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OFF-FARM LABOUR DECISIONS BY FARMERS IN NORTHWEST SELANGOR INTEGRATED AGRICULTURAL DEVELOPMENT PROJECT (IADP) IN MALAYSIA

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ABSTRACT

Farmers are constantly faced with employment decisions off the farm. To work off farm would definitely increase their incomes but this will affect their farming jobs. This study analyses the farm labour decision making process of farmers in an IADP in Selangor, Malaysia. Results indicate the consistency of labour allocation decisions as in other past studies. Farmers do response rationally to favourable economic stimuli off the farm with respect to the labour supply decision making process.

I. INTRODUCTION

Many low-income countries have achieved rapid economic growth in recent years, but the benefits of the development have often been concentrated in the hands of only few individuals. Abject poverty among small farmers is still one of the most serious problems confronting these countries. The main strategies that have been used to counter poverty have revolved around the adoption of new technology and improved production services that can increase the productivity of resources used in agriculture. However, these strategies have often constrained the small farmers because of limited land holdings and lack of resources that prevent efficient use of technology.

Off-farm work is an alternative strategy that offers much potential for alleviating farm poverty. Empirical studies have revealed that off-farm income is growing in importance in most developed countries (Ahearn, et al, 1985; Barlett, 1986; Bollman, 1979; Fuller 1989, 1990; Gasson, 1986; Huffman, 1980; Pulver and Rogers, 1986; Robinson et al, 1982; Robson et al, 1987). These include the comprehensive documented literature in agricultural development by Frauendorfer (1966), Shand (1985) and Hallberg et al (1991).

The increasing importance of off-farm income may be a result of the increased financial obligations in agriculture (Simpson and Kapitany, 1983). Gunter and McNamara (1990) noted the use of off-farm income by the farm families to survive the downturns in the agricultural economy. The decision to work off the farm can also be explained by the neoclassical labor supply theory. The framework has been used in the study by Bollman (1979), Gould and Saupe (1989), Huffman and Lange (1989), Lass et al (1986), Simpson and Kapitany (1983),

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Sumner (1982) and Weersink (1992). According to the theory, off-farm work increases when the marginal return from off-farm work becomes greater than the marginal return to farms. Thus, changes in the relative returns and improved human capital skills can also explain the increasing importance of off-farm employment.

There are several reasons why understanding the off-farm work decisions by agricultural producers may be important. The first is that it may provide insights into the future structure of the agricultural sector. The second reason is related to the rural development issue of part-time farmers discussed by Bollman (1979). A policy goal of increasing farm income may be accomplished by increasing off-farm job opportunities and may also slow, rather than speed, the exodus from farms by offering stability in farm family income. A final reason for understanding is to analyse who is working off the farm and why so as to ensure that extension efforts may be targeted appropriately.

The purpose of this paper is to examine the off-farm labor decision making process by farmers in the Northwest Selangor Integrated Agricultural Development Project (IADP) in Malaysia. In the next section, a review of the development of the theoretical household production model based on neoclassical labour supply theory is presented. The next part of the paper discusses the data and variables used in the model. Both logit and probit equations have been used to test the accuracy and suitability of data to models. The empirical results are then presented, followed by the implications of the findings for policy makers and extension agents.

II. THEORETICAL FRAMEWORK

The neoclassical labour supply theory stated in the form of a time allocation model is the framework within which off-farm employment is commonly analysed (Furtan et al, 1985; Gunter and McNamara, 1990; Huffman, 1980; Hymer and Resnick, 1969; Schmitt, 1989). At the level of individual decision maker, the marginal rate of return to labour in agricultural and off-farm labour market are compared to determine the sequential allocation of additional hours of labour to competing uses. It is implicitly assumed that both farm and off-farm employment are continuously available and that there are no information or timing constraints to sequence in whichever time allocations are chosen. Using a comparative static partial equilibrium approach, the effects of changes in various parameters like changes in technology, in wage rates, in agricultural productivity, in education levels, in cost of employment, and in labour force participation rates can be represented by shifts in the curves.

