

Agricultural Disaster Relief Payments and Labor Supply of Farm Couples: Empirical Analysis from Taiwan

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ABSTRACT

Evaluating the impacts of government subsidies on farm household well-being has been one of the longstanding interests in rural development. Considerable research efforts have been paid on this topic and empirical evidences have been provided in many countries of the world. Compared with other industries, agricultural production is highly depended on natural disaster shocks and weather uncertainty. Therefore, the agricultural authority plays an important role in mitigating crop loss. Most of the existing studies on agricultural disaster programs focused on the risky factors of the farms to disaster shocks, and not much is known about the impacts of disaster relief payments on individual farm household. This study contributes to this interesting topic by addressing the extent to which natural disasters relief payments may affect the allocation of labor supply of the farm couples in Taiwan. A unique nationally representative sample of 124,827 farmers drawn from Farming Household Surveys in 2009, 2011, 2012, 2013, and 2014 is constructed. In addition, the administrative profile of all of the recipients of disaster payments from the Natural Agricultural Disaster Program provided by the Council of Agriculture was collected and it was merged into the individual farm household survey. By estimating a panel data fixed effect model, it is evident that natural disaster payments significantly increase farm couples' propensity to work off the farm. Also, the more disaster payments lead to a higher (lower) possibility of the head of farm households to engage in on-farm (off-farm) work.

Keywords: Disaster relief payments, on-farm work, off-farm work, farm couples.

1. Introduction

1.1 Motivation

In many countries, governments have implemented a variety of income support programs to enhance farm household wellbeing owing to the relatively low socio-economic status among the farm population (e.g. Gardner, 1992; El-Osta *et al.*, 2008). As a result, evaluating the impacts of government policies on the wellbeing of farm households has remained one of the longstanding interests in rural development. Given that agricultural production is more vulnerable to uncertain weather conditions, natural disaster relief acts in agriculture production have received enormous attention in the relevant literature.

By changing weather conditions, such as temperature, precipitation and sea level, global climate change continues to increase disaster risks and hazard levels (UNISDR, 2015). Due to the weather-dependent nature of the agriculture industry, natural disaster shocks and extreme weather conditions adversely affect the well-being of farm households to a significant extent (Chang & Zilberman, 2014). Especially in Taiwan, owing to its unique geographical location and island structure, a great number of natural disaster strike each year, causing a magnitude loss in agriculture production. Therefore, the central government in Taiwan launched the Agricultural Natural Disaster Relief Act (ANDRA) in 1991 to maintain the operation of the agriculture industry and decrease the instability of on-farm income.

However, although government subsidies mitigate the income loss from natural disaster shocks, a great body of literature has provided evidence that farm households allocate labor into the off-farm sector as a mechanism to deal with disaster shocks (Cameron & Worswick, 2003). Beach and Kulcsár (2015) claim that people choose to work off-farm due to the financial pressure on farm families to seek additional income. More intense and frequent natural disaster shocks may cause a greater transition of farm household labor supply to off-farm work. Moreover, Mishra and Sandretto (2002) found that off-farm income played a more important role in stabilizing farm household income than did government farm program payments.

The phenomenon of the increasing off-farm participation among farm households not only can be found in developing countries, but also in developed countries (e.g. Ahearn *et al.*, 2006; Cunguara *et al.*, 2011). In Taiwan, the Farm Household Census in 2010 showed that 45% of farm household members participated in off-farm activities, and that the total may continue to increase in the future. Therefore, a better welfare

program is necessary in order to increase the willingness of farm household members to remain on-farm.

According to UNISDR (2009), compared with other Western countries, farmers in Asian countries are more likely to suffer from intense crop loss. Also, the frequent and variety of natural disasters put Taiwan in a high risk position compared with other developed countries in Asia, therefore, an efficacious disaster relief program is especially necessary for farmers in Taiwan.

So far, most research topics on disaster relief act have focused on the allocation of subsidies (Garrett & Sobel, 2003; Chang & Zilberman, 2014) or the efficiency of relief payment (Park & Wang, 2017; Cheng *et al.*, 2015). In contrast to the large amount of empirical studies on the ex-post evaluation of disaster relief payment, not much attention has been paid so far to the impacts of disaster relief payment on individual farm household members.

Given the importance of the disaster relief program and lack of relevant research in Asia countries, this article focuses on the impacts of natural disaster payment on Taiwan farmers' labor supply.

