The Determinants of Participation Decision in Off-farm Work:

The Iowa Case

By

Chul-Woo Kwon, Peter Orazem, and Daniel Otto

Iowa State University

May 2002

Paper prepared for the American Agricultural Economics Assocation meetings in Long Beach, CA, July 28-31, 2002.

The Determinants of Participation Decision in Off-farm Work:

The Iowa Case

By

Chul-Woo Kwon, Peter Orazem, and Daniel Otto

Introduction

Our understanding of rural labor markets has improved considerably from the extensive research conducted in this area over the past two decades. In the early literature about the labor supply of rural household, the basic framework for empirical and theoretical studies was a single-worker time allocation model (Behrman and Wolfe, 1984; Simpson and Kapitany, 1983; Sumner, 1982; Bollman, 1979). Although a single-worker model has increased our understanding a worker's behavior and still provides useful concept to understand rural labor market, many later studies have pointed out the important role of a spouse's decision in affecting the operator's labor market decision. As a result, the two-workers model has become more popular for studying off-farm participation of households. (Huffman and Lange, 1989; Tokle and Huffman, 1991; Abdulai and Delgado, 1999; Weersink and Weerhewa, 1998; Skoufias, 1993; Weersink, 1992; Lass, Findeis, and Hallberg, 1989) This two-worker model provides more implications for labor decisions of the household: e.g. the substitution and income effect of spouse's wage and the changes in household production, wealth, taste, or the partner's reservation wage by changing spouse's human capital, the partner's labor participation decision relationship to changing his/her reservation wage. Also this two-workers model can increase the statistical efficiency of estimation (Tokle and Huffman, 1991).

Previous empirical studies of off-farm labor decision generally focused on the characteristics of and the factors affecting off-farm labor supply and participation decision. The general findings are the significant effects of human capital on labor demand and supply and the life-cycle effects of human capital. However, many studies have suggested including other important factors such as local labor market conditions, local amenity, farm type, family characteristic, and financial condition of household. The effects of distance from a metropolitan area and the number of dependents on the rural labor decision are largely observed in most literature about off-farm participation decision and off-farm labor demand. Furthermore, Tokle and Huffman (1991) indicated that local economic condition (anticipation of labor demand growth, higher unemployment rates, larger share of employment in services), and higher costs of living make wage premiums and the strength of these effects is stronger for males than females. Several papers showed that type of farm, e.g. number and kind of livestock, affects the labor decision of household (Lass, Findeis, and Hallberg, 1989; Weersink, Nicholson, and Weerhewa, 1998). Also the effects of farm and social support policies (Weersink, Nicholson, and Weerhewa, 1998), the farm ownership (Tavernier, Temel, and Li; 1997) and financial obligations of farm entry (Simpson and Marilyn Kapitany, 1983) were observed.

The purpose of this paper is to examine specific factors affecting farm household labor decisions and local labor market wages in nonagricultural sector. The factors include characteristics of the individual, the family, farm production, the farm family finances, and the region. Farm production characteristics can be endogenous rather than exogenous variables. This causality can be analyzed as long run and short run effects.

This approach hypothesizes that the influence of farmland price factor on labor participation decision can be understood as an indirect long run effect through changing farm size as well as their direct influence. The effects of an individual's off-farm experience on his/her wage are also examined. Although the effects of an individual's lifetime experience on a wage equation were reported in many studies, the role of the off-farm experience was seldom examined. Models reflecting these relationships are specified and estimated using the data of Iowa farmers and Iowa counties. After first discussing the time allocation model for husband and wife, the specified empirical model and variables are presented. In the following section, the data and the empirical result are presented and discussed.

Theoretical Model

The theoretical foundation of this paper is based on the agricultural household model that combines the agricultural production, the households' consumption, and the labor-supply for the off-farm wage work in a single framework. In the agricultural household model, the household utility is assumed to depend on leisure time of husband and wife (L_i), which are indexed separately, and of household consumption goods (Q):

(1) $$U = U(L_1, L_2, Q; H_1, H_2, \tau), \partial U / \partial X > 0, \partial^2 U / \partial X^2 < 0, X = L_i, Q, H_i \quad i = 1, 2$$

where i = 1 is husband, and i =2 is wife. Thus, U is household utility function, which is assumed to be monotone increasing in its arguments and strictly concave and to possess continuous second partial derivatives. The parameter H_i is human capital variable of husband and wife, and τ is other household and area characteristics. Thus, the level of utility achieved by the household also depends on efficiency of household production and local and household characteristics.