Basically a farmer is faced with a decision of allocating a given endowment of total time (T), to a combination of time spent in farm (F), time spent on other employment (OF) and time spent on nonemployment activities, i.e. leisure (L). Thus the time constraint can be expressed as :

$$T = F + OF + L \qquad (1)$$

In the household production model, the household maximizes utility by consuming various commodities it produces and by combining market goods and time. Utility (U) is derived from purchased goods (G) and leisure (L), and affected by environmental factors (E) such as age and health which are assumed to be exogenous to current consumption decisions :

$$U = U(G, L; E) \quad (2)$$

The consumption of market goods at the price P_G is limited by the amount of available income earned from farm profits, off-farm wages, and other exogenous household incomes (V). Farm profit is equal to the price of farm output (P), multiplied by quantities of output (Q), less the variable costs of production (RX), where R is the input price vector and X is the quantity of inputs used. Off-farm income is the product of the wage rate (W), and the hours worked off-farm. The budget constraint is therefore :

$$P G_G = PQ - RX + W.\ OF + V \quad (3)$$

The technology available to produce farm output represents the final constraint to the household which is represented as follows :

$$Q = f(F, X; K, H) \quad (4)$$

where

F (.) = a strictly concave production function,

K = a vector of fixed farm inputs, and

H = a vector of human capital stock variables influencing farm productivity.

These same human capital will also influence the off-farm earning potential of the farmers along with the other market conditions (M) which implies that the wage rate should be expressed as :

$$W = W(H, M) \quad (5)$$

Substituting Eqs. 1, 3, 4 and 5 into Eq. 2 will result in the following utility function, which the farmers maximize through the choice of variable inputs (X), and allocation of labour to farm (F), and off-farm activities (OF)

$$\text{Max } U\ [\{P'.\ f(F, X; K, H) - R'\ X + W'\ (H, M).\ OF + V'\},\ \{T - F - OF\};\ E]\ X, F, OF \quad (6)$$

where the prime notation denotes monetary variables deflated by the price of consumption goods; (e.g. $P' = P/P_G$). The associated Khun-Tucker conditions for maximum are :

$$\delta U/\delta x = U_G\ (F, H, M, V', E).\ [P'.\ f_X\ (K, H) - R'] \leq 0$$

$$UG\ (.)\ [P'.\ fX\ (.) - R']\ X = 0 \quad (7)$$

$$\delta U/\delta F = U_G\ (F, H, M, V', E).\ [P'.\ f_F\ (K, H)] - U_L \leq 0$$

$$\{U_G\ (.)\ [P'.\ fF\ (.)] - U_L\}F = 0 \quad (8)$$

$$\delta U/\delta OF = U_G\ (F, H, M, V', E).\ [W'\ (H, M)] - U_L \leq 0$$

$$[U_G\ (.)\ W'\ (.) - U_L]\ OF = 0 \quad (9)$$

where U_G and the U_L are the marginal utility of consumption and leisure and f_X and f_F are the marginal productivity of variable inputs and farm labor, respectively.

The first order conditions given by Eq. 7 states that variable inputs will be used to the point at which their marginal value product is equal to their marginal cost. Eq. 8 indicates that the producer will allocate hours to the farm up to the point that the marginal rate of substitution between leisure and consumption, U_L/U_G, is equal to the marginal value of farm labor, $P' f_F (K, H)$.

Using Eq. 9, the decision to work off-farm can be summarized through the following participation rule :

$$D = \begin{cases} 1 \text{ if } W' (H, M) > P' f_F (K, H) \; I_{OF} = 0 \\ \\ O \text{ if } W' (H, M) \leq P' f_F (K, H) \; I_{OF} = 0 \end{cases} \qquad (10)$$

Eq. 10 states that the producer will work off the farm (D = 1) if the wage rate is greater than the marginal value of farm labour, assuming no off-farm work and evaluated at the point of optimal allocation of time between farm work and leisure, vice versa.

DATA

Definition

Following Corner's (1985) definition, off-farm employment refers to all paid or otherwise rewarded labour activities other than farm work carried out by any member of a rural household. Rural off-farm employment thus encompasses both farm and non-farm rural household but excludes all work of a farming or broadly agricultural character carried out either on the home farm (if a farm houshold) or the farms of others. Fishing, as a basically 'agricultural' or primary producing activity would also be excluded in most circumstances. It is not strictly confined to activities undertaken away from the farm since a number of handicraft activities and some forms of manufacturing activity organized on a 'putting out' basis may be physically located on the farm but are clearly not of a farming nature.

