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The Selection of the Best Deal for Sweet Potato Contract Farming under Directing of Multinomial Logit Model: An Application of the Theory of Planned Behavior

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Abstract: The purposes of this study are based upon the theory of planned behavior (TPB) to examine the impact of past experiences of contract farming on selecting a specific type of contract farming in the future and then compare different psychological factors in the TPB for different potential contract farmer statuses. These statuses include homesteaders, farmers from cooperative farms, farmers from production and sales teams, professional farmers, and brokers. The impact of factors in the TPB for a particular contract type on potential contract farmers is further to compute. To this end, data are collected in three major sweet potato production areas in Taiwan. The results show that the farmers' past contract farming experience does not influence the selection of the contract in the future. As for the selection of contract type, strengthening the perception and motivating the behavioral intention of contract farming for cooperative farms will increase the probability of selecting an unclassified sweet potato size contract. On the other hand, enhancing perceived behavioral control factors and behavioral intention factors for professional farmers and brokers is apt to have a relatively high probability of selecting those types involving the highest amount or the best price to obtain the best deal.

Keywords: Theory of planned behavior; Psychological factors; Sociodemographic factors; Behavior; Broker; Professional farmer; Cooperative farm; Probit model; Multinomial logit model; Marginal effect

1. Introduction

Agricultural production is apparently affected by all kinds of climate factors. Under globalization, it has become increasingly difficult for small-scale agricultural management to compete with similar agricultural products imported from countries with large-scale agricultural operations. Contract farming is one way for those countries with small scales of operations to engage in agricultural production that is part of a planned scheme. This can help maintain a balance between production and marketing and further reduce farmers' possible losses due to market risk [1]. Moreover, food security and agricultural development can also be maintained via contract farming [2]. Contract farming means that the contract owner and contract farmer enter into an agreement whereby one side offers the other side land and labor and provides it with a variety of promises regarding the quality, required size, quantity, and price of the contract items. The agreement might extend to the provision of healthy seeds and seedlings, the safe use of pesticides, fertilizer, biological control technology, and all kinds of technical support. The agreement also covers the date of delivery, packaging and transportation, etc. [3]. This normally results in a long-term cooperation between the contract owner and the farmer [4].

Ipomoea batatas (L.) Lam, commonly referred to as the sweet potato, was originally produced in South America. It is currently ranked as the sixth grain crop in the world and as the fifth grain crop in developing countries. About 95% of the production is used as a grain crop and feed. As for the grain crop, about 20% is consumed directly by people and 80% is used in all kinds of food processes. The production area is mainly in Asia, which accounts for 90% of the overall amount grown in the world, with China, Indonesia and India being the three major producers [5]. According to statistics compiled by the International Potato Center, this short-term crop is an important source of food supply. A sweet potato weighing 125 grams can provide 125 grams of vitamin A for a preschool child. This can help counter the adverse effects of slow learning or the threat of death for 0.14 billion children [6]. With the supply chains for all kinds of materials and products with food being no exception having been interrupted globally since early 2019 due to the Coronavirus pandemic (COVID-19), gaining access to necessary nutrition has become a challenge for many governments. The supply of sweet potatoes is a relatively easy way to make up for undernutrition or malnutrition under such circumstances at the local level.

According to statistics compiled by the Council of Agriculture, Executive Yuan (COA) for 1950-1990 in Taiwan, the total sweet potato cultivation acreage in Taiwan is 230 thousand hectares and the total production is about 2,500-3,400 thousand kilotons [7]. Over the past 35 years or so (1986-2019), the total acreage of sweet potatoes has decreased from 22,062 hectares in 1986 to 8,407 hectares in 2019. The total number of hectares under production has decreased by more than 70%. However, the amount produced has remained at 19.8 thousand kilograms per hectare and has resulted in the total value consistently remaining at US$ 80 million or even double this amount (under the assumption of the exchange rate between the US$ and TWD at the end of the most recent full year, i.e., 2020, is 1:28.09). In spite of the smaller acreage under cultivation, the value of total production has been maintained or become even higher due to the diversification of demand, i.e., frozen and then roasted sweet potatoes are sold in over 10,000 convenience stores, and the development of new export markets for processed sweet potatoes are key reasons for this [7].

In 1996-2019, the three regions in Taiwan with the highest sweet potato production were Yunlin, Changhua and Taichung. Each account for 40%, 18-20%, and 8-10% of total production in Taiwan, respectively [8]. All three cities/counties are located in the central part of the island. Among these, one of the townships in Yunlin County, Shuilin township, has been named as the hometown of the sweet potato due to its geographic advantages, environment, climate, and soil condition. A total of 1,180 hectares have been cultivated and it accounts for 32% of total acreage under production in Yunlin. Shuilin township is also the main food processing location for sweet potatoes in Yunlin County, and in Taiwan, too. Farmers in Shuilin township have long cooperated with agribusiness through contract owners by contract farming. The contracted acreages have consistently increased over the years. The total area under cultivation in Changhua County is 542 hectares and accounts for 46% of total hectarage production in Changhua County. Many farmers in Changhua County have joined production and sales teams (PSTs) or cooperative farms [9].

The average farm size is less than 1 hectare in Taiwan. This has resulted in a high production cost and low agricultural income. Participating in contract farming is one way to enlarge farming size and stabilize and increase agricultural income [10]. Adopting contract farming is also a means of managing risk and diversifying agricultural income [11]. The sweet potato is one of the major agricultural products in contract farming in Taiwan. The incentives and motivations for farmers to participate in contract farming are concerned not only with the content of the contract, but also the other services provided by the contract, such as technology support, the supply of seeds and seedlings, the variable contracted quantity and/or price to maintain a high revenue overall [12].

To determine farmers' attitudes, norms or perceptions about the contract or the various kinds of services provided, the Theory of Planned Behavior (TPB), modified from the Theory of Reasoned Action (TRA) proposed by Fishbein and Ajzen in 1967 and sub-

sequently elaborated by Ajzen [13,14], can be used for this purpose. The theory is capable of integrating the multi-dimensions of attitude, subjective norms, and perceived behavioral control to explain the possibility of having certain behavioral intentions and further encouraging particular forms of behavior. It is evident that behavior or action can be forecasted by behavioral intention and behavioral intention is further influenced by individual attitudes, subjective norms, and perceived behavioral control. The idea of the TPB has been applied to different behaviors in relation to various types of consumption, medical health, and transportation [13, 15-18].

The TPB has also been applied to contract farming for different kinds of agricultural products. Examples can be found in the studies for dairy production in the Netherlands [19], for apples in China [20], for tea in Taiwan [21], for okra in India [22], for the collaboration of farmers and supermarkets in China [23], for palm oil in Ghana [24], and for peanuts in Senegal [25]. Each study finds that attitudes, subjective norms, and perceived behavioral control have played a relatively important role in participating in a specific type of contract farming. In addition to those essential psychological factors that affect the final decision, Adnan et al. [26] have observed the role of sociodemographic factors of farmers for corn production in Bangladesh, and Nguyen et al. [27] have discovered that coffee production in Vietnam also plays a role in the kinds of behavior adopted.