The household utility-maximization is subjected to constraints on net cash income, household production function, and endowed time constraint. Individuals can allocate time endowment to farming, off-farm work, and leisure:

$$(2) \qquad T = T_{i1} + T_{i2} + L_i \,.\; T_{i2} \geq 0 \text{ for } i\text{=1,2.}$$

where T is the total time endowment of the husband and wife, T_{i1} is farm work hours, T_{i2} is off-farm work hours, and L_i is leisure hours.

The farm household income source consists of the net return on the farming operation, off-farm work, and non-farm assets and the household cash income is uncertain because of uncertain employment prospect (Tokle and Huffman, 1991). If we ignore saving and investment to simplify the model, this income is spent on household consumption. Assuming the household faces perfectly competitive input and output markets, the budget constraint on household cash income is:

$$(3) \qquad P_y Y - \sum_x W_x X + \sum_{i=1}^{2} (1 - u_i) W_i T_{i2} + V = PQ \,,\; i = 1,2$$

where Y is the output produced from the farm, P_y is the price for farm output, X is the quantity of purchased farm inputs, W_x is the price of purchased farm inputs, u_i is the expected probability of unemployment, V is non-labor income, and P is the price for the consumption good purchased in the market.

The wage rates facing husbands and wives are assumed to depend on their marketable human capital characteristics (H_i) and local labor market condition (Θ).

(5) $$W_i = W_i(H_i, \Theta),\ i = 1,2$$

From this representation we can expect that changes in human capital or local labor condition change wage rates.

The technology of farm production is represented by production function with diminishing marginal returns to farming inputs. Also this production function may be affected by parameters.

(6) $$Y = f(T_{11}, T_{21}, X; H_1, H_2, \Delta), \partial Y / \partial T_{i1} > 0, \partial Y / \partial X > 0, i = 1,2$$

where Δ is exogenous farm-specific characteristics. This additional constraint from household production should be combined with other constraints.

From equations (1) ~ (6), we can obtain Lagrangian for household utility maximization.

$$(7) \quad L(X, T_{11}, T_{21}, T_{12}, T_{22}, L_1, L_2, Q; T, H_1, H_2, \tau, \Delta, \Theta, V, P, P_y, W_1, W_2, W_x, u_1, u_2) =$$

$$U(L_1, L_2, Q; H_1, H_2, \tau) + \lambda[P_y f(T_{11}, T_{21}, X; H_1, H_2, \Delta) - W_x X$$

$$+ \sum_{i=1}^{2} (1 - u_i) W_i T_{i2} + V - PQ] + \gamma[T - T_{i1} - T_{i2} - L_i], \; i = 1,2$$

where λ and γ are the Lagrangian multipliers.

Where the farm household is at an interior solution for all choices, this optimization problem gives us the structural demand functions for husband's and wife's farm labor, farm input, leisure, and consumption and the structural supply function for farm output and off-farm labor.

$$(8) \quad T_{i1}^* = d_{T_{i1}}^* (W_x, P, P_y, V; H_i, H_j, \tau, \Delta), \; i \neq j, \text{ and } i, j = 1,2$$

$$(9) \quad X^* = d_X^* (W_x, P, P_y, V; H_i, H_j, \tau, \Delta), \; i \neq j, \text{ and } i, j = 1,2$$

$$(10) \quad L_i^* = d_{L_i}^* (W_x, P, P_y, V; H_i, H_j, \tau, T), \; i \neq j, \text{ and } i, j = 1,2$$

$$(11) \quad Q^* = d_Q^* (W_x, P, P_y, V; H_i, H_j \tau, T), \; i \neq j, \text{ and } i, j = 1,2$$

$$(12) \quad T_{i2}^* = T - T_{i1}^* - L_i^* = s_{T_{i2}}^* (W_x, P, P_y, V; H_i, H_j, \tau, \Delta, T), \; i \neq j, \text{ and } i, j = 1,2$$

(see Huffman, Wallace E. "Agricultural Households Models: Survey and Critique" In *Multiple Job-holding among Farm Families,* ed. M. C. Hallberg, J. L. Findeis, and D. A. Lass. Ames: Iowa State University Press)