The data of this study is obtained from a cross-sectional survey of off-farm employment and rural industrialization in 1990 (Abd. Rahman et al, 1991). The unit of sampling is the agricultural household in the Northwest Selangor IADP. The agricultural households are divided into paddy and non-paddy households. A sample of 317 paddy households and 313 perennial crop respondents comprised of cocoa/coconut, oil plam and rubber households. A stratified random sampling procedure based on development blocks were used to select the respondents. The sampling frame, which contained other basic information, was obtained from the Project Manager's Office. However, the number of observations used in the analysis consisted of 513 of the 630 respondents described above. The smaller number of observations are the result of excluding respondents who do not report farm income in the survey.

Sample Characteristics

The human capital variables used commonly in previous empirical studies were age and education. Age is a proxy for experience, which is assumed to increase both the farm and offfarm labour productivity of farmers. The anticipated effect is thus ambiguous, but prior empirical work has often found a life-cycle effect by including linear (AGE) and quadratic (AGESQ) age terms. The stages in the life cycle were incorporated in the model by entering the age of farmers in quadratic form to capture the U-shape relationship of off-farm employment. In this study, the average age of respondent is 54.49 years for farmers who do not work offfarm and 46.84 years for those who participate in off-farm activities.

Information on the farmer's working experience and job skill components of human capital were not available. Therefore, the farmer's education level was used as a proxy for human capital as measured by the number of schooling years the farmer had received. The average number of formal education for those who participated in off-farm work is 4.83 years compared to 3.51 years for those who did not. Education has a similar ambiguous effect on off-farm employment as age, in that it is hypothesised to increase both farm labour productivity and the off-farm wage rate. However, previous studies have often found that an increase in the level of education increases the probability of working off the farm (Sumner, 1982; Lass et al, 1989; Gunter and McNamara, 1990).

The average houshold is made up of 5.75 and 5.15 for those who participated and those who did not participate in off-farm work, respectively. The variable number of dependent household of age below 15 and over 65 year (DEPEN) is used to capture the impact of dependent household members on the household heads decision to seek employment outside the farm. The impact is however difficult to predict as the larger the number of family members in this category, the greater the need for income, and thus the need to participate in off-farm employment. It could be argued that the larger the number of family members in this category, the greater is the demand on the household head's time at home to attend to the younger members of the household, thus leaving less time for off-farm employment. For the farmer who participated in off-farm work, the average number of dependent is 2.09 individuals and 1.41 for those who did not participate in off-farm activities.

Members of the household includes the spouse and other members of the family aged between 16 to 65 years (ADULT). The average number of family members in this category is 1.72 and 1.95 for farmers who participated and those who did not participate in off-farm activities, respectively. A priori, the effect of this variable on the decision to participate in offfarm work is not predictable (Mohd. Noh et al, 1993). If more family members are involved in off-farm activities, the exposure of the household head to the work opportunities are greater. One could thus expect a positive relationship between this variable and the decision to participate in off-farm work. It is also possible that the larger the number of family members

in off-farm activities, the less the need for the houehold heads to participate in off-farm work in order to augment household income.

The influence of farm characteristics can be represented by variables that affect the labor intensity and size of the farming operations. Off-farm employment is usually found to be negatively related to farm size (AREA), which is usually measured by acres (Leistritz et al, 1986; Thurmeier, 1981; Wozniak and Scholl, 1988). The average farm sizes in the study area for paddy, cocoa, palm oil and rubber are presented in Table 1.

Table 1. Summary Statistics of Variables in the IADP Off-farm Model

Variable	Working Off-farm OFFARM = 1	Not Working Off-farm OFFARM = 0	All Respondent
Farm Income	5145.29	5109.23	5125.34
Total household income	7208.49	5416.58	6217.15
Ratio (INCOME)	0.6494	0.9501	0.8157
Other Income (OTHINC)	326.21	307.35	315.78
Education Level (EDU)	4.83	3.51	4.10
Age (AGE)	46.84	54.49	51.07
Age square (AGESQ)	2321.37	3124.24	2765.54
Household Members			
Dependent household members (DEPEND)	2.09	1.41	1.71
Independent household members (ADULT)	1.77	1.95	1.87
Total household	5.75	5.15	5.42
Land area			
Pady (ha)	2.32	2.72	2.57
Cocoa/Coconut (ha)	0.48	0.45	0.47
Palm oil (ha)	0.54	0.53	0.54
Rubber (ha)	1.11	1.16	1.14
Total area (AREA)	1.32	1.83	1.60

The farm income variable (INCOME) is the ratio of farm income to the total annual income of the household. If farm income is only a small portion of total household income, one will expect that a farmer had participated more in off-farm work. A negative relationship between INCOME and the probability of off-farm activities is therefore expected. In many rural households, other incomes like remittances from children working outside the farms and pension payments (OTHINC) form important sources of extra household incomes and thus will influence work decisions of household heads. If remittance income is large, there is less need for the households to participate in off-farm activities.