To summarize, although natural disasters cause significant reallocation in the farm labor supply, government relief payment plays an important role in the allocation of the labor supply in on-farm and off-farm work. The primary objective of this study is to contribute to the limited evidence of disaster relief payments on on-farm and off-farm labor decisions of the farm couples in Taiwan.

The remainder of this paper is organized as follows. Introduction of Farm Household Survey Data and Agricultural Disaster Assistance Program Data followed by the process to merge the data and sample statistics of the chosen variables will be shown in Chapter 2. Chapter 3 outlines the econometric method used in this study. In Chapter 4, the empirical results of how government payment affects labor decisions of farm couples are presented. Chapter 5 includes a conclusion of the study.

2. Data

In this section, the data sets used in our empirical analysis and the procedure for merging the data sets are introduced. Next, chosen variables are shown with variable definitions and measures. At last, sample statistics table of the chosen variables is summarized.

2.1 Data Source

The primary dataset used in this study is a 5-year (2009, 2011, 2012, 2013, and 2014) Taiwan Area Farming Household Survey in Taiwan, conducted by the Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Republic of China, Taiwan. In order to enhance the well-being of the farm household, policy makers have gathered information of all farm households in Taiwan by conducting Agriculture, Forestry, Fishery and Husbandry Census' survey (AFFHC) every 5 years since 1956. Though the AFFHC provide overall information for policy evaluation, it costs plenty of time and money to perform every year. In response to the need of instant data to face the changing world, Taiwan Area Farming Household Survey has been held in the years between census' survey years since 1977.

Taiwan Area Farming Household Survey is conducted using stratified two-stage sampling¹. First, by calculating the proportion of farm household operation type, all villages will be stratified into 120 classes – 6 farm operation classes (rice, vegetable, fruit, other crops, livestock, not engaged in farm work) X 20 counties. Next, approximately 7500 households will be chosen from the stratified samples according to the magnitude of each stratum in the second stage. Face-to-face interview of all chosen household individuals will be held in order to capture the labor supply structure status and structural change of the farmers.

Since the impact of government disaster payment on farm household labor supply is the main interest in this study, natural disaster relief payments data are used herein. The agricultural disaster assistance program data is provided by Agriculture and Food Agency, Council of Agriculture, Executive Yuan, Republic of China, Taiwan. The data set provides information on number of recipients, total subsidies, and subsidized land for every natural disaster event in town-level.

¹ Listed sampling method is based on Taiwan Area Farming Household Survey in 2014. Stratification and numbers of determination households may exist little difference each year.

To analyze the impact of natural disaster subsidy on farm household labor allocation, first farm household data is merged into individual data by using house id as a key. Meanwhile, agricultural disaster assistance program data each year is aggregate to town-level. Next, after deleting outlier and missing data, the farm household member data contains five-year cross-section household data with 124,827 individuals. The two data sets are merged by town id within separated year. At last, by combining data of separate years, this research contains 124,827 samples which include individual and household characteristics of aged over 15 farm household members with natural disaster payment data.

2.2 Definitions and measures of the selected variables

Each year, Taiwan Area Farming Household Survey collects information on household characteristic, individual socio-demographic characteristics and on-farm/off-farm status. To analyze the impact of government subsidies on labor decisions, household and individual factors that are potential determinants of labor supply decisions are controlled. Table 1 report definitions and descriptive statistic of all variables used in this study.

In the questionnaire, all aged over 15 family members are instructed to fill in their working status. First, respondents will be asked whether working on-farm and off-farm or not. If yes, then the respondents will be asked to answer further questions about their working position and working days in the surveyed year. Therefore, whether working on-farm (FARMWORK) and off-farm (OFFFARMWORK) or not are chosen as our dependent variable. Furthermore, dummy variables of on-farm and off-farm work position are generated to see the impact of natural disaster on different work categories. On-farm work is classified into main on-farm worker (MAINWORKER) and on-farm assistant (NONMAINWORKER); off-farm work is classified into three dummy variables- work as an employer or own a business (SELF-EMPLOYED), working in the private company as an employee (PRIVATE) and other off-farm works ² (OTHERWORK). At last, on-farm working days per year (FARMDAY) and off-farm working days per year (OFFFARMDAY) are chosen to see the intensive effect of the natural disaster and government payment on labor supply. Group midpoint of working

² Other off-farm work includes working in government agencies or work in a family business with no pay.

days is calculated from the questionnaire to create continuous variable FARMDAY and OFFFARMDAY.