Econometric Model

The structural form of off-farm labor demand was already shown in equation (5). The off-farm work participation decision comes from comparison individual's expected market wage with his/her reservation wage. The reservation wage equation is derived from the labor supply equation in the household's utility maximization problem. If the individual's reservation wage is less than the expected off-farm wage rate, then he/she participates in off-farm work. In this decision, there exist four different cases: both husband and wife work off-farm ($W_H^R < W_H$ and $W_W^R < W_W$); wife works off-farm but husband does not ($W_H^R \geq W_H$ and $W_W^R < W_W$); husband works off-farm but wife does not ($W_H^R < W_H$ and $W_W^R \geq W_W$); both husband and wife do not work off-farm ($W_H^R \geq W_H$ and $W_W^R \geq W_W$). To describe individual's decision, define

$$D_i = \begin{cases} 0 & \text{if individual hosehold does not participate off - farm work} \\ 1 & \text{if husband only in individual participate off - farm work} \\ 2 & \text{if wife only in individual hosehold participate off - farm work} \\ 3 & \text{if husband and wife both in individual household particpate off - farm} \end{cases} \quad ,i = 1,2$$

Then the probability of participation decision of husband and wife can be estimated by using the multinomial logit model.

To specify model for off-farm participation decision, We choose five categories of variables: (1) individual characteristics, (2) family characteristics, (3) farm production characteristics, (4) financial characteristics of the farm family, and (5) locational characteristics. Following previous researches such as Huffman and Lange, 1989 and using those categories of variables, the specified model can be defined as

(29) $\Pr(D_i = j) =$

$$F(\beta_{i0} + \beta_{iIC_i} IC_i + \beta_{iFC} FC_i + \beta_{iFPC} FPC_i + \beta_{iFIC} FIC_i + \beta_{iLC} LC_i), \ i = 1,2 \ \ j = 0,1,2,3$$

where IC_i is individual characteristics which is related to human capital, FC_i is family characteristics, FPC_i is farm production characteristics, FIC_i is financial characteristics for the farm family, and LC_i is locational characteristics. Obviously efficiency parameters, τ, Θ, and Δ, are represented by FC_i, FPC_i, FIC_i, and LC_i.

The Data Description

The data used in this analysis were obtained from various sources. The data of individual and household characteristic, farm characteristics, and household's financial characteristics were obtained by a sample survey of Iowa farmers and spouse in August 1999. The data of price of farmland was collected from the Ag Land Value Survey that is conducted by the Economics Department at State University. The unemployment rate data for each county was obtained from data set of Iowa Workforce Development. Means, standard deviations, and definition of variables are given in Table 1.

Table 1. Data Definitions and Descriptive Statistics, Iowa Farm Household, 1999

Variable	Variable Description	Mean	Standard Error
Individual/Household			
Hage	Husband's age (year)	54.35	13.44

Hedu	Husband's education (year)	13.00	1.79
Wage	Wife's age (year)	52.23	13.02
Wedu	Wife's education (year)	13.31	1.45
Child	Number of children under age 18	0.79	1.16
Farm production and Financial characteristics			
Land	Average farmland price in each county (for all grade) (dollar)	1888.16	459.02
Prospect	Personal prospect of agricultural circumstance (-1 ~ 1)	-0.24	0.71
Cropld	Crop land acres	378.63	437.18
Pastld	Pasture acres	69.13	85.05
Hog	Market value of hogs (dollar)	138910.80	181558.90
Cattle	Market value of cattle (dollar)	46057.14	111642.30
Dairy	Market value of dairy (dollar)	159125.00	105872.50
Othliv	Market value of other livestock (dollar)	92786.67	163300.30
Locality			
Dist	Distance to nearest city (mile)	23.60	13.37
Purate [a]	Predicted unemployment rate of each county (percentage)	4.61	1.17

Dependent variables			
Hoff	1 if husband works for wage; 0 otherwise	0.53	0.50
Woff	1 if wife works for wage; 0 otherwise	0.63	0.48

a. The predicted unemployment rate was estimated by using AR(1) model with time series data of unemployment rate of each Iowa county for the period 1978-1998

In the original survey, education was surveyed as discrete date (1 ~ 5) by individual's educational level. I have converted this to schooling years. The data for personal prospect of agricultural circumstance was collected as discrete data (-1 ~ 1): negative (-1), neutral (0), and positive (1). The predicted unemployment rate was estimated by using AR(1) model with time series data of unemployment rate of each Iowa county for the period 1978-1999. Several previous studies used the AR(2) model to estimate anticipated unemployment rate (Topel, 1986; Tokle and Huffman, 1991) but PACF and ACF pattern of Iowa data suggested AR(1) rather than AR(2). The sample size of data used in estimation of participation equation is 276.