Of all the studies conducted on contract farming, it is obvious that the bulk of the research has been concentrated on knowing the influential factors in the TPB, either of a psychological or sociodemographic type, for a specific type of behavior or action. Some studies are ultimately concerned with the farmer's income from a designated contract. As the content and conditions of the contract significantly affect the selection of the contract and will certainly influence farmers' income, mastering different types of contract designs offered to potential farmers is not only essential for contract farmers, who should know which type of contract offers them the best deal, but also for the government whose mission is generally to watch over the stability and/or raising of farm income. Furthermore, it is expected that the psychological and sociodemographic factors will have different impacts for contracts entered into between potential farmers with different statuses and contract owners. It is then necessary to have an in-depth understanding of the importance of each factor to potential farmers in selecting a specific type of contract.

To fill this gap in the literature, the first purpose of this study is to use the TPB to examine whether there is an impact of past experience in contract farming on selecting specific types of contracts farming in the future. Since each type of potential contract farmer has different levels of predominance and characteristics in production and marketing, the second purpose is to compare different psychological factors in the TPB for different potential contract farmer statuses, i.e., homesteaders, farmers from cooperative farms, farmers from PSTs, professional farmers, or brokers, when selecting different types of contracts. Subsequently, the third purpose is to demonstrate the impact of the factors in the TPB for a particular contract type on potential contract farmers. The data are collected from potential contract farmers in three major sweet potato production areas in Taichung City, Changhua County, and Yunlin County, in Taiwan. The effect of each essential factor in the TPB, i.e., attitude, subjective norm, perceived behavioral control, and behavioral intention, is ascertained by comparing the change in the corresponding probability in selecting a specific type of contract farming.

2. TPB framework Influencing the Selection of the Type of Contract Farming

The component of attitude in the TPB denotes the evaluation of the preference for specific objects and targets. The stronger that the attitude toward specific objects and targets is, the higher will be the probability of having a specific behavioral intention. An objective norm means pressure from others, such as friends, relatives, and/or colleagues, imposed on an individual's intention to determine whether to perform a particular type of behavior. As with the perceived behavioral control, it is the opportunity and the degree of difficulty for all kinds of resource control perceived by an individual that will

give rise to the intention to engage in a particular type of behavior. When an individual perceives that the barriers are fewer, the stronger will be the perceived behavioral control [14]. Based upon the behavioral intention defined by Fishbein and Ajzen [28], the extent of the behavioral intention will be determined by how much effort or willingness the individual will commit in the action. It is expected that homesteaders, farmers that are members of PSTs, farmers from cooperative farms, professional farmers, and brokers have different attitudes, norms, perceptions, and intentions toward behavior in regard to different contract types. Thus, it is reasonable to examine the selection of the contract separately.

Regarding the application of the TPB in the selection of contract farming, the study performed by Pennings and Leuthold [29] indicates that the farmer's risk attitude toward market fluctuations will influence the farmer's contractual behavior. Other services, such as the provision of transportation or harvest assistance, provided by the contract farming, are also incentives for farmers to participate. The farmer's attitude toward the reputation of the contract owner, i.e., the agribusiness, such as the unexpected termination or breaking of a contract, is also an essential factor. The farmer's subjective norm toward an increase in revenue in agriculture is also a key factor for farmers to participate in contract farming [30, 31, 32]. Past experience might also have an impact on the selection of the type of contract farming in the future. The compensation offered by a contract owner to guarantee the contracted price is higher than the market price [4]. In some cases, this indicates that the decision will be affected by friends, other farmers, or propaganda from the government [19]. The perception of information accessibility difficulties, the ability to acquire cultivation technology, fiduciary loans, and field management are also perceived behavioral control factors that determine the participation in contract farming [33]. Farmers perceive of contract farming as saving much farming pressure, time and effort and completing the cultivation process in a friendly manner. The more the farmers participate in contract farming the more the farmers will be attracted. That is, herding behavior will sometimes take place.

In addition to the above factors, the stronger the behavioral intention toward contract farming, the higher will be the probability of engaging in a specific type of behavior. The behavioral intention is usually revealed in the sharing of the advantages of a certain kind of behavior with other farmers and relatives who are not yet involved in contract farming. A study performed by Hou and Hou [20] finds that sharing the advantage of contract farming with others usually originates from the cost saving. Three types of contracts are designed for the case at hand here, namely, purchase all sweet potatoes without sweet potato size classification, purchase them with size classification, and make adjustments for a bullish market. The framework of the TPB used in this study is shown as Figure 1 (Modified from [14]). The behavioral intention is placed in parallel with other psychological and sociodemographic factors as a potential factor in terms of its impact on the selection of a specific contract as previous studies show that behavioral intention and the performance of behavior are consistently highly correlated [13,15,16].

3. Research Methodology

3.1. Influential Factors and Their Treatment

From the above framework, factors can be categorized into two parts to determine the type of contract farming. One category is related to the factors in the TPB and the other category concerns the sociodemographic characteristics [34, 24]. The factors related to the TPB are the attitude toward the advantages of participating in contract farming (Att), the subjective norms regarding the decisions of others and the information offered by the contract (Sub), the perceived behavioral control regarding the contract (Per), and the behavioral intention regarding the suggestions to others and possible changes in contract farming (Int). The specific questions for each factor are listed in Table 1. This category of factors in the TPB is measured using a 5-point Likert scale where 1 indicates

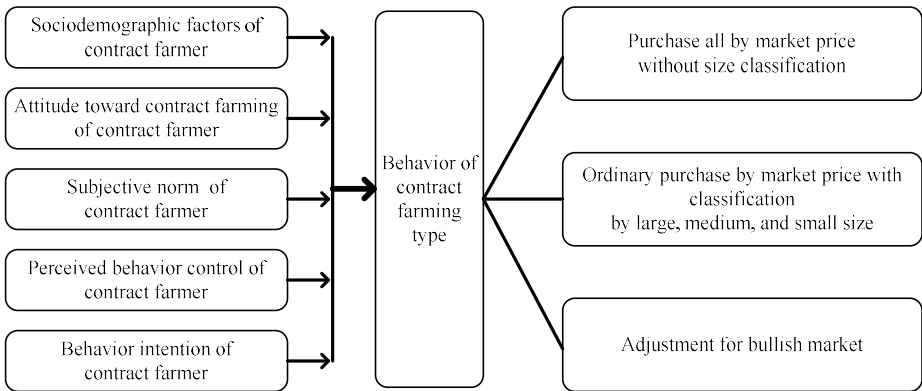"very much disagree", 2 is "disagree", 3 is "no comment", 4 is "agree", and 5 is "very much agree" [35].

Figure 1. Framework of the TPB for selecting the type of contract farming for sweet potatoes.

Table 1. Specific questions for each factor in the TPB.

Attitude towards the advantages of participating in contract farming
1.My agricultural revenue will increase and remain stable if I participate in contract farming. 2.The advantage of participating in contract farming will enable me to obtain healthy seeds and seedlings and learn about the safe use of pesticides. 3.The advantage of participating in contract farming will assist me in harvesting and transportation. 4.Signing a contract with an agribusiness with a good reputation will result in multiple guarantees.
Subjective norms regarding the decisions of others and information offered by the contract
1.My decision to participate in contract farming is affected by the government, media, and all kinds of agricultural workshops. 2.My decision to participate in contract farming is influenced by friends, relatives, and other farmers. 3.I have confidence due to the past good experiences of contract farming. 4.I will sign the contract depending upon whether or not the contract owner will provide additional compensation when the market price is higher than the contracted price.
Perceived behavioral control in contract farming
1.The clearer the contract activity information is, the more that farmers will participate in contract farming. 2.Contract farming will not increase the pressure of farming. 3.I am willing to participate in contract farming because it is friendly to the environment and farm community. 4. I will participate in contract farming if the contract owner maintains a high quality.
Behavioral intention of my suggestions to others or to change to contract farming
1.I will suggest that friends, relatives, neighbors, and other farmers participate in contract farming. 2.I currently have a sweet potato contract, but I am willing to change to a contract owner with a good reputation.