To examine the impact of natural disaster payment on labor supply, the dummy variable (PAYMENT_D) is generated and equals to one if the household received natural disaster during the year. Also, the total received disaster payments (PAYMENT) is included in the unit of NTD 10 million per household, which is calculated by total received payment of the town divided by a number of recipients.

From Goodwin and Mishra (2004) and Larson and Hu (1977), it is evident that household characteristics play an important role in on-farm and off-farm allocation. As a result, three aspects of household characteristic variables are included in our study. The first household feature is family size. Number of family farm household members (FAMILY), the ratio of male adults to family members (ADULTMALE) and the ratio of male adults to family members (ADULTFEMALE) are chosen to capture the composition of effective labor in the family. The second feature of farm household is farm size. Total arable land in the unit of a hectare (LAND) and rate of self-owned land to farm size (SELF-LAND) are chosen. The third feature of farm household is farm business type. Permanent crops are categorized as rice (RICE), grains (GRAIN), vegetables (VEGETABLE), fruits (FRUIT) and other crops (CROP). Other crop type consists of flower, mushroom, sprout and special crop. In addition, livestock farm (OTHER) is chosen as the base in our research.

Other individual attributes such as gender, age, education and marital status also affect labor supply decisions (Sheu *et al.*, 2016). Variable MALE is used to depict the gender of the respondent. All aged (AGE) over 15 household individuals are included in the research. Education is expressed in 5 dummy variables (NONE, ELEMENTARY, JUNIOR, HIGH, and UNIVERSITY), ranging from illiterate to university degree. Among them, illiterate is the base. Marital status (MARRIED) equals to one if the respondent is married, keeping other marital status³ as the base. Except for age, all individual characteristics are presented using binary variables.

Furthermore, county control variables are added in our study to control geographical and location indicators among county. Total arable land in the county (CULTIVATELAND), the rate of arable land of the county (CULTIVATERATE) and the population density of the county (DENSITY) are chosen.

³ Other marital status includes unmarried, divorced or widowed in the questionnaire.

2.3 Sample statistics of the data set

The final sample consists of 124,827 farmers. To highlight the differences in receiving disaster payment, sample statistics are not only displayed with a full sample but also by receiving payment (Treatment group) or not (Control group). Also, t-tests are tested for the mean equality between two groups.

Dependent variables used in the study are classified into on-farm and off-farm variable. Sample statistics of independent variables will be displayed in five categories: payment variable, household characteristic, socio-demographic characteristic, and county control. Detailed definitions and sample statistics of all selected variables are presented in Table 1.

2.3.1 Dependent variable

As presented in Table 1, 55% of the surveyed individuals work on-farm- 30% work as main on-farm worker and 25% work as on-farm assistant; 42% of the respondents work off-farm- 30% work in private company, 6% work as employer and 5% work in government agencies or work in family business. Also, on-farm working days per year shows an average of 48 days while the mean of off-farm working days per year is 89 days.

We test for mean equality of the dependent variable between treatment group and control group using t-test. Except for the variable OTHERWORK, all dependent variables show significant difference among two groups which shows a difference in labor decisions among received disaster relief payment and none received sample.

For those received natural disaster subsidies, the proportion of on-farm working farm household members (57%) is more than the control group (52%). On the contrary, the treatment group has a lower age of off-farm workers (41%) than the control group (43%).

2.3.2 Independent variable

The definition and sample statistics of the chosen independent variable are also shown in Table 1. First, the payment variables are the main interest in our study. 61% of the respondents lived in household that received payment in the survey year.

Other than payment variables, household characteristics, socio-demographic characteristics, and county variables are also added as control variables. For household variables, ratio of male adults to family members do not show significant difference between treatment and control group. The mean of number of family members is 4.76.

Mean of total farm lands of the treatment group is 0.86 hectare which is 0.18 hectare more than the control group. The ratio of self-owned land is 89% in the treatment group which is 2 percent less than the control group. For the permanent crop type, 30% of the farm households participate in rice production, 24% of farm household grew fruit, and 21% of the farm household grew vegetables.

For individual characteristics, 52% of the respondent is male while 48% is female. The average age of the total sample is 50.43. As for education, 25% of respondents received university degree or above and 15% of the respondents are illiterate. The variable MARRIED show that 62% of the total sample are married.

Mean of the total arable land in the county is 53.77 km²; mean of the rate of arable land of the county is 29.96% and mean of population density of the county is 1000 person per km². The mean of total arable land of the treatment group is 59.13 which is more than the control group (45.47). The mean of treatment group is 745 people per km² which is less than population density of the control group (1569).