Empirical Result

As presented above, we can consider farm specific factors as exogenous in the short run. The results estimated using multinomial logit for off-farm wage work participation equations are reported in table 2. The corresponding elasticities are presented in table 3. These elasticities are calculated by estimating the percentage change in the predicted probability of each group from a 10% change in an individual exogenous variable holding all other variables at their sample mean. Many significant effects appear in the cases where only wife works in off-farm sector and that both of wife and husband work in off-farm work. The fewest significant effects are present in the case where only the husband works off-farm.

The household's human capital has strong influence in decision of household's participation. Increase in husband's age raises the probability of wife's labor supply to off-farm sector. Table 3 shows that 10% increase in husband's age raises the probability of wife's off-farm participation by 2.6%. This suggests that, as man becomes older, wife tends to earn more additional household income from off-farm work. Many previous researches that used bivariate probit model reported this negative relation between husband age (or education) and wife's participation. The increase in the age of wife seems to decrease wife's participation or household's participation in off-farm work. The result in table 3 shows that 10% increase in wife's age reduces the chance of wife's participation by 2.3% and couple's participation by 1.6%. The most studies that used bivariate model consistently reported that the increase in female age raises the female's off-farm labor supply but reduces the husband's off-farm participation. Our estimation shows quite different effects of wife age.

The level of individual's education also influences the household's labor decision. The higher education of husband raises the probability of husband's off-farm participation, but reduces the probability that only the wife works in the off-farm sector. Likewise, higher levels of education of the wife increases her off-farm work and reduces husband's. These effects are consistent with the previous studies that used bivariate models.

The estimation results show that if a household has more children, then both husband and wife tend to decrease off-farm labor supply. This negative sign is a little counterintuitive. In many previous studies, the children were grouped by their age; e.g. less than 6 years old, less than 12 years old, and less than 18 years old. However, our data does not have age information about children in the household. Therefore, it is difficult to interpret this negative effect of the number of children on the probability of household's off-farm participation. The elasticity in table 3 shows that this negative effect is significant in the case that husband and wife both work in off-farm sector.

Farm characteristics are relatively more important in affecting the wife's work force participation decision, individually and where both husband and wife work in off-farm. Although it is not significant, the size of cropland and livestock negatively related to men's off-farm participation. This suggests that if the farm is more labor intensive, the operator, who is usually the husband, tends to reduce his off-farm work and concentrate on farming. The results also indicate different signs for the effects of farm characteristics on husband or wife's labor supply. This suggests that the reduced opportunity for man's off-farm labor income is compensated by more off-farm labor participation of the wife. The elasticity in table 3 shows us that a 10% increase in hog production results in a 3% increase in the probability that the wife will work off-farm. In addition, the labor-intensive farming reduces the probability that both of husband and wife work in off-farm sector. We can see that a 10% increase in cropland size and in the value of dairy reduce the probability of off-farm participation of both of husband and wife by 9.9% and 5.4% respectively.

The effect of the predicted unemployment rate is significantly different from zero at the 5% level in the case where only the husband participates in off-farm work. When the predicted unemployment rate is high, the husband reduces his off-farm labor supply, although it is not statistically significant. Lass, Findeis, and Hallberg reported a similar pattern, though they used unemployment rate rather than predicted unemployment rate. If the demand for leisure increases as the expected wage decreases, a higher expected local unemployment rate will raise an individual's reservation wage and reduce the probability of participation in off-farm work. Simultaneously firms that expected high unemployment rates and anticipated a lack of labor force will pay higher wage rates to raise the probability of participation (Tokle and Huffman, 1991). The negative sign in the wife's participation model suggests that the first effect is dominant for women. The positive sign in husband's participation says that the second effect is dominant for men.

Summary and Conclusions

An off-farm work participation model and off-farm labor demand equation for Iowa are estimated using Iowa data to examine specific factors that affect household's decision and wage setting in local nonagricultural labor market. Also the effects of farmland price and distance to nearest city on farm size factors in long run are estimated, and their effect on the participation decision is analyzed. To capture jointly related household participation decision in off-farm work, a multi-nomial logit model was used. Heckman's two-step procedure was used to remove the selection bias in wage equation.