Table 2. Variables used in the estimation and their definitions and mean values.

| Variable	Definitions	Mean Value*	Standard deviation
	Dependent variable		
P	Latent variable for farmer who has participated in contract farming in the past three years; 1 if yes, 0 if no	0.318	0.466
Y	Selection of contract type from six designed contracts	3.604	1.921
	Independent variable		
Att	Total scores of four attitude questions regarding contract farming	15.672	2.695
Sub	Total scores of four subjective norm questions	13.709	1.637
Per	Total scores of four perceived control behavior questions	15.341	2.343
Int	Total scores of two behavioral intention questions	7.647	1.496
Per-2	Score for perceived control behavior – Contract farming will not increase pressure of farming	3.709	0.758
Per-3	Score for perceived control behavior – I am willing to participate in contract farming because it is friendly to the environment and farming community	3.853	0.820
Per-4	Score for perceived control behavior – I will have good contract conditions if the contract owner is of high quality	3.915	0.762
Homest	Dummy variable; 1 if contract farmer is a homesteader; 0 otherwise	0.796	0.403
Cofarm	Dummy variable; 1 if contract farmer is from a cooperative farm; 0 otherwise	0.010	0.099
PST	Dummy variable; 1 if contract farmer is from a PST; 0 otherwise	0.149	0.356
Profarmer	Dummy variable; 1 if contract farmer is a professional farmer; 0 otherwise	0.027	0.163
Conagu	Dummy variable; 1 if farmer is concerned about disputes being resolved by the contract; 0 otherwise	0.107	0.309
Conoth	Dummy variable; 1 if farmer is concerned about other services provided by the contract; 0 otherwise	0.274	0.446
Taichang	Dummy variable for farmland location; 1 if it is located in Taichung; 0 otherwise	0.189	0.392
Changhua	Dummy variable for farmland location; 1 if it is located in Changhua; 0 otherwise	0.224	0.417
Yunlin	Dummy variable for farmland location; 1 if it is located in Yunlin; 0 otherwise	0.587	0.492
Gender	Dummy variable for gender 1 if male; 0 otherwise	0.639	0.481
Age	Age (years)	53.823	13.925
Marriage	Dummy variable for marriage status 1 if married; 0 otherwise	0.081	0.400
Edu	Years of education (years)	10.206	3.348
Agricper	Number of persons in farming (persons)	2.507	0.677
Agricexp	Years of farming experience (years)	15.100	8.977
Ha	Sweet potato cultivated acreage (hectares)	1.661	1.341
Income	Annual income of the potential contract farmer (US$)	14,831.000	1.636
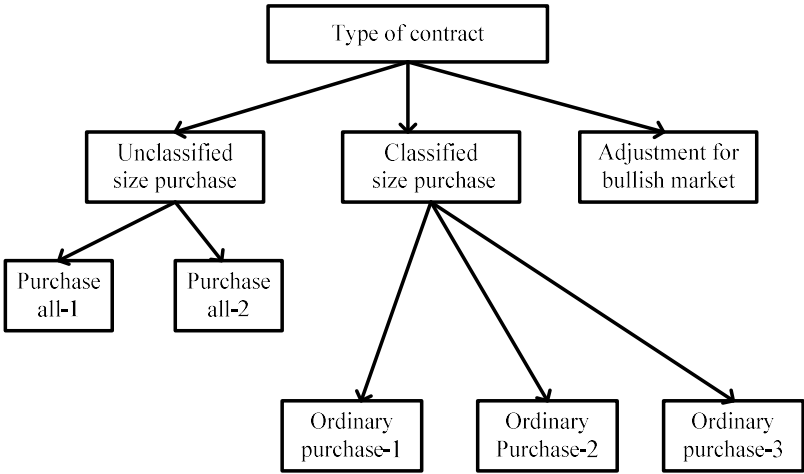
Figure 2. Selection of different types of contracts designed**.**

   Sociodemographic factors that have been chosen include gender (Gender), age (Age), educational level (Edu), the number of persons in farming in the family (Agricper), farming experience (Agricexp), farmland size (Ha), marriage status (Marriage), and income from agricultural practices (Income), to examine their impacts on the selection of contract type. More attention is paid to certain characteristics of contract farming than others [12]. Thus, "if a farmer is concerned about whether the dispute will be resolved by the contract" (Conagu) and "if a farmer is concerned about other services provided by the contract" (Conoth) are two independent factors to be observed. The definitions, mean values, and standard deviations for all factors (variables) used in the estimation are listed in Table 2. The average number of persons in farming for each household (Agriper) is 2.507 persons. The average farm size is (Ha) is 1.667 hectares. The experiences in farming (Agricexp) are classified into three kinds to demonstrate the farmer's proficiency in agricultural practices [36]. One consists of those with average farming experience of 5 years, another of those with average farming experience of 15 years, and the other those with farming experience of 25 years. The average farming experience is 15.1 years.

   The farmland location and statuses are also included. The farmland location is designated by the three county/city regions in which the farmland is located. It is believed that different factors in the TPB will have different impacts on the different statuses of the potential farmers in charge, i.e., "homesteader", "farmer from a cooperative farm", "farmer from a PST", "professional farmer", and "broker." Thus, the different statuses of potential contract farmers are distinguished to have different combinations with those TPB factors stated above. In this way, it will be possible to observe the impact of each TPB factor on each type of farmer. Furthermore, a question is designed to determine whether the experience of contract farming in the past three years will have an impact on the participation in contract farming in the future and the type of contract selection [37, 38].

   Six types of contracts for selection are categorized as three major forms of contract, namely, purchase all, ordinary purchase, and adjustment for bullish market, respectively. Uncertainty regarding the product price is the biggest concern of farmers [39, 40]. Thus, the design of the contract type focuses on the stability or assurance of the price or compensation offered for the most preferred size of sweet potato. Among these, there are two specific types under the purchase all contract and three different types under the ordinary purchase contract. One type of purchase all contract is that the contract owner purchases all the sweet potatoes and pays 15% more than the market price for superior ones, designated as "purchase all-1." The other type of purchase all contract is if the amount of medium-sized sweet potatoes is greater than the contracted amount by at least 10%, in which case a bonus amount of US$ 249-US$ 356 will be offered per hectare, designated as "purchase all-2".

The three ordinary purchase contracts include one type where the contract owner purchases a specific amount for the large (more than 525 grams), the medium (between 375 grams and 525 grams), and the small (between 75 grams and 337.5 grams) sweet potatoes according to the local market price, designated as "ordinary purchase-1." The second type is similar to the "ordinary purchase-1," but the contract owner will pay 20% more than the contracted price for the medium-sized amount with at least 20% or more according to the prior agreement, designated as "ordinary purchase-2." A bonus of US$ 249-US$ 356 per hectare will be offered to the farmer if the price of the medium-sized sweet potato is 15% more than the price in the previous contract, designated as "ordinary purchase-3." The third type is purchased according to the large, the medium-sized, and the small sweet potatoes based on the market price level of the county. However, when market price increases, the contract price will be adjusted close to the bullish market, designated as "adjustment for bullish market." The selection scheme for the above six types of contract is shown as Figure 2.