Another characteristic that affects farm labour productivity is the type of crop being planted. A binary variable equal to 1 is allocated to crop farms of paddy (PADI), cocoa

(COCOA) and oil palm (PALM), and 0 if otherwise. However, the impact of this variable to participation in off-farm employment is also difficult to predict.

III. EMPIRICAL RESULTS

The factors described in the above section will influence the farmer decision to seek off-farm work. This ability to seek off-farm employment is represented by the dichotomous variable OFFARM with values of 1 for those engaging in off-farm activities and 0 otherwise. An OLS regression of the above relationship with OFFARM as the dummy variable is beset by several problems namely : (1) nonnormality of the error term, (2) heteroscedasticity, and (3) the possibility of the estimated probabilities lying outside the 0-1 bound (Gujarati, 1988). Since the dummy OFFARM is actually a proxy of the actual propensity or ability to seek offfarm employment, the probit and logit approaches are appropriate here. Both the probit and logit models guarantee that the estimated probabilities lie in the 0-1 range and that they are nonlinearly related to the explanatory variables. The difference between these two approaches are mainly in the distribution of the regression error terms. The logit approach assumes that the cumulative distribution of the error term is logistic while probit assumes that it is normal.

The results of the logit and probit equations for the participation decisions (YES and NO) as a function of the variables described in the above section are presented in Table 2. The residual chi-square score statistics for both approaches indicate that the hypothesis of no relationship between the dependent and independent variables are firmly rejected. The proportion of correct predictions from estimated equations are high that is 92.40% and 92.00% for the logit and probit equations, reespectively. The logit equation predicted that 199 out of 222 farmers (89.64%) participated and 275 out of 291 (94.51%) who did not participate in offfarm employment. The probit equation, on the other hand, predicted 197 participations (88.74%) and 275 non participations (94.50%) with respect to the same respondent as above.

Results of the study indicate that the variables that are significant in explaining the offfarm work decisions at the 1% level are age (AGE and AGESQ), number of household members below 15 years and over 65 years (DEPEN), education level of the farmers (EDU), ratio of farm income to total household income (INCOME) and remittance income (OTHINC). The signs for each of significant variables are consistent with a priori expectations.

The human capital variables of age and education level of farmers have an a priori ambiguous effect on the probability of off-farm employment, given their impact on both farm labour productivity and market wage rate. However, the results obtained here are consistent with most previous studies. Participation in off-farm work was found to increase with wage and then declined, as suggested by the life cycle hypothesis. The probability of working offfarm was found to be maximized at 43 years by Sumner (1982), at 48 years by Lass et al (1988) and at 29 years by Robinson et al (1982). In this study, probability of working off-

Table 2. Estimation of Participation in Off-farm Employment

Explanatory Variables	Coefficients from logit Model	Coefficients from Probit Model
AGE	0.3223 (0.1083)*	0.1676 (0.0609)*
AGESQ	-0.0047 (0.0011)*	-0.0025 (0.0006)*
AREA	-0.0206 (0.1847)	-0.0241 (0.1064)
DEPEN	0.3400 (0.1164)*	0.1998 (0.0657)*
ADULT	-0.0425 (0.1571)	-0.0147 (0.0847)
INCOME	-38.370 (4.7587)*	-20.5550 (2.2549)*
EDU	0.2973 (0.0923)*	0.1571 (0.0500)*
OTHINC	-0.0029 (0.0005)*	-0.0015 (0.0002)*
PADI	1.3558 (2.3342)	0.6643 (1.1342)
COCOA	2.9437 (2.3362)	1.5057 (1.1303)
PALM	-0.7919 (2.5592)	-0.7445 (1.2524)
Dependent Variable	OFFARM	OFFARM
No. of observation	513	513
Log of likelihood function	-78.1740	-78.216
Chi-squared (11 df)	545.5130	545.429
McFadden R^2	0.7772	0.7771
% of correct predicted	92.40	9200
Predicted :		
OFFARM = 0 (291)	275 (94.51%)	275 (94.51%)
OFFARM = 1 (222)	199 (89.64%)	197 (88.74%)

Note : Number in the parentheses are standard error
* Significant at 1% level

farm was found to be maximized at 35 years. As with experience, increses in education level appear to have a larger effect on market earnings than marginal productivity of farm labor. Higher educational levels increase labor skills and, therefore, the opportunity for off-farm work (Hanson and Spitze, 1974). This indicates that, off-farm work is quite sensitive to the skill levels of the rural farmers. Efforts to improve education in rural areas are expected to increase the off-farm labour suply as well as to accelerate the farm modernisation process (Larson and Hu, 1977).