The result of this research shows the differences in determinants of rural labor decision between husband and wife.

The effects of human capital on the participation decision are clear and consistent with theoretical expectations in long run and short run. An increase in age and education raises the probability of labor supply to the off-farm sector. The effects for wife are stronger than that for husband, and the weak life-cycle effect of age was captured for both spouses. The education of spouse, the presence of children in household, and the individual's prospect of agricultural circumstance have no influences on the individual's participation decision. The effect of farmland price is very different between the long run and short run model, suggesting that farmland price influence farm size factors in long run rather than directly affecting participation in the short run.

The variables that represent the locational characteristics have significant effect on the participation decision in long run and short run. The effect of predicted unemployment rate is significantly different from zero at the 10% level in wife's decision of participation in long run and short run off-farm work. Short run and long run analysis that used for farmland price also is applied to distance to nearest city. Distance is negatively related to the probability of participation for male in short run estimation. This suggests that the more isolated farm household has lower probability of individual's participation in off-farm work because the more commuting distance decrease the net income by raising the cost of off-farm wage work. However the effect of distance to nearest city on male is positive in short run, suggesting that the distance to city increase the probability of household's long run off-farm participation by changing farm size factors in long run. Although the characteristics of farm are endogenous in long run, they are significantly and influences on man/woman's short run participation in off-farm wage work. If household runs more labor-intensive enterprises and larger farm, operator of farm and spouse will work less in nonagricultural sectors.

In estimation of off-farm wage equation, we find a little evidence that the on-farm experience by male or female reduces the effect of experience on the wage while off-farm experience reinforces the effect and there is no evidence of life-cycle effect of experience. The analysis of the distribution of hourly wage rate for men and women suggests that more women work for the low wage and this pattern dilute the effects of off-farm experience on wage. The impacts of education are clear and significant for both genders, implying that more investment in education causes more return in wage. Influences of distance to nearest city are significant in three wage equations but negative. This implies that there is no evidence of wage premium for locational disadvantage but individuals living in more isolated area are more willing to accept a lower wage offer.

References:

Behrman, J. R. and Wolfe, B. L. "Labor Force Participation and Earnings Determinants for women in the special conditions of Developing countries" *The Journal of Develop. Econ.* Vol. 15 (1984) 259-288

Bollman, Ray. D. "Off-farm Work by Farmers: An Application of The Kinked Demand Curve for Labor" *Can. J. Agr. Econ.* Vol. 27 (Nov. 1979) 37-60

Findeis, J. L., Lass, D. A., and Hallberg, M. C. "Effects of Location on Off-farm Employment Decisions" In *Multiple Job-holding among Farm Families,* ed. M. C. Hallberg, J. L. Findeis, and D. A. Lass. Ames: Iowa State University Press

Heckman, J. J. "Sample Selection Bias as a Specification Error" *Econometrica,* Vol 47 (Jan., 1979), 153-162

Huffman, Wallace E. "Agricultural Households Models: Survey and Critique" In *Multiple Job-holding among Farm Families,* ed. M. C. Hallberg, J. L. Findeis, and D. A. Lass. Ames: Iowa State University Press

Huffman, W. E. and Lange, M. "Off-Farm Work Decisions of Husbands and Wives*." Rev. Econ. And Statist.,* 71 (August 1989), 471-80

Johnson T. G. "The Market for Farm Family Labor" In *Multiple Job-holding among Farm Families,* ed. M. C. Hallberg, J. L. Findeis, and D. A. Lass. Ames: Iowa State University Press

Lass, D. A., Findeis, J. L., and Hallberg, M. C. "Factors Affecting the Supply of Off-farm Labor: A Review of Empirical Evidence" In *Multiple Job-holding among Farm Families,* ed. M. C. Hallberg, J. L. Findeis, and D. A. Lass. Ames: Iowa State University Press

Lass, D. A., Findeis, J. L., and Hallberg, M. C. "Off-farm Employment Decisions by Massachusetts Farm Households" *Northeastern J. Agr. Res. Econ.* Vol. 18 (1989) 149-159

Roback, J. "Wages, Rents, and Quality of Life." *The Journal of Political Economy,* 90 (Dec., 1982), 1257-1278

Simpson W. and Kapitany M. "The Off-farm Work Behavior of Farm Operators" *Amer. J. Agr. Econ.* Vol. 67 (Nov. 1983) 801-805