3.2. Sampling

Under the 95% confidence level and where the sampling error is less than 0.05, the normalized value for such a condition is 1.96. Assuming that the probability of answering each questionnaire for each type of sweet potato farmer is 50%, then the size of the effective sample is computed as (1):

$$N = P(1 - P)\left[Z(\frac{\alpha}{2}) \Big/ e \right]^2 , \qquad (1)$$

where N is the number of observations, P is the probability, α is the value of correctness, $Z(\alpha/2)$ is the normalized constant term, and e is the acceptable sample error. Accordingly, the sample size is 384.16 and is rounded up to 385.

The pretest was conducted in early May 2021. It was found that the demand for the frozen and then roasted or steamed sweet potatoes has significantly increased in convenience stores. The popular size is the medium size. This has resulted in an increase in the price for this size in the contract. In the revised questionnaire the type of contract offered to the farmers has thus been modified to reflect the phenomenon found in the pretest. The list of potential farmers is obtained from the agricultural bureaus in these city/county locations. The final questionnaires have then been assigned in proportion to the numbers of homesteaders, farmers in cooperative farms, farmers from PSTs, professional farmers, and brokers in Taichung city, Changhua County, and Yunlin County.

The final number of completed questionnaires was 402, which was more than the number of observations computed in (1), including 76 observations from Taichung, 90 from Changhua, and 236 observations from Yunlin County. The formal survey was conducted from the middle of May to June in 2021. A common problem confronted by potential contract farmers in these areas is that the contract farming is entered into orally. Disputes arise when the market fluctuates. There is no guaranteed contracted price. This only serves to deepen the mistrust between the contract owners and contract farmers. Thus, there is room for contract owners or agribusinesses to offer systematic and guaranteed contracts to existing or potential farmers.

Although many sociodemographic variables in the questionnaire are defined differently in the analyses, it is good to observe the impact of every unit change in the related variables on the probability of participating in contract farming in the past three years or on the different types of contract scheme selection designated in this study. The variable for education (*Edu*) is one such variable with an average of 10.206 years. Similarly, annual agricultural income (*Income*) has 7 ranges for selection and the mid-value of each range is used for each selection, with the result that the average annual agricultural income per household is US$ 14,831.

3.3. Specification for Participation in Contract Farming in the Past Three Years

In order to capture the factors and marginal effects that influence the decision to participate in contract farming to grow sweet potatoes in the past three years and the selection of different contract schemes for potential contracts with different statuses, this study calculates the cross-product of attitude, subjective norm, perceived behavioral control, and behavioral intention and five different statuses of potential contract farmers. The cross-product term can reinforce the performance of the individual variable [41, 42]. This then generates 20 different cross-product terms for the subsequent estimation.

The probit model is used to analyze the probability of the factors that affect the contract farmers who participated in contract farming in the past three years. It is expected that past experience might have an influence on the willingness of contract farmers to participate. However, the influence depends upon the positive or negative experience from the past. Pi is a latent variable with value of 1 if the farmer participated in contract farming, with value of 0 otherwise. The probit model is expressed as (2):

$$p_i = \begin{cases} 1, \text{ when } P_i^* \geq 0 \\ 0, \text{ otherwise} \end{cases}, \tag{2}$$

$$\begin{aligned} \text{Prob}(P_i = 1) &= \text{Prob}(P_i^* \geq 0) \\ &= \text{Prob}(P_i^*(\bullet) - \varepsilon_i \geq 0), \tag{3} \\ &= F_\varepsilon(P_i^*(\bullet)) \end{aligned}$$

where $F_\varepsilon(P_i^*(\bullet))$ is the cumulative distribution function of ε_i and ε_i is assumed to be a normal distribution. The distribution is written as (4):

$$F_\varepsilon(\Delta P_i^*(\bullet)) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\Delta P_i^*(\bullet)} e^{\frac{c^2}{2}} dc, \tag{4}$$

The coefficients in $\Delta P_i^*(\bullet)$ are obtained by the estimation of the maximum likelihood function stated as (5):

$$\ln L = \sum_{i=1}^{n} \left\{ P_i \ln F_\varepsilon(\Delta P_i^*(\bullet)) + (1 - P_i)\ln(1 - F_\varepsilon(\Delta P_i^*(\bullet))) \right\}, \tag{5}$$

The estimation of $\Delta P_i^*(\bullet)$ is specified as (6) below:

$$\begin{aligned} P_i^* = {}& \alpha_0 + \alpha_1 Att_i \bullet Homest_i + \alpha_2 Att_i \bullet Cofarm_i + \alpha_3 Att_i \bullet PST_i + \alpha_4 Att_i \bullet Profarmer_i + \alpha_5 Att_i \bullet Broker_i \\ & + \alpha_6 Sub_i \bullet Homest_i + \alpha_7 Sub_i \bullet Cofarm_i + \alpha_8 Sub_i \bullet PST_i + \alpha_9 Sub_i \bullet Profarmer_i \\ & + \alpha_{10} Sub_i \bullet Broker_i + \alpha_{11} Per_i \bullet Homest_i + \alpha_{12} Per_i \bullet Cofarm_i + \alpha_3 Per_i \bullet PST_i \\ & + \alpha_{14} Per_i \bullet Profarmer_i + \alpha_{15} Per_i \bullet Broker_i + \alpha_{16} Int_i \bullet Broker_i + \alpha_{17} Int_i \bullet Cofarm_i \\ & + \alpha_{18} Int_i \bullet PST_i + \alpha_{19} Int_i \bullet Profarmer_i + \alpha_{20} Int_i \bullet Broker_i + \alpha_{21} Per - 2_i + \alpha_{22} Per - 3_i \\ & + \alpha_{23} Per - 4_i + \alpha_{24} Conagu_i + \alpha_{25} Conoth_i + \alpha_{26} Taichang_i + \alpha_{27} Changhua_i + \alpha_{28} Gender_i \\ & + \alpha_{29} Age_i + \alpha_{30} Marriage_i + \alpha_{31} Edu_i + \alpha_{32} Agricper_i + \alpha_{33} Agricexp_i + \alpha_{34} Income_i + \varepsilon_i, \; i=1,...,402 \end{aligned} \tag{6}$$

All the α s in (6) are coefficients to be estimated and ε_i is a random error term.

3.4. Specification for the Type of Contract Farming Selected

The selection scheme in **Figure 2** needs to be estimated using a multinomial logit model. Since there are J non-sequential types of selection, j=1,2,…, J, the multinomial logit influenced by *K* explanatory variables x is shown as (7):

$$\ln\left[\frac{p(y=j\,|\,x)}{p(y=J\,|\,x)}\right] = \beta_{0j} + \sum_{k=1}^{K}\beta_{1j}x_k \, , \qquad (7)$$

In the general formation of *J* types of selection, when selection *J* is used as the reference, the logit of *J −1* is written as (8):

$$
\begin{aligned}
\ln\left[\frac{p(y=j\,|\,x)}{p(y=J\,|\,x)}\right] &= \beta_1 + \sum_{k=1}^{K}\beta_{1k}x_k \\
\mathrm{n}\left[\frac{p(y=j\,|\,x)}{p(y=J\,|\,x)}\right] &= \beta_2 + \sum_{k=1}^{K}\beta_{2k}x_k \\
&\vdots \\
\mathrm{n}\left[\frac{p(y=(J-1)\,|\,x)}{p(y=J\,|\,x)}\right] &= \beta_{(J-1)} + \sum_{k=1}^{K}\beta_{(J-1)k}x_k
\end{aligned}
\qquad , \qquad (8)
$$

Among all the selections, when the last selection, i.e., *J*, is used as the reference type, then the probability of selecting the J type is computed as (9):

$$p(y=j\,|\,x) = \frac{\ell^{\beta_j + \sum_{k=1}^{K}\beta_{jk}x_k}}{1 + \sum_{j=1}^{J-1}\ell^{\beta_j + \sum_{k=1}^{K}\beta_{jk}x_k}} \, , \qquad (9)$$

The marginal effect for factor x in selecting the J type can be computed by (10):

$$\partial p(y=j\,|\,x)\Big/\partial x = \partial\left[\frac{\ell^{\beta_j + \sum_{k=1}^{K}\beta_{jk}x_k}}{1 + \sum_{j=1}^{J-1}\ell^{\beta_j + \sum_{k=1}^{K}\beta_{jk}x_k}}\right]\Big/\partial x \, , \qquad (10)$$

There are six contract selections for the case at hand and the latent variable *y* has six options, 1, 2,..,6.

