farmers' market.

The results of the interval regression models with three independent groups were presented in Table 2. The estimation with All Sample was also included in Table 2 for comparison purposes. These four independent interval regression models obtained statistically significant outcomes from the Wald χ^2 test, implying that each model and overall model specifications were valid. It should be noted that the coefficient estimates in the interval regression model reported in Table 2 were the adjustments to the reference WTP value for a respondent reporting values of explanatory variables, which could be interpreted in NTD-metric terms.

Table 2. The Empirical Outcomes of the Interval Regression Model.

	CSA Budget Higher	Same Budget as CSA	CSA Budget Lower	All Sample
Female	45.094 (58.617)	55.203 (70.958)	34.621 (98.881)	30.620 (47.169)
Age	6.931 ** (2.907)	3.230 (3.426)	7.297 (3.894)	4.562 ** (1.983)
Income	2.833 *** (0.923)	−0.244 (1.114)	3.237 *** (0.951)	2.106 *** (0.623)
Married	−19.188 (73.429)	223.748 *** (82.638)	−99.376 (109.781)	−11.015 (54.449)
City	−90.698 (74.120)	−8.536 (80.658)	−85.389 (122.921)	−67.194 (54.234)
Suburb	37.430 (100.324)	119.750 (113.709)	−139.060 (192.606)	53.737 (82.891)
Primary grocery shopper	−21.603 (50.218)	−30.994 (72.919)	−34.568 (96.436)	−20.320 (45.481)
Freq. of buying vegetables and fruits	12.260 (11.197)	51.100 ** (23.842)	−5.719 (14.416)	11.679 (12.448)
Freq. of cooking	12.390 ** (6.132)	−10.978 (7.092)	11.738 (9.746)	7.398 (4.883)
Freq. of visits to NCHU Farmers' Market	8.864 ** (3.715)	7.820 (4.080)	13.442 *** (4.117)	6.796 *** (2.286)
Member of NCHU Farmers' Market	−43.597 (70.996)	155.712 ** (65.555)	135.861 (95.586)	32.665 (43.452)
Safety confirmed	3.658 (54.715)	127.805 (82.230)	−85.654 (85.118)	−3.289 (44.252)
Support local food	35.423 (49.367)	97.601 (61.821)	−16.388 (66.449)	31.234 (39.276)
Bring kids	22.568 (74.521)	155.054 (80.914)	162.081 (114.780)	88.194 (55.620)
Live around	62.905 (57.535)	−65.745 (79.082)	−145.636 (81.074)	−27.200 (42.521)
Trust from university	83.416 (55.689)	−26.899 (78.684)	−80.976 (69.762)	−17.982 (40.174)
Heard of CSA	−8.979 (54.241)	165.714 ** (65.926)	66.287 (78.482)	59.223 (41.618)
Will join CSA (joined before)	281.497 *** (78.503)	58.428 (142.412)	196.898 (125.533)	171.890 ** (71.730)
Will join CSA (no experience)	81.457 (59.599)	45.574 (118.792)	−35.335 (85.641)	17.557 (46.727)
Support local farmers	72.708 (97.876)	195.325 (123.489)	−164.912 (117.257)	2.894 (66.726)

Table 2. Cont.

	CSA Budget Higher	Same Budget as CSA	CSA Budget Lower	All Sample
Sharing the risk via CSA	−24.231 (65.750)	−41.711 (101.538)	134.369 (104.350)	50.369 (58.843)
Save money on food purchase	113.454 ** (51.354)	16.372 (63.323)	146.245 (77.844)	111.465 *** (40.636)
Constant	−99.890 (121.198)	−322.885 (228.068)	−163.319 (236.010)	−19.343 (113.754)
Number of observations	88	106	126	320
Wald χ^2	133.5 ***	105.72 ***	124.83 ***	119.67 ***
Log-Likelihood	−93.51	−131.50	−179.07	−457.69
AIC	235.022	311.004	406.142	963.371

Note: ** and *** represent 5% and 1% significance, respectively.

