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Off-farm Employment and Food Consumption at Home and away from Home: Evidence from Farm Households in Taiwan

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Introduction

Off-farm work by farm households has increased steadily over several decades. The large proportions of farm households participating in the off-farm labor markets have been evident in many countries (e.g., Glauben et al. 2008; Mishra et al. 2002; Kimhi 1994, 1996, 2000; Lim et al. 2002). For instance, nearly 80% of farm household income originates from off-farm sources in the United States (El-Osta et al. 2008). In Taiwan, approximately 75% of the farm households reported wages earnings from an off-farm job based on 2001 Census of Agriculture. Also, off-farm work has been seen as a lifestyle choice with farming being a second job of the farm household.

A growing body of literature has investigated farm households' decisions to work off the farm. Many studies have examined the role of household characteristics and human capital of the farm operator and the spouse, and farm programs on off-farm labor supply (e.g., Huffman and Lange 1989; Kimhi 1994, 2004; El-Osta et al. 2004; El-Osta et al. 2008). However, the linkage between off-farm work and food expenses has largely gone unaddressed. This study contributes to literature by examining the effects of off-farm work on food consumption by farm households in Taiwan. This issue is of important policy relevance as food consumption has been recognized as a more reliable indicator of farm household well-being than income (e.g., Barry et al. 1995; Slesnik 1994). Due to the stochastic nature of farm income caused by weather conditions and commodity markets, many farm families rely on savings and/or borrowing to maintain a steady flow of consumption in the face of large income shocks. As such, household food expenditures are better measures of households' long-term welfare (e.g., McGregor and Barooah 1992). Also, with the growing concerns about the relationship between food consumption away from home and unhealthy diet, our analysis demonstrates an undesired effect of the off-farm work by the farm household on health.

While we follow the literature in distinguishing between off-farm works by the farm operator and the spouse (Ahearn et al. 2006; Huffman and Lange 1989), two features distinguish this study from previous studies. First, we investigate the effects of off-farm work on food consumption, rather than household income. Second, we address the endogeneity of operator and spouse's off-farm work decisions in food consumption, both at home (multiple categories) and away from home. By distinguishing among food categories, we are able to investigate the extent to which off-farm work by the operator and the spouse may affect the allocation of food budget between at home and away from home, and among food consumed at home.

Data

Our data are drawn from the 2005 and 2006 Surveys of Family Income and Expenditure (SFIEs), conducted by Taiwan's Directorate General of Budget,

Accounting and Statistics (DGBAS 2005, 2006). The SFIE survey was conducted every two years prior to 1976 and annually thereafter. Each year, approximately 12,000 households were interviewed. Data collected included income earned by family members from salaries, entrepreneurial, property, and government transfers, as well as expenditures on both durable and nondurable goods in different categories. In DBGAS 2005 and 2006, 2276 farm households were included. To address the role of off-farm employment by the operator and spouse in food consumption, we restrict our sample to farm households with married couples. After excluding households with missing values on operator or spouse characteristics such as age and education, the final sample includes 1819 farm households.

Binary indicators are used for the operator and the spouse's off-farm work. The other endogenous (dependent) variables include expenditures on five food categories: (total) food consumed away from home, and staple food, secondary food, dairy products, and fruit products consumed at home. Staple food includes raw food items such as rice, noodles and other grain products; secondary food includes meat, fish, vegetables and oils; dairy products include milk, yogurt and other food made of milk; fruit products consist of all kinds of fruits. Food consumed away from home is aggregated in one category. All expenditures are on the per capita basis per year.

Sample means of food expenditures by the operator's and spouse's off-farm work statuses are reported in table 1. Off-farm works generally are related with larger food expenditures away from home but smaller food expenditures at home. For instance, the mean food expenditures away from home and at home are NT$6420 and NT$26860 per capita per year for households not working off the farm; the corresponding means are NT$11210 and NTS24200 for households with both operator and spouse working off the farm. Expenditures on staple food, secondary food, and fruit products at home are smaller for households with off-farm work.