The contract type selected for reference under the multinomial logit model is the "adjustment for bullish market." The results for all the other five specific contract types are then related to the reference one. It is reasonable to assume that different factors in the TPB will have different impacts on potential farmers with different statuses. Thus, the cross-product term is obtained for each type of farmer. There are five types of farmers and four essential factors in the TPB. As a result, 20 cross-product terms are generated. Under such a framework, the selection of each contract is specified as equation (11):

$$Y_i = \beta_0 + \beta_1 Att_i \bullet Homest_i + \beta_2 Att_i \bullet Cofarm_i + \beta_3 Att_i \bullet PST_i + \beta_4 Att_i \bullet Profarmer_i + \beta_5 Att_i \bullet Broker_i$$
$$+ \beta_6 Sub_i \bullet Homest_i + \beta_7 Sub_i \bullet Cofarm_i + \beta_8 Sub_i \bullet PST_i + \beta_9 Sub_i \bullet Profarmer_i$$
$$+ \beta_{10} Sub_i \bullet Broker_i + \beta_{11} Per_i \bullet Homest_i + \beta_{12} Per_i \bullet Cofarm_i + \beta_{13} Per_i \bullet PST_i$$
$$+ \beta_{14} Per_i \bullet Profarmer_i + \beta_{15} Per_i \bullet Broker_i + \beta_{16} Int_i \bullet Homest_i + \beta_{17} Int_i \bullet Cofarm_i \qquad (11)$$
$$+ \beta_{18} Int_i \bullet PST_i + \beta_{19} Int_i \bullet Profarmer_i + \beta_{20} Int_i \bullet Broker_i + \beta_{21} xb2_i + \beta_{22} Per-2_i + \beta_{23} Per-3_i$$
$$+ \beta_{24} Per-4_i + \beta_{25} Conagu_i + \beta_{26} Conoth_i + \beta_{27} Taichang_i + \beta_{28} Changhua_i + \beta_{29} Gender_i$$
$$+ \beta_{30} Age_i + \beta_{31} Marriage_i + \beta_{32} Edu_i + \beta_{33} Agricper_i + \beta_{34} Agricexp_i + \beta_{35} Income_i + \mu_i, \quad i=1,...,402$$

In equation (11), all βs are coefficients to be estimated and μ_i is the random error term.

4. Results and Discussions

4.1. Influence of Participation in Contract Farming in the Past Three Years

Before the analyses, all explanatory variables were tested for multicollinearity, with variance inflation factors (VIFs) being employed for this purpose. The results indicate that in addition to the cross-product terms such as *Att•Homest* , the VIF for all other individual variables is less than 10. The VIFs for those cross-product terms that are greater than 10 are not detrimental to the estimation results [43, 44]. For all the other 14 explanatory variables in addition to those with cross-product terms, none of the variables has a VIF larger than 10 and the average VIF for these 14 explanatory variables is 2.11. The problem of multicollinearity is thus avoided in the related estimations.

The estimation results shown in Table 3 indicate that the attitude, subjective norm, perceived behavioral control, and behavioral intention in the TPB have different impacts on the participation in contract farming for the past three years. As with the sociodemographic factors of farmers and the farmland conditions, the overall result indicates that farmers with more experience in farming and with higher income have a high probability of participating in contract farming in the past three years. The factors further indicate that the younger the farmer is, the lower is the probability of having participated in contract farming in the past. The geographical areas also show that sweet potato farmers in Yunlin County have a high probability of signing the contract. The results demonstrate that the project of "Retaining Young Farmers in the Countryside" proposed by the government has not been effective in attracting young farmers with a high educational level to take part in contract farming. The estimated equation (6) is used to forecast a new variable for estimating the participation in selecting contract farming in the future.

Table 3. Estimation results for farmers' contract participation in the past three years.

Variable	Estimated coefficient	Standard deviation	Z value
Att•Homest	0.0178	0.040	0.4400
Att•Cofarm	-81.5307 ***	3.905	-20.8800
Att•PST	0.0010	0.078	0.0100
Att•Profarmer	-9.1438 ***	0.439	-20.8200
Att•Broker	0.4357 ***	0.115	3.7700
Sub•Homest	-0.1040 **	0.058	-1.7900
Sub•Cofarm	-40.5207 ***	2.153	-18.8200
Sub•PST	0.1119	0.102	1.1000
Sub•Profarmer	-0.0472	0.143	-0.3300
Sub•Broker	-1.2524 ***	0.196	-6.3900
Per•Homest	0.1770	0.113	1.5600
Per•Cofarm	86.9117 ***	4.234	20.5300

Per•PST	0.0629	0.144	0.4400
Per•Profarmer	0.3500 *	0.186	1.8800
Per•Broker	-3.0254 ***	0.211	-14.3400
Int•Homest	0.0487	0.076	0.6400
Int•Cofarm	64.2399 ***	3.152	20.3800
Int•PST	0.0379	0.143	0.2600
Int•Profarmer	18.6112 ***	0.770	24.1700
Int•Broker	6.9086 ***	0.176	39.1800
Per − 2	0.0193	0.193	0.1000
Per − 3	-0.2296	0.165	-1.3900
Per − 4	-0.4427 **	0.194	-2.2800
Conagu	-2.0694 ***	0.566	-3.6600
Conoth	-0.3467 **	0.171	-2.0300
Taichang	-1.0090 ***	0.239	-4.2200
Changhua	-0.6729 ***	0.228	-2.9500
Sex	0.3305 *	0.170	1.9500
Age	-0.0080	0.009	-0.9200
Marriage	0.1551	0.199	0.7800
Edu	-0.0502 *	0.030	-1.6800
Agricrop	-0.0660	0.128	-0.5100
Agricexp	0.0263 **	0.013	1.9800
Income	0.0067 ***	0.002	3.8000
Cons	0.4213	1.034	0.4100
Wald χ^2 (34) = 9957.19			
Pseudo R² = 0.2562			
N=402			

Note: Numbers with *, **, and *** indicate that the estimated coefficients are significantly different from zero at the 10%, 5%, and 1% significance levels, respectively.