Estimation results for respondents who preferred to budget the CSA higher than usual spending in the farmers' market were reported in the "CSA Budget Higher" column in Table 2. The CSA Budget Higher group was a unique group in this study, since these consumers, on average, were willing to pay more for CSA than their average spending in the farmers' market. The CSA Budget Higher Model reveals that it successfully rejects the null hypotheses (c, d, f, g). This means that the demographic, consumption, CSA experience, and reasons to join CSA will influence the WTP for the CSA share budget. In particular, those who were older, with a higher income, a higher frequency of cooking at home, and a higher frequency of visits to NCHU Organic Farmers' Market, were willing to join CSA if they had joined before, and saved money on their food purchase when they felt that the CSA participation could reduce their food spending cost. The older respondents tended to budget higher for CSA participation, about NTD 6.93 (US\$0.23). This result could be explained by the older consumers having health concerns, thereby being willing to join CSA, which provides pesticide-free products. This is in line with the outcomes of prior studies [45,48,49]. Respondents with a higher income were prone to budget higher; for example, a unit increase in income led to NTD 2.83 (US\$0.09) more in the budget for CSA assuming all other things stayed constant. Perhaps these higher-income consumers were able to budget for CSA, which specified the upfront membership fee payment in a lump sum over the farmers' market budget that paid little at a time.

In addition, consumers with a higher frequency of cooking at home and visiting the farmers' market were willing to pay NTD 12.39 (US\$0.41) and NTD 8.86 (US\$0.30) on CSA participation, which was more than those who had a lower frequency of cooking and visiting the farmers' market. Consumers who visited the farmers' market more frequently to purchase produce might do so because they often needed food products from this farmers' market. Thereby, if they were not able to visit the farmers' market for some reason, then their WTP for CSA participation would tend to be higher. The previous CSA participation experience seemed important to the WTP for joining CSA in this farmers' market. Results revealed that those who had participated in the CSA before would be willing to pay NTD 281.50 (US\$9.38) in this farmers' market. However, only about 18% of respondents had CSA experiences. Therefore, education for CSA in this farmers' market is an important issue.

Furthermore, it was surprising that saving money on food purchases led consumers to higher budgets for joining CSA in this farmers' market (about NTD 113.45 (US\$3.78)). In general, customers who were willing to pay premium for CSA might assume that CSA is a premium service or they might receive more quantity or other varieties of fresh produce [28] if the farm was productive compared to the farmers' market. Hamzaoui-Essoussi and Zahaf [50] stated that some consumers would like to pay more for CSA because of the production quality assurance. The explanation of this factor implied that those who expected to save food costs were also willing to pay higher than their usual food spending in this farmers' market [51].

Regarding the Same Budget as the CSA Model, the results successfully reject the null hypotheses (c, d, f). This means that the demographic, consumption, and CSA experience will influence the WTP for the CSA share budget. When it comes to the respondent group who had a CSA budget similar to their usual spending in the farmers' market, marital status, frequency of buying vegetables and fruits, being a member of this farmers' market, and CSA awareness were essential. Married respondents would like to pay around NTD 224 (US\$7.47) more for the CSA participation than unmarried respondents. Respondents who bought vegetables and fruits more frequently were willing to pay NTD 51.10 (US\$1.70) for the CSA participation compared to those who bought these items less frequently. Furthermore, respondents who had a membership in the NCHU Organic Farmers' Market were likely to pay NTD 155.71 (US\$5.19) more for CSA participation compared to those who were not members. In addition to the knowledge about CSA, respondents who were aware of CSA were willing to pay NTD 165.71 (US\$5.52) higher for CSA participation compared to those who had never heard about the concept. Therefore, a married respondent with higher frequency of buying vegetables and fruits, was a member of the farmers' market [52], and had heard about CSA was more likely to join CSA by spending the same WTP as their usual spending in the farmers' market.