Drawing on previous studies of off-farm labor supply (e.g., Ahearn et al. 2006; El-Osta et al. 2008; Lim et al. 2002; Huffman and Lang 1989) and food consumption in the general population (e.g., Byrne et al., 1996; Jensen and Yen 1996; Lee and Brown 1986; McCracken and Brandt 1987; Stewart and Yen 2004; Yen 1993), characteristics of the farm operator and spouse, financial situations, household characteristics, and local economic conditions are specified. The human capital of the operator and the spouse are reflected by age, and several dummy variables indicating education levels for the operator and the spouse (primary school, junior high, senior high, and college). Household characteristics variables include age compositions in three categories: numbers of household members' age < 6, age 6–18, and age > 65. To capture the effects of household income and wealth on off-farm work and food consumption, we include disposable income per capita, house size, the number of cars

owned, and a dummy variable indicating home ownership. To accommodate geographic heterogeneity geographic locations of the farm households are also included, with dummy variables indicating households' locations in urban, town, and village area, and in the northern, central, southern and eastern parts.

Finally, several variables are also included to capture the effects of the status of the local economy on off-farm work. They are average unemployment rate, and employment rates in the industry and service sectors. These variables are extracted from the Bureau of Economic Analysis' employment files and the 2004 Bureau of Labor Statistics Census, aggregated to the county level. Detailed definitions and sample statistics of all explanatory variables are presented in table 2.

Econometric Model

The model features 2 equations for binary off-farm decisions (d_{1i}, d_{2i}) and m equations for continuous food expenditures (y_{1i}, ..., y_{mi}) by household i. Participation in the off-farm labor market is governed by a binary probit mechanism such that:

(1)
$$d_{ki} = 1 \text{ if } z'_i \alpha_k + u_{ki} > 0$$
$$= 0 \text{ if } z'_i \alpha_k + u_{ki} \le 0, \quad k = 1,2$$

where z_i is a vector of exogenous variables and, for the off-farm work decision k, α_k is a conformable parameter vector and u_{ki} is a random error. To captures the effects of off-farm work on food expenditures, both binary employment variables appear in each of the food expenditure equations as endogenous regressors:

(2)
$$y_{ki} = x'_i \beta_k + \gamma_{k1} d_{1i} + \gamma_{k2} d_{2i} + v_{ki}, \quad k = 1,\ldots \text{m}$$

where x_i is a vector of exogenous variables and, for food expenditure k, β_k is a parameter vectors, γ_{k1} and γ_{k2} are scalar parameters, and v_{ki} are random errors.

Assume the concatenated error terms in Equations (1) and (2) are distributed as (m+2)-dimension normal distribution with zero means, covariance $\Sigma \equiv [\rho_{h\ell}\sigma_h\sigma_\ell]$.

Assuming dichotomous indicators $\kappa_{1i} = 2d_{1i} - 1$, $\kappa_{2i} = 2d_{2i} - 1$, and letting $\eta_{1i} = (z_i'\alpha_1 + \xi_{1i})/\omega_1$, $\eta_{2i} = (z_i'\alpha_2 + \xi_{2i})/\omega_2$ and $\tau_{12} = \omega_{12}/(\omega_1\omega_2)$. The likelihood function for an independent sample of size n is

(3)
$$L = \prod_{i=1}^{n} f(v_{1i}, v_{2i}, \ldots v_{mi}) \Phi_2(k_{1i}\eta_{1i}, k_{2i}\eta_{2i}; k_{1i}k_{2i}\tau_{12})$$

where Φ_2 is the bivariate standard normal cumulative distribution function (cdf). Maximum-likelihood (ML) estimation is carried out by maximizing the likelihood function (3). Given the consistent estimates, the effects of off-farm work on each food intake (y_{ki}) can be evaluated based on the conditional mean:

(4)
$$E(y_{ki} \mid d_{1i}, d_{2i}) = x_i'\beta_k + \gamma_{k1} d_{1i} + \gamma_{k2} d_{2i} + \sigma_k \rho_{k1} \lambda_{1i} + \sigma_k \rho_{k2} \lambda_{2i}$$

where

(5) $$\lambda_{1i} = \frac{\kappa_{1i}\phi(z_i'\alpha_1)\Phi[\kappa_2(z_i'\alpha_2 - \rho_{21}z_i'\alpha_1)/(1-\rho_{21}^2)^{1/2}]}{\Phi_2(\kappa_1 z_i'\alpha_1, \kappa_2 z_i'\alpha_2; \kappa_1\kappa_2\rho_{21})}$$

(6) $$\lambda_{2i} = \frac{\kappa_{2i}\phi(z_i'\alpha_2)\Phi[\kappa_1(z_i'\alpha_1 - \rho_{21}z_i'\alpha_2)/(1-\rho_{21}^2)^{1/2}]}{\Phi_2(\kappa_1 z_i'\alpha_1, \kappa_2 z_i'\alpha_2; \kappa_1\kappa_2\rho_{21})}.$$

In Equations (5) and (6), $\phi(\cdot)$ and $\Phi(\cdot)$ are the univariate standard normal pdf and cdf, respectively. The effects of participation in each activity can be derived. For example, the effects of the off-farm work of the operator and the spouse (separately) can be shown as calculated as, respectively:

(7) $$\begin{aligned} &E(y_{ki} \mid d_{1i}=1, d_{2i}=0) - E(y_{ki} \mid d_{1i}=0, d_{2i}=0) \\ &= [\gamma_{k1} + \sigma_k\rho_{k1}(\lambda_{1i}\mid_{d_{1i}=1} - \lambda_{1i}\mid_{d_{1i}=0})] + [\sigma_k\rho_{k2}(\lambda_{2i}\mid_{d_{2i}=1} - \lambda_{2i}\mid_{d_{2i}=0})]. \end{aligned}$$

(8) $$\begin{aligned} &E(y_{ki} \mid d_{1i}=0, d_{2i}=1) - E(y_{ki} \mid d_{1i}=0, d_{2i}=0) \\ &= [\sigma_k\rho_{k1}(\lambda_{1i}\mid_{d_{1i}=1} - \lambda_{1i}\mid_{d_{1i}=0})] + [\gamma_{k2} + \sigma_k\rho_{k2}(\lambda_{2i}\mid_{d_{2i}=1} - \lambda_{2i}\mid_{d_{2i}=0})]. \end{aligned}$$

Empirical Results

Table 3 presents ML estimates of the simultaneous equation system. Significance of the error correlations between the food expenditure equations and the off-farm labor equations suggests endogeneity of off-farm work in the food expenditure equations, and that failure to accommodate such endogeneity would cause simultaneous biases in parameter estimates of the food expenditure equations. Such endogeneity is specifically confirmed for operator's and spouse' off-farm work on the expenditures of food away from home and secondary food and fruit products; whereas spouse' off-farm work is also endogenous in the expenditure equation for staple food. Statistical significance of the error correlations among the expenditure equations also justifies estimation of these equations in a system in improving statistical efficiency of the parameter estimates. Corroborating results from previous studies of a positive correlation between the operator and the spouse's off-farm work (e.g., Huffman and Lange 1989; Lim et al. 2002), the error correlation between the two off-farm work equations is estimated at 0.357 and is statistically significant at the 1% level.

Factors Affecting Off-farm Work of the Operator and the Spouse

Results in table 3 also suggest that operator and spouse characteristics, household factors, and geographic locations are significant factors in off-farm work decisions of the operator and the spouse. Our results also confirm findings in existing literature that older farmers are more likely to work off the farm (Sumner 1982; Benjamin and Guyomard 1994). The effects of age are nonlinear, with the likelihood of engaging in off-farm labor market increasing with the operator's age, at a decreasing rate. This

nonlinear effect of operator's age on off-farm work is consistent with finding by El-Osta et al. (2004). Education of the operator is positively associated with his propensity to work off the farm. Compared to farm operators with a college degree or higher, those with only junior high school education are less likely to work off the farm. Human capital also matters in the spouse's decision to work off-farm. Spouses who are older or with better education are more likely to work off-farm than others and, as in their male counterparts, the effect of age is also nonlinear. This significant association between spouse's human capital and her off-farm work has been reported in previous studies (Kimhi 1994; Lim et al. 2002).

