Stress Among Farm Women: An Analysis of Farm Households in Pennsylvania

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Abstract
Farming is among the high-stress occupations in the United States and farm women have higher stress scores due to multiple job holdings. The study investigates the determinants of time stress experienced by farm women in Pennsylvania applying an economic model of stress developed by Hamermesh and Lee (2003).

I. Introduction

Farming is among the high-stress occupations in the United States (http://www.nsc.org/issues/agri/stress.htm). Out of 130 high stress occupations in the United States, farming has been ranked twelfth by the Institute of Occupational Safety and Health (Deary *et al*. 1997). External economic conditions in agricultural and non-agricultural markets, environmental forces influencing on-farm and off-farm decisions, social structures and norms and most importantly agricultural policies affect farm households in both developed and developing countries (Findeis[b] 2002). The number of women entering external labor force has grown to the point that majority of farm women in the U.S., for example are employed off-farm (Findeis[a] 2002).

Studies have shown that farmers employed off-farm have higher stress scores due to increased workload (Gary and Lawrence 1996). For women time pressure is among the main factors resulting in stress. The issue of balancing work and family or home responsibilities is particularly of significance among farm families today. In addition to working on the family farm and in the home, the majority of working-age farm women in the U.S. are also employed in wage jobs off-farm, and participation rates in off-farm work continue to increase (Findeis and Swaminathan 2003).

This trend reflects the overall trend of increased women's participation in formal labor markets in most developed counties (Findeis *et al.* 2001), but is also likely exacerbated by low farm incomes, high variability in farm income levels, and uncertainly regarding levels of future government support of agriculture through farm progress.

Meyer and Lobao (1994) have shown that farm women face higher levels of social-psychological stress than men due to their multiple roles. While the sociologists and psychologists have addressed issues relation to time stress, economists too have shown their interest recently. Subjective outcomes such as stress have not been examined by economists until recently. Stress, particularly time stress arises out of imperfect substitutability between goods purchased and time spent on household tasks and farm tasks in the case of agricultural households (Hamermesh and Lee 2003). Since individuals face time constraints, any increase in work load reduces leisure and the increase in income does not typically completely translate into purchased goods that serve to reduce household tasks (Hamermesh and Lee 2003).

Given this perspective, this study investigates the determinants of time stress experienced by farm women in Pennsylvania applying an economic model of stress. We use the framework developed by Hamermesh and Lee (2003). The data used in the paper are based on a statewide mail survey of 1,250 farm women in Pennsylvania that assesses the characteristics, contributions and attitudes of women living on farms in the Commonwealth (Jolly and Willits 2003). The survey was conducted by Penn State University in 2001.

The paper is organized as follows. A brief background on US farm women and the stress they face is discussed in Section II and Section III presents the theoretical

model. Data and method used for the analysis are described in Section IV. Section V summarizes our empirical findings and finally, Section VI presents the conclusions of the research.

II. Background

Women on farm

In terms of their work roles outside home production, farm women in the United States have traditionally been viewed as the 'bookkeepers' on farms in the United States. However, this view is simplistic and fails to recognize the multiple work roles of women on U.S. farm households. These roles may include off-farm wage work, self-employment in a 'nonfarm' business that may or may not be farm-related, work in farming itself, and/or traditional bookkeeping or record-keeping for the farm operation. This is in addition to their contributions to household home production and possible participation in community activities.

Participation in off-farm employment has opened farm women's access to a source of cash income. Further, as off-farm real wages earned by farm women have increased, women are contributing a larger share to total household income, although this observation is difficult to fully document because women's contributions to the profitability of the farm enterprise remains largely unmeasured. The majority of farm women employed in off-farm jobs are also employed full-time during the week and continuously throughout the year. For women, in particular, due to the multiple roles that they play, the movement into off-farm labor markets could influence them in one of two ways: 1) off-farm employment could reduce their time allocation to farm activities

and/or 2) household duties or could force them to work longer hours to satisfactorily fulfill their various roles.

Haugen *et al.* (1994), who studied young women farm operators in Norway, report that women still shouldered the main responsibility of household work. Levels of stress are likely to be enhanced by these multiple work roles. The necessity to integrate home and occupational spheres forces women on farm to assume multiple roles and these roles are thought to be stress causing (Hall, 1972). Hence, it becomes important to study factors that cause stress among the farm women. For the farm women farm work, household chores and off-farm work are intertwined (Giesen *et al.* 1989). In their study of 140 Manitoba farmers, Walker and Walker (1986) find that farm women report symptoms of anxiety and confusion because of their multiple roles in balancing farm, non-farm, family and community activities.

Stress among farm women

The farm sector throughout has also been subjected to highly fluctuating market conditions and farm households make adjustments during downturns by increasing their farm and off-farm work and by reducing consumption levels. Farm women in particular have been found to be stressed because they are triply burdened with household work, farm work, and non-farm income-generating activities (Labao and Meyer 1995).

Factors including general frustrations, equity between the spouses, presence of children on the farm, off-farm work, life events, role conflict, age, role conflict, souse support, mastery, farm values and perception of what is at stake are some of the predictors of farm stress (Gary and Lawrence 1996). The farmers in north central USA states were studied by the Farm Stress Survey that included six stress related domains *viz*

personal finance, national economic issues, geographical isolation, time pressure, climatic conditions and hazardous working conditions (Dreary *et al.* 1997). Higher stress scores are reported among farm women and the responsibility of completing too many tasks in too little time has been found to be a major source of stress among farm women (Walker and Walker 1986).