Some respondents were willing to have a lower CSA budget than their usual spending in the farmers' market. Overall, the CSA Budget Lower Model reveals that it successfully rejects the null hypotheses (c, d). This means that the demographic and consumption will influence the WTP for the CSA share budget. Especially for those respondents who had a higher income and visited the farmers' market more frequently reveal a significant difference in the CSA Budget Lower group. Respondents who had a higher income were willing to pay about NTD 3.24 (US\$0.11) more for the CSA participation compared to those who had a lower income. Therefore, we found that those who had a higher income were either willing to pay for CSA with a higher budget or willing to pay for CSA with a lower budget. Respondents who visited the NCHU Organic Farmers' Market more frequently were willing to pay about NTD 13.44 (US\$0.45) more to participate in the CSA with a lower budget compared to those who visit less frequently. The possible explanations for this could be that high-frequency customers in the farmers' market treat the value of the market environment differently in interactions with farmers and other customers [53]. Thus, if they could not make it to the farmers' market for some reason, then they might still like to pay for the CSA participation to compensate for their inability to be at the farmers' market.

Disregarding the difference between the CSA budget and the usual spending in the farmers' market, the results of All Sample revealed an aggregate outcome for CSA' WTP. Overall, the All Sample Model reveals that it successfully rejects the null hypotheses (c, d, f, g). This means that the demographic, consumption, CSA experience, and reasons to join CSA will influence the WTP for the CSA share budget. Results showed that respondents who were older, had higher incomes, and visited the NCHU Organic Farmers' Market more frequently showed a positive attitude to joining CSA in the future due to their previous experience, thought that the CSA participation could save money, and would like to pay positive WTP for CSA participation. Therefore, the major target consumers should be focused on backgrounds related to demographic, consumption, CSA experience, and reasons to join the CSA for potential promotion strategies.

Note that only statistically significant estimates were used to find the mean WTP. Table 3 presented the estimated results for the WTP per week. As shown in Table 3, respondents in the CSA Budget Higher group were willing to budget NTD 1080 (US\$36) per week to join the CSA while results suggested that those who were likely to spend the same and had a lower budget for CSA when shopping at the farmers' market were able to pay NTD 698 (US\$23.27) and NTD 379 (US\$12.63) per week, respectively. The average WTP of the total sample was NTD 705 (US\$23.50) per week to participate in CSA in the farmers' market. In particular, those who joined the CSA before would like to pay NTD 281 (US\$9.38) per week when their CSA budget was higher than their usual expenses in the farmers' market. One might note that those who visited the farmers' market more often would be even willing to pay NTD 175 per week if their CSA budget was lower than their usual expenses in the

farmers' market. We found that the CSA Budget Lower group tended to have a higher income and physically enjoy the farmers' market value for consumers. Thus, if they could not physically visit the farmers' market for some reason, they would be willing to pay slightly more for the CSA share price.

Table 3. The Estimation of the willingness to pay (WTP) per Week in NTD.

	Unit	Sample Average	CSA Budget Higher	Same Budget as CSA	CSA Budget Lower	All Sample
Age	years	44	305	0	0	201
Income	NTD 1000	63	178	0	204	133
Marital status	yes	1	0	224	0	0
Frequency of buying vegetables and fruits	times	3	0	153	0	0
Frequency of cooking at home	times	7	87	0	0	0
Frequency of visiting NCHU Organic Farmers' Market	times	13	115	0	175	88
Being NCHU Organic Farmers' Market member	yes	1	0	156	0	0
Heard of CSA	yes	1	0	166	0	0
Will join CSA (joined before)	yes	1	281	0	0	172
Save money on food purchase	yes	1	113	0	0	111
Total Estimated WTP	NTD		1080	698	379	705

We made a cross-comparison between the variable of the frequency of visiting NCHU Organic Farmers' Market and the budget, and found out that those who visited the NCHU Organic Farmers' Market more frequently could join CSA either with a higher budget or with a lower budget. This might imply that higher frequent consumers could treat the CSA participation as a backup plan. If those higher frequent consumers were not able to visit the NCHU Organic Farmers' Market, then they might like to pay either higher or lower CSA budget to compensate for the potential shortage of food supply. Another explanation for this was that these consumers already had a fixed relationship in purchasing food products in this farmers' market. Thus, if they could not make it to the farmers' market, they were still willing to pay a positive WTP for CSA participation.