Household characteristics and geographic regions are also significantly related to operator's and spouse's decisions to work off-farm. For instance, operators and spouses living in households with higher income are more likely to work off-farm, which confirms findings in the literature (e.g., El-Osta et al. 2004). Urbanization is also a significant factor, with households in small villages being more likely to work off-farm than households in the urban and town areas. This effect of urbanization may reflect the fact that urban and town areas are more business intensive with more job opportunities off-farm, and this effect also relates to the negative association between operator's off-farm work and geographic locations. Compared to farm households in the northern part, households in the east are less likely to work off the farm.

Effects of Off-farm Work on Food Consumption

To fully explore the roles of off-farm employment by the operator and the spouse in food expenditures, we calculate the treatment effects for each activity on the means over the sample observations. For statistical inference, standard errors for the ATEs are calculated by the delta method. The results, presented in table 4, show that off-farm work increases food expenditure away from home. Specifically, compared with households not participating in off-farm employment, food expenditure away from home is NT$1399 higher per capita per year among households with an operator working off-farm and NT$1525 higher among households with a spouse working off-farm. As expected, the effect is more pronounced among households with both operator and spouse work off-farm; these households spend NT$3357 more on food away from home per capita per year than households not participating in off-farm employment. Our result is not inconsistent with the findings in many previous studies of the positive association between wives' employment and food expenditures away from home among the general population (Yen 1993).

On food expenditures at home, consistent with the prediction of the household production theory of time allocation, the effects of off-farm work on food expenditures at home are negative but much sparser, with significant and negative effects only on expenditure on staple food. Compared with households without

off-farm employment, the expenditure on staple food at home is NT$209 lower per capita per year when the operator works and NT$245 lower when both operator and spouse work off the farm. Off-farm work has no effect on expenditure of dairy products at home, but has marginally significant effects (p-value ≤ 0.12) on secondary food and fruit products. Specifically, compared to households with no off-farm employment, households with both operator and spouse working off the farm spend NT$849 less on secondary food and NT$393 less on fruit products per capita. The insignificant effects of off-farm employment on food expenditures at home reflect the unique farm family structure in Taiwan (and many other Asian countries), in which the elderly usually reside with or in the vicinity of their children, engaged in household work activities such as cooking and child care. This multi-generation family structure is very common among farm households in Taiwan.

The results in table 4 also highlight one of the emerging food issues in the United States: the inadequacy of fruit consumption. Recent studies have shown that fruit consumption by Americans has failed to meet the U.S. Department of Agriculture's recommended dietary guidelines (e.g., Blisard et al. 2004; Reed et al. 2004), and that the inadequate consumption is evident among all types of households. As such, promoting the consumption of fruit and vegetable has become one of the important policy objectives in the United States. A number of studies have tried to identify the factors that may contribute to the inadequate fruit consumption (e.g., Reed et al. 2004). We find the joint effects of operator's and spouse's off-farm employment marginally significant in fruit products consumption at home.

Other Factors Affecting Food Consumption

The other contributing factors of food expenditures include human capital of the operator and the spouse, household characteristics, and geographic location (table 3). House size and the number of cars, both as proxies for household assets, have significant and positive effects on food expenditure away from home. Surprisingly, income does not affect expenditures on food away from home, although its effects are significant and positive on staple food and, most notably, on fruit products at home.

Household age composition, which reflects family structure, plays a definitive role in determining food expenditures. Echoing findings reported in the literature (e.g., Keng and Lin 2005), the numbers of children age < 6 and adults age > 65 have significant and negative effects on food expenditure away from home. The number of adults age > 65 however has a positive effect on the expenditure in staple food. Our findings on the negative effect of the elderly on food away from home and positive effect on staple food at home reflect the general belief in Taiwan that the elderly prefer traditional staple food at home and are likely relatively too weak (physically) to dine out. The number of children age < 6 also has negative effects on expenditures on

secondary food and fruit products but, interestingly, a positive effect on dairy products. The number of family members age 6–17 has significant and negative effects on all food products at home.