4.2. The Marginal Effect of TPB Factors in Selecting Contract Farming

The results of using the multinomial logit model in contract farming selection are listed in Table 4. The results show that whether or not the farmers had experience in contract farming in the past three years and their sociodemographic factors will not affect the selection of any type of contract farming in the future. The results show that the actual available and existing contract conditions have different impacts on farmers with different statuses. One contract is necessarily selected as the reference in the multinomial logit estimation. The contract with the "adjustment for bullish market" is selected as the reference type. Thus, each estimated coefficient in Table 4 is the change in a specific factor in relation to the change in the probability of selecting a particular contract type listed in the Table compared to the contract with the "adjustment for bullish market" type for the corresponding factor. For instance, the estimated coefficient for the factor of the *Att•Homest* under the "purchase all-1" contract type is -0.0391, which means that when the attitude toward contract farming is more positive. the probability of selecting "purchase all-1" is lower than that of selecting the "adjustment for bullish market" contract type for homesteaders. Similar explanations are applicable for all the other coefficients. It is not easy to interpret and understand the absolute impact of a particular factor on selecting a specific contract type in terms of probability.

Table 4. Estimation results of selecting different types of contract farming.

Variable	Purchase all-1	Purchase all-2	Ordinary purchase-1	Ordinary purchase-2	Ordinary purchase-3
Att•Homest	-0.0391	0.0401	0.2276 **	0.0182	0.1105
	(0.4400)	(0.3600)	(2.4200)	(0.1600)	(0.9900)
Att•Cofarm	-62.1880 ***	-103.3594 ***	-5.5636	221.3747 ***	11.0664
	-(2.9900)	-(4.8200)	-(0.3200)	(11.0400)	(0.5300)
Att•PST	-0.4250 **	0.0328	-0.0293	-0.8375	-0.3692 *
	-(2.1400)	(0.1300)	-(0.1600)	-(1.3900)	-(1.6900)
Att•Profarmer	-28.8693 ***	-11.3434 ***	-12.2736 ***	-14.8333 ***	-24.0887 ***
	-(20.8200)	-(10.0800)	-(10.2000)	-(11.8900)	-(18.0600)
Att•Broker	-37.2029 ***	27.8646 ***	-27.2737 ***	-37.1603 ***	-5.0462
	-(18.7800)	(4.1400)	-(11.2800)	-(13.8200)	-(1.2200)
Sub•Homest	-0.0705	-0.0489	-0.0199	0.0164	-0.3232 **
	-(0.4600)	-(0.2900)	-(0.1500)	(0.1100)	-(2.2600)
Sub•Cofarm	-20.1870 **	-64.4128 ***	-2.8986	113.4620 ***	6.2898
	-(1.9600)	-(6.0100)	-(0.3400)	(11.2800)	(0.5900)
Sub•PST	-0.7821 **	-0.1133	0.0129	0.7072 **	0.5353
	(2.5000)	-(0.4100)	(0.0400)	(2.0900)	(1.3400)
Sub•Profarmer	-38.5030 ***	-26.5836 ***	-28.6723 ***	-29.4701 ***	-45.4254 ***
	-(22.7200)	-(13.7300)	-(14.9200)	-(14.0400)	-(22.2500)
Sub•Broker	-1.9020 ***	27.1355 ***	10.7783 ***	1.0997 *	-4.6687 ***
	(3.0300)	(21.8000)	(14.1200)	(1.7200)	-(7.2000)
Per•Homest	-0.4726 **	-0.2061	-0.7121 **	-0.1038	-0.5456 *
	-(1.7100)	-(0.6200)	-(2.2200)	-(0.3900)	-(1.7200)
Per•Cofarm	-61.8344 ***	115.6468 ***	5.9432	-236.5677 ***	-12.7490
	(2.7800)	(5.0300)	(0.3200)	-(11.0600)	-(0.5600)
Per•PST	-0.2508	-0.1366	-0.1390	0.0682	-0.5164
	-(0.8200)	-(0.3200)	-(0.4400)	(0.1000)	-(1.4300)
Per•Profarmer	-52.4286 ***	46.6615 ***	55.1834 ***	54.8063 ***	83.5076 ***
	(23.2600)	(13.4800)	(15.8100)	(13.7400)	(21.8900)
Per•Broker	-46.5618 ***	-51.2414 ***	21.5727 ***	43.2508 ***	-4.2143
	(17.9600)	-(6.2900)	(6.7700)	(12.3700)	-(0.6500)
Int•Homest	-0.5609 ***	-0.0460	0.1106	0.2419	0.0972
	(3.1900)	-(0.2600)	(0.6700)	(1.0800)	(0.5400)
Int•Cofarm	-41.0789 **	90.7804 ***	3.7048	-175.8752 ***	-9.3614
	(2.5200)	(5.3800)	(0.2700)	-(11.0500)	-(0.5600)
Int•PST	-0.2436	-0.0130	-0.5538	0.4349	-0.5038
	-(0.7500)	-(0.0300)	-(1.4100)	(0.8600)	-(1.3600)
Int•Profarmer	-17.5290 ***	-22.7144 ***	-35.2066 ***	-27.5358 ***	-39.4574 ***
	(12.1700)	-(8.6200)	-(12.2700)	-(9.9800)	-(14.9200)
Int•Broker	-22.1926 ***	-2.5781	-5.7815 ***	-13.7115 ***	26.2136 ***
	-(19.8700)	-(0.9800)	-(4.8600)	-(10.2500)	(5.6300)
xb2	-2.6362	1.1994	-0.2209	1.6604	1.8908
	-(0.8200)	(0.3500)	-(0.0800)	(0.5500)	(0.6100)
Per − 2	-0.5582	0.2369	0.8128 *	-0.2636	0.3058
	(1.3400)	(0.4900)	(1.8800)	-(0.5800)	(0.6100)
Per − 3	-0.0851	0.4453	0.7966	-0.0124	0.5770
	(0.2100)	(0.9500)	(1.5500)	-(0.0300)	(1.2000)
Per − 4	-0.5796	0.0846	0.5864	-0.3523	0.3167
	(1.1600)	(0.1400)	(1.1900)	-(0.7800)	(0.5600)

Conagu	-0.2363	-0.2934	1.0016	1.4465	0.1986
	-(0.1700)	-(0.2200)	(0.9400)	(1.2800)	(0.1600)
Conoth	-0.1471	0.8715	0.2770	0.7603	0.4301
	(0.3000)	(1.5600)	(0.4800)	(1.2500)	(0.8700)
Taichang	-0.4081	0.1362	-1.5564 *	1.1776	0.0429
	-(0.3800)	(0.1200)	-(1.7000)	(1.2100)	(0.0400)
Changhua	-0.4146	0.0995	-1.1593 *	0.2244	0.9359
	(0.5100)	(0.1200)	-(1.6900)	(0.2500)	(1.1800)
Gender	-0.6555	0.9687	0.1341	-0.4398	-0.5294
	(1.5000)	(1.7700)	(0.3200)	-(0.8400)	-(1.0300)
Age	-0.0093	-0.0160	-0.0237	-0.0003	0.0197
	(0.4500)	-(0.6900)	-(1.1000)	-(0.0100)	(0.9000)
Marriage	-0.0421	-0.4586	0.2995	0.0383	-0.2851
	-(0.0900)	-(0.9100)	(0.5900)	(0.0700)	-(0.5200)
Edu	-0.1976 **	-0.0154	-0.1125	0.0426	-0.0333
	-(2.4000)	-(0.1700)	-(1.3800)	(0.4800)	-(0.3900)
Agricrop	-0.2435	-0.5144	0.5056	0.5312	0.6067 *
	(0.8000)	-(1.3900)	(1.6300)	(1.4200)	(1.8600)
Agricexp	-0.0124	-0.0646	0.0386	0.0056	-0.0145
	-(0.3100)	-(1.5600)	(1.0300)	(0.1300)	-(0.3400)
Income	-0.0048	-0.0020	-0.0050	0.0009	0.0025
	(0.5700)	-(0.2200)	-(0.5700)	(0.1200)	(0.3500)
Cons	-0.6417	1.8766	-1.4417	-2.1117	2.1048
	-(0.2200)	(0.5800)	-(0.5000)	-(0.7200)	(0.7200)

Note: Numbers with *, **, and *** indicate that the estimated coefficients are significantly different from zero at the 10%, 5%, and 1% significance levels, respectively.