The number of young and old family members with off-farm employment has a positive impact on the probability of household head participating in off-farm employment. This

implies that the need for off-farm employment fiir the household head is increased if more young and old members are in the family.

One of the most consistent result with other past studies is the negative relationship between participation in the off-farm employment and the ratio of farm income to total annual income of the household (INCOME). This suggests that the participation of farmers in off-farm employment will decrease if returns from farming increases. The same indication is given by the sign of remittance income variable (OUTING) confirming the view that the need for offfarm employment for household head will be reduced if remittance income is increased. This implies that remittance income is an important factor in determining farmers participation in off-farm employment.

IV. CONCLUSION

The supply of off farm labor constitutes an important aspect of resource use in the Malaysian agriculture. Off-farm employment should be analysed as the outcome of the efficient resource allocation decision. It can also be viewed as another form of adjustment or an alternative to other more adjustments in the rural sector. This paper examines the off-farm employment decisions of Northwest Selangor IADP farmers using household production theory. The empirical resuls are as expected theoretically and supported by past studies. It is observed that human capital variables like age and education levels have the largest impact on off-farm labor participation. The number of under age (below 15 years) and old (over 65 years) family members also have a positive impact on the probability of household head participating in off-farm activities. However the ratio of farm income to total household income and remittance income have a negative relationship with participation in off-farm employment.

Several inferences and policy implications can be drawn from the study. The general trend to the bimodal farm size distribution will likely to continue in the Northwest Selangor IADP farm, since it is the middle age cohort of farmers who are most likely to work off-farm, while the oldest farmer cohort will not engage in off-farm employment. In order to increase farm income levels, measures such as farm mechanisation, better technologies, increasing capital investments and subsidies should be advocated as a means of increasing farm productivity. These measures, may increase output and revenue in the short-run but farmers will be made worst off in the long-run. This is because of the small size land holdings and limited farm resources which prevent the efficient use of technology. Besides that, techniques of production are increasingly labour saving, as economies of size for larger operating units are being exploited to the disadvantage of smaller operations. Therefore, off-farm employment provides an alternative way for some farmers to continue to be active in the labour force.

In order to increase participation of farmers in off-farm employment, policies should be formulated to increase the availability of off-farm jobs in the vicinity of farming communities. Another policy implication concerns targeting extension efforts to increase their education levels. Training programmes should also be directed at farmers to improve their skill in off-farm jobs.

REFERENCES

Abdul Rahman, A. A. et al (1991) : *Non-Farm Employment in the Northwest Selangor Integrated Agriciultural Development Project (IADP) Malaysia.* Report Presented at the Workshop on Rural Industrialization in Asia at Chieng Mai, Thailand.

Ahearn, M. et al (1985). "The Distribution of Income and Wealth of Farmer Operator Household", *American Journal of Agricultural Economics,* **67** : 1087-94.

Barlett, P. (1986). "Part-time Farming : Saving the Farm or Saving the Lifestyle?". *Rural Sociology,* 51 : 289-313.

Bollman, R. D. (1979). "Off-Farm Work by Farmers : An Application of the Kinked Demand Curve of Labor". *Canadian Journal of Agricultural Economics,* **27** : 37-60.

Corner, L. (1985) : The Prospect for Off-Farm Employment as an Anti-Poverty Strategy among Malaysian Paddy Farm Household : Macro and Micro View. in Off-Farm Employment in Development of Rural Asia (ed) Shand, R. D. Vol. 2. National Centre for Development Studies, Australian National University, Canberra.

Frauendorfer, S. V. (1966). "Part Time Farming : A Review of World Literature". *World Agricultural Economics and Rural Sosiology Abstract,* **8**(1) : V-XXXVII.