The education level of the spouse significantly affects food expenditures both at home and away from home. The effect of urbanization is also evident, with households residing in urban and town areas spending more on food away from home. Finally, regional effects are present— compared with households in the north, households residing in the central part of the island spend more on dairy products but less on staple and fruit products. Households in the south spend more on food away from home and secondary food, dairy products and fruit products but less on staple foods. Not surprisingly, households in the east, a less developed area, spend less on staple food, dairy products and fruit products compared to those in the north.

Concluding and Policy Implications

Off-farm work has been recognized as one of the important sources of farm household income. Although many studies have examined the stimuli of off-farm labor supply, research on the association between off-farm labor supply and farm household well-being is limited. This study investigates the effects of off-farm employment on food expenditures by the farm household. In contrast to most previous studies on the topic, this study is unique in several ways. First, we accommodated the differentiated effects of off-farm work by the operator and the spouse on food expenditures. Second, endogeneity of off-farm employment in food expenditures is addressed. Third, we examine food expenditures away from home and multiple categories of food expenditures at home.

Using data from a national household survey in Taiwan, we estimate a simultaneous equation system by the ML method. Consistent with the household production theory, we find endogeneity of off-farm employment in food consumption, and that off-farm employment by the operator and spouse increases food expenditures away from home. Food expenditures at home generally decrease when the operator or the spouse works off the farm, with a notable (negative) effect found for staple food.

With the growing concerns about the relationship between food consumption away from home and unhealthy diet, and the resulting health outcomes such as obesity, our results suggest an undesired effect of the off-farm work by the farm household. While working off the farm increases farm household income, its contribution to an unhealthy diet and adverse health effects should also be recognized. Therefore, government policies such as the farm support programs which tend to promote off-farm work by the farm households, might also consider the tradeoff between supplemented farm income and health.

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Table 1. Sample Means of Food Expenditures per Household Member

Expenditure (NT$1,000 per year)	Full Sample	By Off-farm Working Status			
		Both	Spouse only	Operator only	Neither
Food away (from home)	8.33	11.21	8.97	9.04	6.42
		(75%)	(40%)	(41%)	--
Food at home					
Total	25.85	24.20	25.53	25.47	26.86
		(–10%)	(–5%)	(–5%)	--
Staple food	2.73	2.54	2.72	2.68	2.84
		(–11%)	(–4%)	(–6%)	--
Secondary food	17.01	15.68	16.76	16.74	17.80
		(–12%)	(–6%)	(–6%)	--
Dairy products	1.80	1.89	1.71	1.83	1.75
		(8%)	(–2%)	(5%)	--
Fruit products	4.32	4.08	4.34	4.22	4.47
		(–9%)	(–3%)	(–6%)	--
Sample size	1.82	0.40	0.10	0.46	0.86

Note: See text for details on components of food expenditures at home. Each percentage (in parentheses) measure the difference to the “Neither” group.

Table 2. Sample Means of Explanatory Variables (Sample Size = 1,819)

Variable	Definitions	Mean	SD
Endogenous variables (binary, yes = 1, no = 0)			
Off-farm (op.)	Operator works off-farm	0.47	
Off-farm (sp.)	Spouse works off-farm	0.27	
Continuous variables			
Age (op.)	Age of the operator	55.02	13.14
Age (sp.)	Age of the spouse	52.29	13.65
Dummy variables (yes = 1; no = 0)			
Junior high (op.)	Operator finished junior high school	0.60	
Senior high (op.)	Operator finished senior high school	0.29	
College (op.)	Operator has a college degree or higher (reference)	0.02	
Primary (sp.)	Spouse did not finish primary school	0.21	
Junior high (sp.)	Spouse finished junior high school	0.54	
Senior high (sp.)	Spouse finished senior high school	0.26	
College (sp.)	Spouse has a college degree or higher (reference)	0.02	
Continuous variables			
House size	House size (100 ping)	0.53	0.52
Cars	Number of cars owned	0.84	0.82
Income	Disposable income per household member (NT$100,000)	0.20	0.12
Age < 6	Number of household members age < 6	0.29	0.65
Age 6–17	Number of household members age 6–17	0.66	1.09
Age > 65	Number of household members age > 65	0.83	0.87
Dummy variables			
Homeowner	Household owns the house	0.98	
Continuous variables			
Unemployment	Average unemployment rate (÷ 100)	0.04	0.00
Employment (ind.)	Average employment rate in industry sector (÷ 100)	0.36	0.08
Employment (svc.)	Average employment rate in service sector (÷ 100)	0.50	0.07
Dummy variables			
Urban	Residing in an urban area	0.32	
Town	Residing in the town area	0.52	
Village	Residing in a small village (reference)	0.16	
Center	Residing in the central part	0.46	
South	Residing in the south	0.35	
East	Residing in the east	0.07	
North	Residing in the north (reference)	0.13	