Considering the estimated length of the CSA contract in Figure 2 with the result reported in Table 3, we concluded that respondents who were in the CSA Budget Higher group were willing to pay the CSA share prices at NTD 4320 (US\$144), NTD 8640 (US\$288), and NTD 12,960 (US\$432) for joining 4-week, 8-week, and 12-week long CSA contracts, respectively. Respondents who set their budget similar to the spending in the farmers' market could pay NTD 2792 (US\$93.07) for 1-month, NTD 5584 (US\$186) for 2-month, and NTD 8376 (US\$279) for 3-month long CSA contracts. In a similar fashion, the CSA share prices were estimated to be NTD1516 (US\$50.53) for 4 weeks, NTD 3032 (US\$101.07) for 8 weeks, and NTD 4548 (US\$151.60) for 12 weeks for respondents in the CSA Budget Lower group (Figure 3). This clearly showed that the share price of the CSA Budget Higher group was about three times higher than in the CSA Budget Lower group. The share price of the CSA Budget Higher group in four weeks was notably similar to the share price of the CSA Budget Lower group in 12 weeks. This might signify that NTD 4500 (US\$150) would be a reasonable intersection of share price for all kinds of customers.

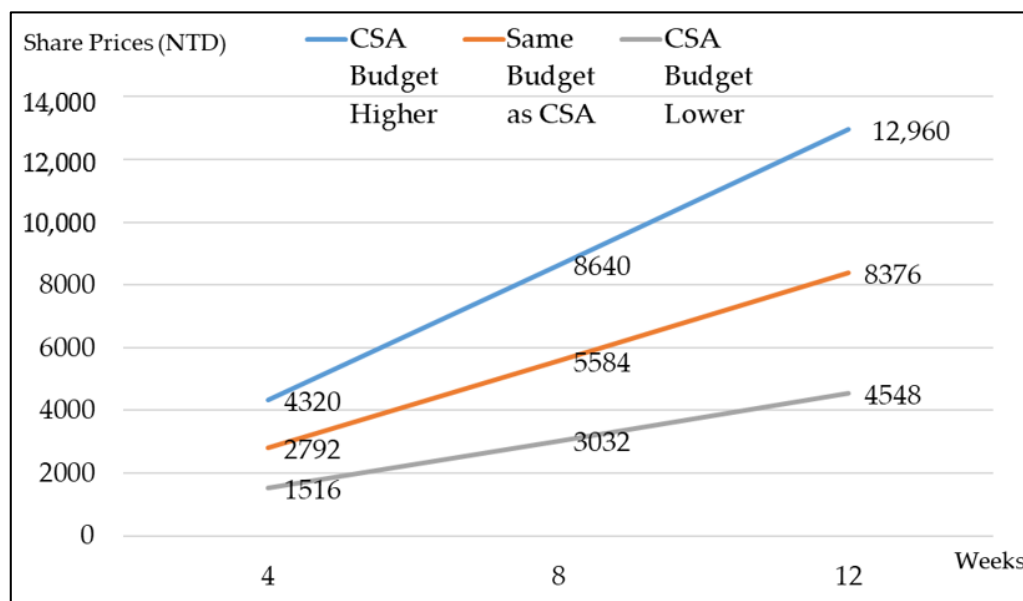


Figure 3. The Relationship between Total Share Prices and Contract Length.

4.4. Discussion

Although the relationship between the willingness to share risk and the length of contract does not show a positive linkage, this study identifies the maximum risk sharing period when consumers would like to join the length of CSA contract for about 4–12 weeks. This is an important finding in Taiwan if we compare it to previous literature [3,19,26,27] regarding the length of contracts. This means that if the CSA program in Taiwan adopts an identical CSA program to the U.S. or other countries, it may easily be difficult to promote.

The relationship between the WTP for CSA share budget and the length of contract was confirmed to have positive linkage, which corresponds to previous studies [28]. This means that when consumers would like to participate in a longer contract of the CSA program, they would like to pay more for the CSA share budget as well. According to Yu et al. [24], the WTP of weekly CSA share for 16 weeks is about 38% higher compared to the WTP for 12 weeks in the U.S. However, this study found that the WTP of weekly CSA share for 12 weeks is only about 5% higher compared to the WTP in 8 weeks in Taiwan. This shows a big difference compared to other countries. This may provide additional evidence as to why respondents prefer a shorter length of CSA contract.