Fuller, A. M. (1989) : Multiple Job Holding Among Farmers in Canada. In *Multiple Job Holding in Farming.* Ames, lowa State University press.

———— (1990). "Form Part-time to Pluriactivity : A Decade of Change in Rural Europe", *Journal of Rural Studies,* **6** : 361-73.

Furtan, W. H. et al (1985). "The Estimation of Labor Supply Function in Saskatchewan", *Journal of Agricultural Economics,* **22** : 155-165.

Gasson, R. (1986). " Part-time Saving : Strategy for Survival". *Sosiologia Ruralis,* **24** : 364-75.

Gould, B. W. and W. E. Saupe (1989). "Off-Farm Labor Marker Entry and Exit". *American Journal of Agricultural Economics,* **71**(4) : 960-969.

Gujarati D. N. (1988) : *Basic Econometrics.* McGraw Hill New York.

Gunter, L. and K. T. McNamara (1990). "The Impact of Local Labor Market Condition on the Off-Farm Earnings of Farm Operators", *Southern Journal of agricultural Economics,* **22** : 155-65.

Hallberg, M. C. et al (1991) : *Multiple Job Holding in Farming.* Ames, Iowa State University Press.

Hanson, R. J. and R. G. F. Spitze (1974). Increasing Incomes of Farm Families through Dual Employment", *Agricultural Finance Review,* **35** : 59-64.

Huffman, W. E. (1980). "Farm and Off-Farm Work Decision : The Rule of Human Capital", *Review of Economics and Statistics,* **62** : 14-23.

———— and M. D. Lange (1989). "Off-Farm Work Decisions of Housbands and Wives : Joint Decision Making", *Review of Economics and Statistics*, **7**(3) : 471-480.

Hymer, S. and S. Resnick (1969). "A Model of Agrarian Economy with Nonagricultural Activities", *American Economic Review*, **59** : 493-506.

Larson, D. W. and H. Y. Hu (1977). "Factor Affecting the Supply of Off-Farm Labor among Small Farmers in Taiwan", *American Journal of Agricultural Economics*, **59**(3) : 549-553.

Lass, D. A. et al (1989). "Off-Farm Employmen Decisions by Massachusetts Farm Households". Northeastern Journal of Agricultural and Resource Economics, **18**(2) : 149-159.

Leistritz, F. et al (1986). "Effect of Farm Financial Stress on Off-Farm Work Behavior of Farm Operators and Spouses in North Dacota", *North Centreal Journal of Agricultural Economics*, **8** : 269-282.

Mohd. Noh, K. et al (1993). "Incidence and Determinant of Nonfishing Employment among Fishermen : A Case Study of the State of Malacca, Malaysia", *Malaysian Journal of Agricultural Economics*, **10** : 1-20.

Pulvar, G. C. et al (1986). "Changes in Income Sources in Rural America", *Journal of Agricultural Economics*, **68** : 1181-87.

Robinson, C. et al (1982). "Labor Supply and Off-Farm Work by Farmer : Theory and Estimation", *Australian Journal of Agricultural Economics* , **26** : 23-78.

Robson, N. et al (1987). "Part-time Farming Implication for Farm Family Income", *Journal of Agricultural Economics*, **38** : 187-92.

Schmitt, G. (1989). "Farm, Farm Households, and Productivity of Resource Used in Agriculture". *European Review of Agricultural Economics*, **16** : 257-284.

Shand, R. D. (ed) (1985). *Off-Farm Employment in Development of Rural Asia. Vol. 1 and 2.* National Centre for Development Studies, Australian National University, Canberra.

Simpson, W. and M. Kapitany (1983). "Off-Farm Work Behavior of Farm Operator", *American Journal of Agricultural Economics*, **65** (4) : 801-805.

Sumner, P. A. (1982). "The Off-Farm Labor Supply of Farmers", *American Journal of Agricultural Economics*, **64**(3) : 499-509.

Thurmeier, M. (1982). "The Determinants of Off-Farm Employment of Saskatchewan Farmers", *Canadian Journal of Agricultural Economics*, **29** : 339-348.

Weersink, A. (1992). "Off-Farm Labor Decisions by Ontario Swine Producers", *Canadian Journal of Agricultural Economics*, **40** : 235-251.

Wozniak, P. J. and K. K. Scholl (1988). "Employment Decisions of Farm Couples. Full-Time or Part-Time Farming", *Home-Economics Research Journal*, **17** : 20-35.