Table 3. MLE Results of Food Expenditure System with Endogenous Off-farm Employment

	Off-Farm Employment		Food	Food at Home			
Variable	Operator	Spouse	away	Staple	Secondary	Dairy	Fruit
Constant	1.654	–1.111	–8.408***	3.475***	23.198***	1.403*	7.988***
	(1.186)	(1.121)	(3.048)	(0.536)	(3.298)	(0.736)	(1.321)
Age (op.)× 10^{-1}	0.170	–0.659	1.343**	–0.138*	–0.618	0.062	–0.497**
	(0.427)	(0.421)	(0.553)	(0.080)	(0.531)	(0.117)	(0.243)
< Primary (op.)	–0.528	–0.234	0.163	0.049	0.825	–0.091	–0.340
	(0.401)	(0.358)	(1.615)	(0.294)	(1.619)	(0.343)	(0.542)
Junior high (op.)	–0.733**	–0.371	1.811	0.188	–0.856	0.004	–0.474
	(0.363)	(0.286)	(1.331)	(0.257)	(1.515)	(0.313)	(0.498)
Senior high (op.)	–0.467	–0.254	1.210	0.074	–0.615	0.062	–0.104
	(0.388)	(0.288)	(1.407)	(0.275)	(1.594)	(0.347)	(0.569)
Age (sp.) × 10^{-1}	–0.001	1.416***	0.392	0.100	–0.196	–0.003	0.058
	(0.374)	(0.408)	(0.444)	(0.066)	(0.428)	(0.096)	(0.188)
< Primary (sp.)	–0.049	–0.467***	–0.976	0.007	1.485**	–0.299*	0.488
	(0.160)	(0.171)	(0.800)	(0.129)	(0.734)	(0.174)	(0.343)
Junior high (sp.)	0.138	–0.399***	0.420	0.128	0.450	–0.160	0.214
	(0.116)	(0.111)	(0.560)	(0.104)	(0.603)	(0.128)	(0.282)
Senior high (sp.)	–0.015	–0.152	1.107	0.034	0.450	0.039	–0.243
	(0.175)	(0.158)	(0.724)	(0.144)	(0.822)	(0.212)	(0.379)
Homeowner	0.005	0.181	0.293	–0.175	–0.880	–0.411	–0.676
	(0.226)	(0.324)	(1.154)	(0.207)	(1.179)	(0.346)	(0.446)
House size	–0.071	0.095	0.771**	–0.052	0.017	0.110	–0.119
	(0.075)	(0.075)	(0.356)	(0.066)	(0.350)	(0.070)	(0.152)
Cars	0.024	–0.007	0.855***	–0.028	–0.219	0.080	–0.072
	(0.060)	(0.057)	(0.244)	(0.046)	(0.262)	(0.054)	(0.113)
Income	1.233***	1.236***	–1.733	0.753**	4.691***	0.310	4.654***
	(0.327)	(0.347)	(2.149)	(0.348)	(1.588)	(0.539)	(0.709)
Age < 6	–0.038	0.011	–1.062***	–0.082	–0.943***	0.730***	–0.382***
	(0.068)	(0.067)	(0.329)	(0.057)	(0.297)	(0.051)	(0.153)
Age 6–17	0.052	0.027	0.108	–0.053	–0.395**	–0.149***	–0.146
	(0.040)	(0.038)	(0.183)	(0.039)	(0.195)	(0.046)	(0.091)
Age > 65	0.027	0.077	–1.492***	0.100***	0.205	0.072	–0.089
	(0.055)	(0.051)	(0.238)	(0.040)	(0.237)	(0.050)	(0.101)
Urban	0.639***	0.304***	0.816	0.058	0.839	0.119	0.124
	(0.121)	(0.120)	(0.608)	(0.107)	(0.616)	(0.133)	(0.246)
Town	0.414***	0.170	0.605	0.091	0.105	0.036	0.162
	(0.102)	(0.108)	(0.533)	(0.099)	(0.525)	(0.115)	(0.197)
Central	0.078	–0.043	0.567	–0.534***	0.632	0.286**	–0.426