When the WTP for CSA share budget is examined through the key factors (i.e., demographic, consumption, reason for visiting farmers' market, CSA experience, and reason for joining CSA in NCHU farmers' market), many results correspond to previous studies [33,49,53]. However, the reason for visiting the farmers' market factor does not show any linkage with the WTP for the CSA share budget. This suggests that the CSA program participation and the visits to the farmers' market can be a different thing among consumers. This is also an important finding because some literature has already mentioned that farmers' market consumers may not want to join a CSA program because they felt they support farmers already [18,53]. This means that the farmers' market consumers in Taiwan could possibly overcome their restraint in visiting farmers' markets. The results in this study can exhibit a good comparison for future study.

5. Conclusions

Due to the multiple and convenient grocery shopping channels in Taiwan, the concept of CSA, production-marketing partnership between farmers and consumers, and supporting locally produced food has been challenging. If the length of CSA contract can be flexible, this research finds that the CSA implementation could be feasible in Taiwan, especially in NCHU Organic Farmers' Market.

Although CSA promotion in Taiwan had not received enough attention in the past, this study confirms that CSA promotion via a farmers' market can be a potential solution to allow more people to get to know about it. The potential CSA shareholders, in general, would pay NTD 705 (US\$23.50) per week to join the CSA, which can vary from NTD 379 (US\$12.63) to NTD 1080 (\$36) per week. This study further attempts to measure how the potential shareholders would be willing to share the farming risks with farmers via CSA. We discover that the magnitude of the willingness to share risk is approximately 65–70% (for instance, the 100% risk-sharing means that consumers would not ask for any compensation when farmers fail to provide food products). In addition, this research finds out that the most acceptable length of CSA contract is roughly 4–12 weeks (1–3 months) in Taiwan. Unlike the CSA programs in other countries, like the U.S., the length of CSA contract is often longer than 4 months. Thus, the CSA promotion in Taiwan needs a strategic plan to comply with the consumer behavior in the farmers' market. We found that consumers are willing to pay for the CSA shared budget in the farmers' market. Furthermore, the CSA program manager would need to have a full plan if farmers failed to provide food products in certain weeks in order to relieve some customers who may not want to share the risk with farmers.

The contributions of this pilot study are straightforward. Understanding the potential consumers' preferences on CSA helps to recruit shareholders and to publicize the CSA scheme in Taiwan. As indicated previously, the awareness of CSA and the previous CSA experiences are valuable. The findings should be taken into consideration by local farmers, farmers' market managers, and policymakers with respect to the differences in consumers' characteristics, preferences, and attitudes. The concerned parties can characterize customers and design appropriate marketing-mix strategies to approach the target customers in order to initiate, promote, and build up the sustainable CSA system as well as induce potential consumers to be members of the CSA in Taiwan.

Limitations are unavoidable. First, this study utilizes the survey from customers at the NCHU Organic Farmers' Market. It is highly suggested that future studies should expand the sample size and enlarge the research scale to cover the whole nation as far as possible. Thus, more reliable results will be collected for government policy makers. Second, this study does not include product attributes to estimate the WTP. Additional study should extend to investigating consumers' preferences on product attributes to estimate the WTP using the choice experiment. As Holmes et al. [52] suggested, the choice experiment resembles a real-life market situation with specific product alternatives and prices. It is suitable for a product that has not existed in the market yet.

In terms of directions for future research, consumer education is indispensable, essentially for developing the marketing strategies. Further study of the farm characteristics, the farm operation, and factors affecting farmers' attitudes towards CSA program are necessary, resembling the exploration of prior research [3,7]. In addition, the non-monetary knowledge benefits for consumers, farmers, and communities in Taiwan ought to be explored. Subsequently, we suggest cooperation with the Agriculture and Food Agency (AFA) of the Council of Agriculture (COA) of Taiwan to extend CSA knowledge, develop the policy, and establish an organization for building connections and promoting CSA.

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