Skoufias, E. "Labor Market Opportunities and Intrafamily Time Allocation in Rural Households in South Asia" *The Journal of Develop. Econ.* Vol. 40 (1993) 277-310

Sumner, D. A. "Useful Directons for Research on Multiple Job- holding among Farm Families" In *Multiple Job-holding among Farm Families,* ed. M. C. Hallberg, J. L. Findeis, and D. A. Lass. Ames: Iowa State University Press

Sumner, D. A. "The Off-farm Labor Supply of Farmers" *Amer. J. Agr. Econ.* Vol. 62 (Aug. 1982) 499-509

Tavernier, E. M., Temel, T. T., and Li, F. "The Role of Farm Ownership in Off-farm Work Participation" *Agr. and Res. Econ. Rev.* Vol 26 (Apr. 1997) 67-81

Tokle, J. G. and Huffman, W. E. "Local Economic Conditions and Wage Labor Decisions of Farm and Rural Nonfarm Couples" *Amer. J. Agr. Econ.,* 73 (August 1991), 652-70

Topel, R. H. "Local Labor Markets " *The Journal of Political Economy*, 94 (Jun., 1986), S111- S143

Weersink, A. Nicholson, C. and Weerhewa, J "Multiple job holdings among dairy farm farmilies in New York and Ontario" *Agricultural Economics*, Vol 18 (1998), 127-143

Table 2. Multinomial Logit Estimates of Short Run Off-farm Labor Participation for Iowa Farm Household

	Husband Only Y=1		Wife Only Y=2		Both Y=3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
CONSTANT	-1.519	9.319	2.026	8.603	10.418	7.569
HAGE	0.045	0.095	0.154**	0.078	0.008	0.075
WAGE	-0.144	0.100	-0.262***	0.082	-0.191**	0.080
HSCHYR	0.299*	0.166	-0.047	0.143	0.039	0.126
WSCHYR	-0.261	0.201	0.316*	0.170	0.313**	0.153
CHILD	-0.239	0.350	-0.451	0.286	-0.533**	0.266
LNLAND	0.432	1.012	-0.021	0.961	-0.316	0.832
PROSPECT	0.039	0.353	-0.315	0.302	-0.197	0.279
LNCROPLD	-0.122	0.148	0.179	0.164	-0.309***	0.116
LNPASTLD	0.121	0.170	-0.012	0.147	-0.024	0.133
LNHOG	-4.183	224229	0.122*	0.056	-0.070	0.062
LNCATTLE	-0.042	0.068	0.063	0.056	0.007	0.052
LNDAIRY	-2.770	389159	0.050	0.085	-0.192*	0.109
LNOTHLIV	-4.432	385235	0.069	0.083	-0.068	0.093
LNDIST	0.292	0.273	-0.154	0.219	0.121	0.203
PURATE	0.505**	0.245	-0.036	0.204	-0.052	0.191

* statistically significant at the 10 % level

** statistically significant at the 5 % level

*** statistically significant at the 1 % level

Table 3. The Elasticities of the Short Run Off-farm Labor Participation

	None Y=0	Husband Only Y=1	Wife Only Y=2	Both Y=3
CONSTANT	-1.445	-0.000	-0.905	2.35
HAGE	-0.009	0.000	0.026**	-0.017
WAGE	0.038	0.000	-0.023***	-0.016**
HSCHYR	-0.002	0.000*	-0.013	0.016
WSCHYR	-0.057	-0.000	0.018*	0.038**
CHILD	0.093	0.000	-0.015	-0.078**
LNLAND	0.042	0.000	0.035	-0.076
PROSPECT	0.043	0.000	-0.032	-0.011
LNCROPLD	0.030	0.000	0.069	-0.099***
LNPASTLD	0.004	0.000	0.001	-0.005
LNHOG	0.002	-0.000	0.030*	-0.032
LNCATTLE	-0.004	-0.000	0.010	-0.006
LNDAIRY	0.022	-0.000	0.032	-0.054*
LNOTHLIV	0.005	-0.000	0.020	-0.025
LNNDIST	-0.007	0.000	-0.042	0.049
PURATE	0.009	0.000**	-0.000	-0.008

Partial derivatives of probabilities with respect to the vector of characteristics. They are computed at the means of the Xs. Observations used for means are all Observations. A full set is given for the entire set of outcomes, OFFPART=0 to OFFPART=3. Probabilities at the mean vector are 0=0.241 1=0.000 2=0.228 3=0.530