	(0.133)	(0.136)	(0.611)	(0.091)	(0.540)	(0.122)	(0.268)
South	0.067	0.123	1.812***	–0.501***	1.528***	0.364***	0.557**
	(0.142)	(0.142)	(0.624)	(0.093)	(0.562)	(0.127)	(0.277)
East	–0.465***	–0.567***	0.538***	–1.047***	–2.342***	–0.601***	–0.997***
	(0.191)	(0.222)	(0.879)	(0.136)	(0.828)	(0.198)	(0.357)
Age^2 (op.) × 10^{-3}	–0.703*	0.543					
	(0.396)	(0.414)					
Age^2 (sp.) × 10^{-3}	–0.048	–1.754***					
	(0.371)	(0.430)					
Unemployment	–7.853	3.440					
	(9.879)	(9.799)					
Employment (ind.)	–0.051	–0.096					
	(0.605)	(0.605)					
Employment (svc.)	–0.264	–0.458					
	(0.673)	(0.703)					
Off-farm (op.)			6.000***	–0.719***	–2.459	0.240	–1.352**
			(1.400)	(0.224)	(1.663)	(0.350)	(0.647)
Off-farm (sp.)			5.524***	0.321*	–4.149***	–0.540	–1.218**
			(1.287)	(0.175)	(1.366)	(0.334)	(0.597)
Std. dev. (σ_i)			6.673***	1.089***	6.551***	1.382***	2.606***
			(0.236)	(0.026)	(0.195)	(0.025)	(0.065)
Error correlation (ρ_{ij})							
Off-farm (sp.)	0.357***						
	(0.048)						
Food away	–0.474***	–0.431***					
	(0.097)	(0.090)					
Staple	0.316***	–0.178**	–0.203***				
	(0.105)	(0.079)	(0.044)				
Secondary	0.274**	0.367***	–0.384***	0.255***			
	(0.142)	(0.107)	(0.042)	(0.033)			
Dairy	–0.075	0.161	–0.069	0.019	0.037		
	(0.146)	(0.143)	(0.052)	(0.038)	(0.043)		
Fruit	0.322***	0.295***	–0.227***	0.036	0.203***	0.046	
	(0.130)	(0.115)	(0.042)	(0.042)	(0.033)	(0.044)	
Log likelihood	–23336.838						

Note: Asymptotic standard errors in parentheses. Asterisks indicate levels of statistical significance:

** = 1%, ** = 5%, * = 10%.

Table 4: Effects of Off-farm Employment on Food Expenditures

Expenditure	Only Operator Works Off-farm		Only Spouse Works Off-farm		Both Work Off-farm	
(NT$1,000)	Effect	S.E.	Effect	S.E.	Effect	S.E.
Food away	1.399***	0.410	1.525***	0.398	3.357***	0.501
Food at home						
Staple	–0.209***	0.082	–0.096	0.072	–0.245**	0.103
Secondary	–0.311	0.483	–0.127	0.435	–0.849	0.549
Dairy	–0.064	0.107	0.010	0.092	–0.107	0.124
Fruit	–0.110	0.204	–0.167	0.199	–0.393	0.244

Note: Asterisks indicate levels of statistical significance: *** = 1%, ** = 5%