Table 1 Sample statistics of labor supplies between treatment and control group

		Total N=124,827 (100%)		Treatment ^{#1} N=75,880 (61%)		Control ^{#2} N=48,947 (39%)		Difference (#2-#1)	
Individual		Mean	SD	Mean	SD	Mean	SD		
Dependent Variable									
On-Farm									
FARMWORK	If engaged in on-farm work(=1)	0.55	0.50	0.57	0.50	0.52	0.50	-0.05	***
MAIN-WORKER	If worked on-farm as main on-farm worker (=1)	0.30	0.46	0.31	0.46	0.29	0.45	-0.02	***
NONMAIN-WORKER	If worked on-farm as assistant worker (=1)	0.25	0.43	0.26	0.44	0.23	0.42	-0.03	***
FARMDAY	Annual days working on the farm (days)	48.55	72.17	51.31	74.05	44.26	68.95	-7.05	***
Off-Farm									
OFFFARMWORK	If engaged in off-farm work (=1)	0.42	0.49	0.41	0.49	0.43	0.50	0.02	***
SELF-EMPLOYED	If worked off-farm as an employer (=1)	0.06	0.25	0.06	0.24	0.07	0.25	0.00	**
PRIVATE	If worked off-farm in a private company (=1)	0.30	0.46	0.29	0.45	0.31	0.46	0.02	***
OTHERWORK	If work as other off-farm worker (=1)	0.05	0.23	0.05	0.23	0.05	0.23	0.00	
OFFFARMDAY	Annual days working off the farm (days)	89.99	111.84	87.39	110.84	94.02	113.27	6.64	***

(continued)

Table 1 Sample statistics of labor supplies between treatment and control group (cont.)

		Total		Treatment ^{#1}		Control ^{#2}		Difference	
Individual		N=124,827		N=75,880		N=48,947		(N2-N1)	
		(100%)		(61%)		(39%)			
Variable		Definition		Mean	SD	Mean	SD	Mean	SD
Payment Variable									
PAYMENT_D	If received government payment in the survey year (=1)	0.61	0.49	1.00	0.00	0	0	-	-
PAYMENT	Total received disaster payments (in NTD 1 million)	0.035	0.846	0.057	1.084	0	0	-	-
House Characteristics									
ADULTMALE	Ratio of male adults to family members	0.47	0.19	0.47	0.19	0.47	0.18	0.00	
ADULTFEMALE	Ratio of female adults to family members	0.44	0.18	0.43	0.18	0.44	0.18	0.01	***
FAMILY	Number of family farm household members (person)	4.76	2.22	4.74	2.23	4.80	2.22	0.06	***
LAND	Total arable land (hectares)	0.79	1.77	0.86	1.93	0.68	1.50	-0.18	***
SELF-LAND	Rate of self-owned land to farm size	0.90	0.26	0.89	0.27	0.91	0.25	0.02	***
RICE	If a rice farm (=1)	0.30	0.46	0.34	0.47	0.24	0.43	-0.10	***
GRAIN	If a cash grain farm (=1)	0.05	0.22	0.05	0.22	0.06	0.23	0.01	***
VEGETABLE	If a vegetable farm (=1)	0.21	0.40	0.16	0.37	0.27	0.45	0.11	***
FRUIT	If a fruit farm (=1)	0.24	0.43	0.26	0.44	0.22	0.41	-0.04	***
CROP	If an other-crop farm (=1)	0.12	0.33	0.13	0.33	0.12	0.32	-0.01	***
OTHER*	If a livestock farm (=1)	0.08	0.27	0.06	0.24	0.10	0.29	0.03	***

(continued)

Table 1 Sample statistics of labor supplies between treatment and control group (cont.)

		Total		Treatment ^{#1}		Control ^{#2}		Difference	
Individual		N=124,827		N=75,880		N=48,947		(N2-N1)	
		(100%)		(61%)		(39%)			
Variable	Definition	Mean	SD	Mean	SD	Mean	SD		
Socio-demographic Characteristics									
MALE	If male (=1)	0.52	0.50	0.52	0.50	0.52	0.50	0.00	
AGE	Individual age (years)	50.43	19.45	50.58	19.45	50.19	19.46	-0.38	***
UNIVERSITY	If finished college degree or higher(=1)	0.25	0.43	0.24	0.42	0.27	0.44	0.03	***
HIGH	If finished senior high school(=1)	0.28	0.45	0.28	0.45	0.27	0.44	-0.01	***
JUNIOR	If finished junior high school (=1)	0.15	0.36	0.15	0.36	0.15	0.36	0.00	
ELEMENTARY	If finished elementary school (=1)	0.23	0.42	0.24	0.42	0.23	0.42	-0.01	***
NONE*	If illiterate (=1)	0.09	0.29	0.10	0.30	0.09	0.28	-0.01	***
MARRIED	If married (=1)	0.62	0.48	0.63	0.48	0.62	0.49	-0.01	***
(continued)									

(continued)

Table 1 Sample statistics of labor supplies between treatment and control group (cont.)