The marginal effect for each factor (variable) under each type of contract is thus computed in Table 5. The marginal effect refers to the impact of a change in a particular factor in the TPB on the change in the probability of selecting a particular contract farming type. The results obviously show that farmers with different statuses have differences in terms of perception, attitude, subjective norms, or behavioral intention for each type of contract and all these factors dominate their past contract farming experiences. The marginal effect in Table 5 can also be observed according to different viewpoints. One viewpoint involves inspecting a particular status of a farmer and comparing the probability of the change in a specific factor in the TPB when selecting a certain contract. The other viewpoint involves observing and comparing the probability of a change in a typical factor in the TPB for farmers with different statuses for participating in a particular type of contract farming. The significance in Table 5 is carried from the estimation results in Table 4. Although some factors in the TPB are not significant in determining the contract type selection, most of the significant factors in terms of the contract types designated in this study are affected by the psychological factors in the TPB. It is very easy to compare the probability influencing each factor either from the viewpoint of a particular farmer or from the standpoint of a designated type of contract farming as shown in Figure 3 and Figure 4.

Table 5. Marginal effects of different factors in the TPB on selecting the contract type for different types of farmers.

Factor and type of contract farmers	Type of contract					
	Purchase all-1	Purchase all-2	Ordinary purchase-1	Ordinary purchase-2	Ordinary purchase-3	Adjustment for bullish

	A	B	C	D	E	market F
			Attitude			
Professional farmer	-3.1212	**0.4492**	**0.7197**	0.1596*	-1.4414	**3.2387**
Broker	-5.2256	**3.9308**	-1.8854	-2.1348	**2.1098**	**3.2230**
Cooperative farm	-15.3113	-9.1097	-0.7596*	**22.7687**	2.2555*	0.1931*
Production and sales team	-0.0091*	0.0264*	**0.0406**	-0.0588*	-0.0198*	0.0520*
Homesteader	-0.0404*	-0.0031*	**0.0264**	-0.0059*	0.0066*	-0.0149*
			Subjective norm			
Production and sales team	**0.1055**	-0.0422	-0.0604*	0.0355*	0.0327*	-0.0712*
Broker	-0.5251	**2.0586**	**1.1744**	-0.2969	-1.6233	-0.7902
Professional farmer	-2.5023	0.1705*	-0.0260*	-0.0994*	-3.1697	**5.6309**
Cooperative farm	-5.4263	-5.8661	-0.7516*	**11.4634**	0.8943*	-0.2992*
Homesteader	0.0035*	**0.0032***	0.0111*	0.0103*	-0.0447	0.0167*
			Perceived behavioral control			
Cooperative farm	**15.4230**	**10.2742**	0.9635*	-24.2426	-2.4207*	-0.0351*
Broker	**8.0267**	-5.8471	**1.2109**	**2.9468**	-3.4995	-2.8596
Professional farmer	**1.0831**	-0.1279*	**1.2238**	0.6869	6.6310	-9.5033
Production and sales team	-0.0155*	0.0046*	0.0086*	0.0263*	-0.0614*	0.0373*
Homesteader	-0.0249*	0.0148*	-0.0586*	0.0276*	-0.0323*	**0.0737**
			Behavioral intention			
Cooperative farm	**10.4673**	**8.1456**	0.7505*	-17.9311	-1.6096*	0.1514*
Professional farmer	**7.8763**	-0.7791	-3.6951	-1.3904	-4.7752	**2.7578**
Homesteader	**0.0907**	-0.0217	-0.0154*	0.0045*	-0.0190*	-0.0392
Broker	-4.7309	0.0624*	-0.4225*	-1.0682	**5.5231**	**0.6480**
Production and sales team	-0.0089*	0.0174*	-0.0598*	0.0658*	-0.0554*	0.0411*

Note: Numbers in bold font indicate that there is a positive marginal effect for the change in the corresponding variable for specific contract farmers under different types of contract farming. The letters A, B,….,F are used to designate the name of the contract for presentation in figures later. Number with "*" indicate that the estimated coefficients are insignificantly different from zero. For a complete presentation, the marginal effects for those insignificant variables are displaced for comparison purposes if necessary and also meaningful.

5. Conclusions

This study has adopted the Theory of Planned Behavior to explore the factors that determined the participation in contract farming of farmers in the past. The results are carried further to examine the impact of all kinds of psychological factors in the TPB, the sociodemographic factors of potential farmers, and farmland conditions in terms of the selection of the six kinds of contract farming designated in this study. One type comprises purchasing all sweet potatoes without regard for size classification or else where a fixed number of bonuses are given for the most preferred size with the amount being paid being more than that agreed in the contract, designated as "purchase all-1" and "purchase all-2," respectively. Another type includes an ordinary purchase with a size classification, where a higher price is paid to the most preferred size with a certain percentage, or where a fixed amount of bonus is paid for the most preferred size over that in the agreement, designated as "ordinary purchase-1," "ordinary purchase-2", and "ordinary purchase-3," respectively. The other type involves the price being adjusted when the market price increases, being referred to as the "adjustment for bullish market."
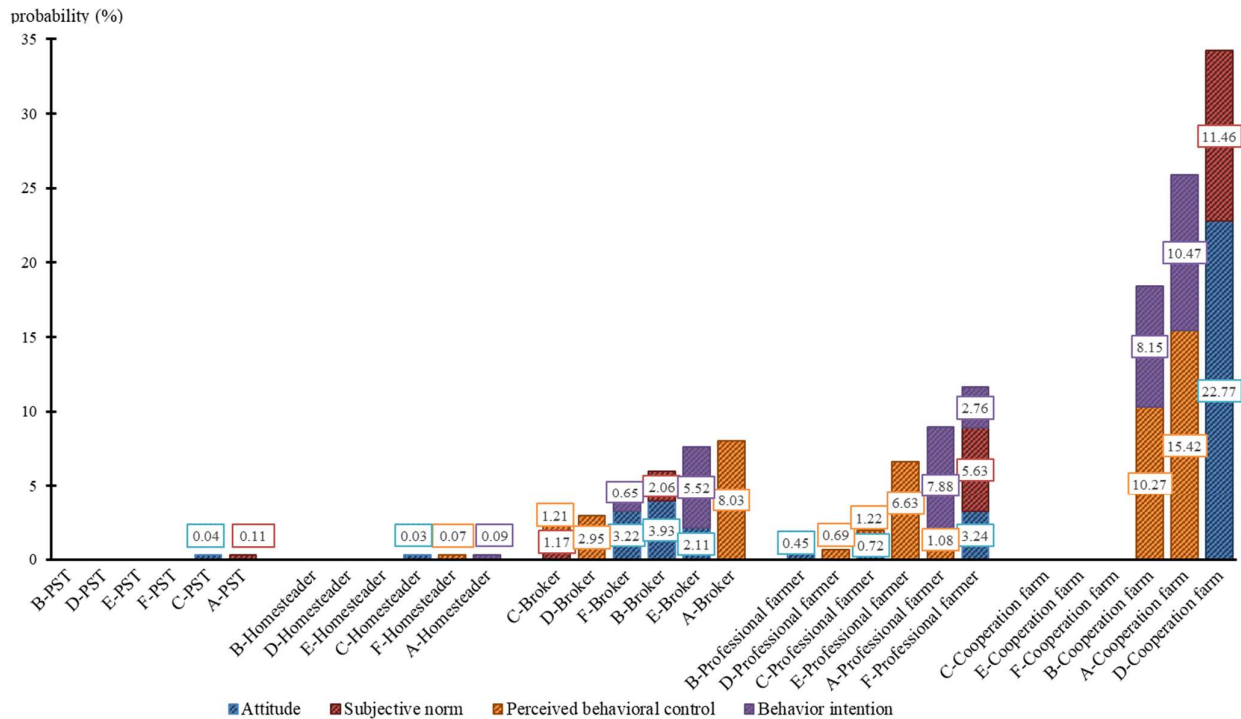
Note: "A" designates the contract type of "Purchase-1," "B" of "Purchase-2," "C" of "Ordinary purchase-1," "D" of "Ordinary purchase-2," "E" of "Ordinary purchase-3, and "F" is the "Adjustment for bullish market."