		Total		Treatment ^{#1}		Control ^{#2}		Difference	
Individual		N=124,827		N=75,880		N=48,947		(N2-N1)	
		(100%)		(61%)		(39%)			
Variable	Definition	Mean	SD	Mean	SD	Mean	SD		
County Characteristics									
CULTIVATELAND	Total arable land of the county (km ²)	53.77	23.85	59.13	21.37	45.47	25.09	-13.66	***
CULTIVATERATE	Rate of arable land of the county (%)	29.96	16.20	31.67	16.55	27.31	15.27	-4.35	***
DENSITY	Population density of the county (100 person per km ²)	10.68	14.07	7.45	6.47	15.69	19.97	8.24	***

Note: * variable is the base.

*P < 0.10; **P < 0.05; ***P < 0.01

#1: Received natural disaster payment in the surveyed year.

#2: Do not received natural disaster payment in the surveyed year.

3. Methodology

To examine the effect of the disaster payments on farm household members' labor supply and to control for potential endogeneity, our empirical analysis adopt the panel data fixed effect mode.

The fixed effect equation can be specified as:

$$Y_{ijt} = \beta_0 + \beta_1 D_{jt} + \beta_2 X_{ijt} + \alpha_j + \varepsilon_{ijt} \quad (1)$$

for individuals $i = 1, \dots, N$ where

Y_{ijt} denotes the on/off-farm decisions of individual farmer i in town j and year t ,

D_{jt} is the payment variable (received payment or not/the amount of payment received in town j on year t),

X_{ijt} is a vector of household characteristic, socio-demographic factors, and city controls,

α_j accounts for the control of town.

Since some of our dependent variables (on-farm/off-farm decisions) are binary, linear probability model (LPM) is applied for estimation. LPM has been known for its limitation that independent variable may not be bounded between 0 and 1 and the existence of heteroscedasticity (Horrace & Oaxaca, 2006). Though logistic model and probit model have been commonly applied for a binary dependent variable, ordinary least square (OLS) estimation on LPM is still used. According to He and Yang (2015), the estimation of LPM has no significant difference with other discrete for example probit models when using large samples. Therefore, LPM is applied with town fixed-effect in this study to answer the question of the impact of relief payment on labor decisions.

4. Empirical Results

Tables 2 and 3 report the summary estimation results of the impacts of natural disaster and government payment on the labor supply decisions of the separated sample: the head of the farm household and the head's spouse, respectively.

For the head of the household, the result in Table 2 shows that receiving disaster payment or not receiving it does not affect the on-farm labor supply, but does increase the off-farm labor supply by 3.56%. The payment also decreases 8.95 on-farm working days and increases 2.06 off-farm working days. The amount of subsidies also affects the on-farm and off-farm labor supply of the household heads. Heads increase the possibility to engage in on-farm work and as a main worker at 1.33% and 1.18%, respectively, for an addition of 1 million payments. Also, the possibility to engage in off-farm work and the number of off-farm working days decrease at 2.43% and 1.28 days, respectively. Owing to the government subsidies to cover crop loss from on-farm work, farmers increase their off-farm working days for obtaining more family income. However, as the payment increases, farm household heads reallocate work engagement from off-farm work to on-farm work.

Differing from the farm heads, disaster payments impose a negative effect on the on-farm willingness of the spouses (the effect is -3.24%) and also a significant effect on on-farm assistants (the effect is -3.61%). At the same time, disaster payment decreases on-farm working days of the spouses by 9.44 days. In general, on-farm labor supply decisions of spouses are negatively associated with government payment. Similar to farm heads, disaster payment increases the probability to work off-farm at 8.70% of spouses; the increase is especially significant in working at an off-farm private company (the effect is 14.19%). Also, disaster payment increases 3.23 off-farm working days of the spouses. The amount of disaster payment only influences the on-farm working days of the spouses, decreasing 1.81 on-farm working days for an addition of 1 million payments.