Figure 3. The effect comparison of each factor in the TPB for different potential contract farmer statuses for different contract types

A total of 402 effective potential contract farmers were surveyed in three major sweet potato production counties and cities in Taiwan. The results from the dataset demonstrated that farmers who participated in sweet potato contract farming in the past did not have an impact on the selection of either type of contract farming. The psychological factors in the TPB, i.e., attitude, subjective norm, perception, and behavioral intention, however, did have an impact and had different impacts on potential farmers with different statuses when selecting the type of contract farming.

If contract farming is to be promoted either from an agribusiness viewpoint in terms of a business mission or a government standpoint based on a public mission, then control over the major factors is essential. The results show that farmers from cooperative farms perceive high advantages of contract farming and a high degree of intention to share experiences of contract farming with others. Thus, strengthening those factors in this regard will increase the probability of selecting a "purchase all-1" or "purchase all-2" type of contract, i.e., a type related to purchasing all without a size classification. Similarly, farmers from cooperative farms have a more positive attitude and more subjective norm toward contract farming. Strengthening these factors will increase the probability of potential contract farmers from cooperative farms selecting the "ordinary purchase-2" type of contract. That is, they will expect to gain the amount based on medium-sized sweet potatoes with at least a markup of 20% or more on the prior agreement, since this will be beneficial to them.

As for professional farmers and brokers, who are the other two types of farmers, when their perceived behavioral control factor and behavioral intention factor are enhanced, they will have a relatively high probability of selecting a "purchase all-1" or "adjustment for bullish market" type of contract. Since these two types of potential contract farmers are somewhere in between homesteaders and farmers from production and sales teams and contract owners, they will naturally perceive the contract farming behavior whether of agribusinesses or food processing companies more positively than

others. The types of contracts farming that they select will basically rely on the highest amount, i.e., "purchase all-1," or they will seek to acquire the best price from the contract owners, i.e., "adjustment for bullish market." It is considered that these two types of contracts will enable them to earn the best deal.
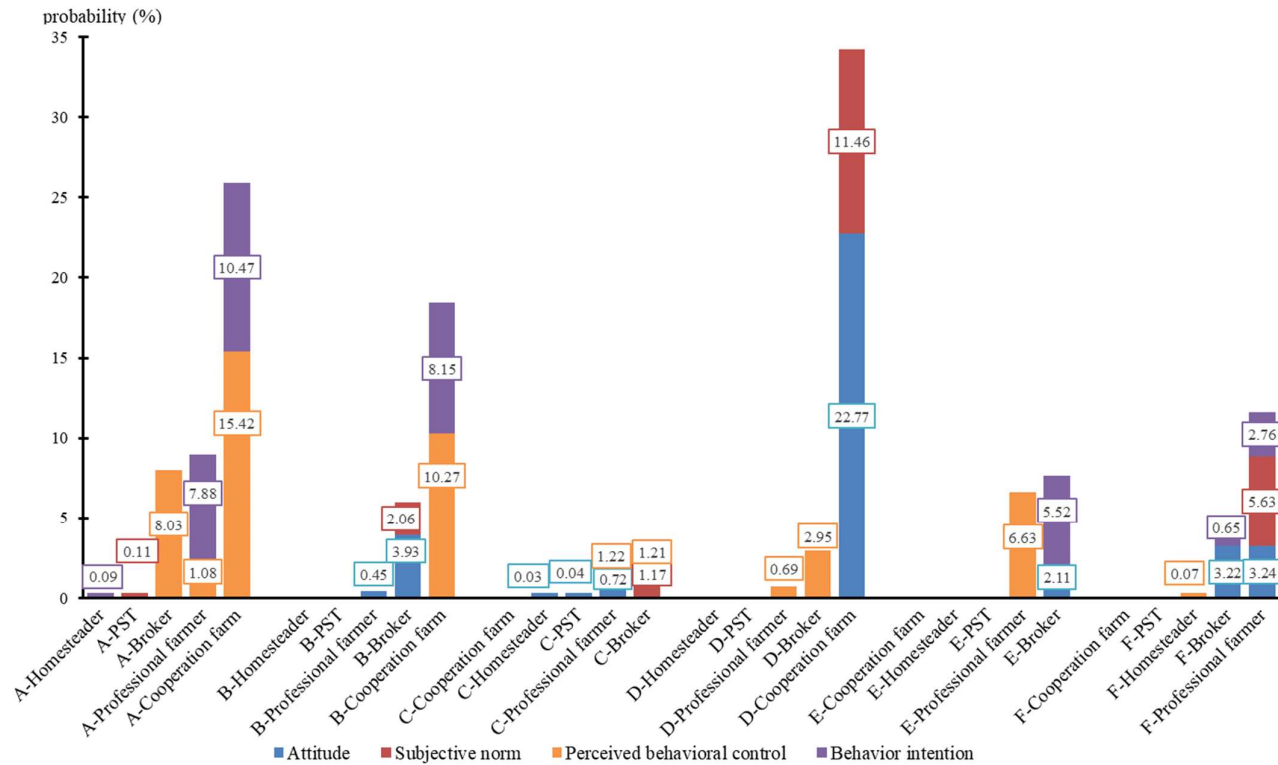
Note: "A" designates the contract type of "Purchase-1," "B" of "Purchase-2," "C" of "Ordinary purchase-1," "D" of "Ordinary purchase-2," "E" of "Ordinary purchase-3, and "F" is the "Adjustment for bullish market."

Figure 4. The impact of different psychological factors in TPB for a particular contract type on different potential contract farmers

The survey needed to overcome major challenges during the outbreak of the COVID-19 pandemic to be accomplished. To a certain degree, this resulted in the study's survey being focused on counties and cities located in the central part of Taiwan, although these are the three major sweet potato production areas in Taiwan. However, certain other counties and cities in the southern part of Taiwan are also important production areas. If a survey for the southern part can be conducted, then there will be a more complete picture of the sweet potato farmers' contract farming behavior in Taiwan. Furthermore, all questions designated in the study that are classified as factors related to attitude, subjective norms, perceived behavioral control, and behavioral intention may be interchanged from one factor to another as certain questions are applied to either factor. However, in the survey, all potential contract farmers replied to the same group of questions categorized as one factor. This limitation has arisen because all respondents faced the same group of questions in relation to a specific factor.

Conflicts of Interest: The authors declare no conflict of interest.

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