Table 2 Estimation results of labor supply decisions of the head of the farm household

	Head							
	PAYMENT_D				PAYMENT			
	N=37033				N=37033			
	R2	Coefficient	SE	%	R2	Coefficient	SE	%
panel 1: farm work								
FARMWORK	0.01	0.00	0.00	-0.21%	0.01	0.01 ***	0.00	1.33%
MAIN-WORKER	0.01	0.00	0.01	0.58%	0.01	0.01 ***	0.00	1.18%
NONMAIN-WORKER	0.01	-0.01	0.00	-5.05%	0.01	0.00	0.00	2.28%
FARMDAY	0.00	-8.95 ***	0.96	-10.20%	0.00	-0.31	0.42	-0.35%
panel 2: off-farm work								
OFFFARMWORK	0.15	0.01 *	0.01	3.56%	0.14	-0.01 ***	0.00	-2.43%
SELF-EMPLOYED	0.00	0.00	0.00	2.84%	0.00	0.00	0.00	-2.04%
PRIVATE	0.08	0.01	0.00	4.44%	0.09	0.00	0.00	-1.95%
OTHERWORK	0.00	0.00	0.00	-0.72%	0.00	0.00 *	0.00	-6.25%
OFFFARMDAY	0.23	2.06 *	1.06	3.93%	0.21	-1.28 ***	0.47	-2.44%

*P < 0.10; **P < 0.05; ***P < 0.01

Table 3 Estimation results of labor supply decisions of the head's spouse

	Spouse							
	PAYMENT_D				PAYMENT			
	N=25479				N=25479			
	R2	Coefficient	SE	%	R2	Coefficient	SE	%
panel 1: farm work								
FARMWORK	0.03	-0.02 ***	0.01	-3.24%	0.02	-0.00	0.00	-0.55%
MAIN-WORKER	0.03	0.00	0.01	-2.21%	0.03	-0.00	0.00	-2.00%
NONMAIN-WORKER	0.02	-0.02 **	0.01	-3.61%	0.02	-0.00	0.00	-0.20%
FARMDAY	0.00	-9.44 ***	1.08	-16.96%	0.00	-1.81 ***	0.62	-3.25%
panel 2: off-farm work								
OFFFARMWORK	0.04	0.02 ***	0.01	8.70%	0.04	-0.00	0.00	-2.07%
SELF-EMPLOYED	0.00	-0.01	0.00	-12.62%	0.00	-0.00	0.00	-2.05%
PRIVATE	0.03	0.02 ***	0.01	14.19%	0.03	-0.00	0.00	-1.12%
OTHERWORK	0.00	0.01	0.00	11.02%	0.00	-0.00	0.00	-1.77%
OFFFARMDAY	0.12	3.23 **	1.35	6.82%	0.11	-0.91	0.77	-1.93%

*P < 0.10; **P < 0.05; ***P < 0.01

5. Conclusions

Natural disaster shocks have proven to exert adverse influences on farm production and household income. While the government provides disaster relief payment to support crop loss, most households allocate labor into the off-farm sector in order to increase household income. Given the pull and push among subsidies and off-farm income, our study elucidates the labor decision of farm couples and provides policy suggestions. A great body of the relevant literature highlights the importance of government policy on farm household labor supply (e.g. Ahearn *et al.*, 2006; Yao *et al.*, 2010); however, owing to the different intentions of the policy, the impact on farm households may totally differ. This paper contributes to the limited evidence on the disaster relief act by assessing the extent to which labor supply decisions are determined by agricultural disaster payments.

Using a unique data set that combines the cash aids data of the Agricultural Natural Disaster Relief program and Taiwan Area Farming Household Survey data, this study reveals some interesting findings. Both head of the household and head's spouse increase off-farm labor supply when received government payment. This study shows similar results to those of other studies that focus on the impact of government payment on farm couples (e.g. El-Osta *et al.*, 2008) whereby payment increases the possibility for spouses to work off-farm. Also, the increase in relief payment do not affect the labor supply decisions of the spouses. However, more disaster payments lead to a higher (lower) possibility of the farm household head to engage in on-farm (off-farm) work.

The policy implication of these primary findings is straightforward: the amount of subsidies distributed plays an important role in influencing the labor decision of the workers. Not only did the disaster relief payment increase the well-being of the farm household by increasing farm household income, but more subsidies also provide more leisure time for the farmers. If excessive subsidies are assigned, the supply of crop production may be insufficient to maintain the food security of the country. Therefore, a more efficient management of the agricultural disaster relief system, along with employment counseling, is needed to stabilize the employment environment.

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