Stress has been defined as a perceived imbalance between the individual and the environment (Giesen *et al*. 1989). Stress that starts in the objective environment takes the individual to a subjective environment which is the environment as perceived by the individual. Stressors are defined as those aspects of the objective environment that poses threat to the individual. Stressors could cause physiological, psychological and behavioral strains which are precursors to illness and healthy functioning of the individuals. In particular, time stress in this study is defined as having too much to do in too little time by the farm women.

III. Theoretical Model

The theory of household production links time use and financial resources where the extent to which time constraints bind is an increasing function of the opportunity cost of time of the individual and hence people with higher income feel more rushed (Hamermesh 2004). Hamermesh and Lee (2003) equated time stress is equated to time use pattern of the individuals in the household. Utility maximizing theory is used to study the determinants of time stress among the farm women where the women spend time on on-farm, off-farm and household work. The model predicts that increase in income leads to increase in time stress due to imperfect substitutability between purchased market goods and household and farm activities. Following Hamermesh and

Lee (2003), household is assumed to maximize household utility over leisure and consumption.

Max $U(Z_1 , Z_2) + V(H_m, H_f)$, where H_i denote market work and Z_i are goods produced within the household.

subject to,

a. Household production functions: households produce goods combining home time and goods (X)

$Z_i = Z_i(T_i , X_i)$, i = 1, 2,

Household production function is characterized by fixed coefficients:

$T_i = t_i Z_i$ and $X_i = b_i Z_i$, i = 1, 2,

b. Household income:

$\Sigma p_i X_i = H_m w_m + H_f w_f + I$, where p_i is goods prices, I is unearned income.

c. Time constraints

$\Sigma T_i = T - H_m - H_f$

Household maximization problem:

$U(.) + V(.) + \mu (H_m w_m + H_f w_f + I - p_1 b_1 Z_1 - p_2 b_2 Z_2) + \lambda(T - H_m - H_f - t_1 Z_1 - t_2 Z_2)$

where μ is the Lagrangean multiplier on the goods constraint and λ is the Lagrangean multiplier on the time constraint (shadow price of time). They assume that time stress is positively related to shadow price of time and fixed market work hours for the husband. They show that as long as value of home time increases more than value of time in market work in response to increase unearned income, the shadow price of time rises with unearned income and time constraint becomes more binding with increase in income.

Hamermesh and Lee (2003) apply this model to various countries (Australia, Canada, Germany, Korea and the United States). They find that higher income households spending similar amount of time in market and household work perceive higher time stress.

IV. Data and Methods

The Penn State Survey of Pennsylvania Farm Women was conducted in 2001 through a mail survey of farm households. A random sample was used and yielded a total of 1,250 observations. In the survey, each farm woman respondent was asked to answer questions about her: role in farm decision-making, involvement in specific farm tasks and sustainable agricultural practices, off-farm work and involvement in non-farm self-employment, and ownership and inheritance of assets such as farm land. Women respondents were also asked about their involvement and leadership in farm and community organizations, individual and household demographic characteristics, frequency and types of stress, characteristics of the farm operation, and attitudes towards farm practices, sharing of work responsibilities, and roles on the farm.

Farm women were asked questions about the types and frequency of the stress they experience. These included: 1) stress resulting from balancing work and family responsibilities 2) time management, 3) from conflicts with husband/domestic partner, due to family 4) farm decisions being made without her input, 5) family decisions being made without her input, 6) from farm isolation, and 7) stress due to worries about the financial viability of the farm.

Possible responses included rarely, sometimes, often and very often. This paper focuses on stress due to too much to do in too little time that is defined as time stress. The data

also contain information on income earned from farm and off-farm employment for both the man and women[1]. The data contains information on the number of weekly hours they spend on farm-related activities.

Model

The time stress equations are estimated using ordered probit model for the farm women[2] as the response to stress questions is ordered.

The following specification is used in the paper:

$S_i^* = \beta x_i + \varepsilon_i$

where S_i^* = latent measure of the level of time stress experienced by the farm women.

x_i= vector of independent variables

β = parameters to be estimated

ε_i = random error term (assumed to follow standard normal distribution)

The stress variable coded as follows:

$S_i = 0$ if $-\infty \leq S_i^* \leq \mu_1$ (rarely)

$= 1$ if $\mu_1 \leq S_i^* \leq \mu_2$ (sometimes)

$= 2$ if $\mu_2 \leq S_i^* \leq \mu_3$ (often)

$= 3$ if $\mu_3 \leq S_i^* \leq \mu_4$ (very often)

where S_i is the observed variable and μ_i is the threshold to be estimated.

We model time stress as a function of the woman's off farm income, individual characteristics *viz.* age and education and household characteristics including presence of

[1] Since the majority of U.S. farm households have a nuclear, two-adult structure, the analysis of this paper is limited to those households with both a farm woman and spouse/partner present.

[2] Stress equation for the spouses could not be jointly estimated because no information was collected on the perceived time stress for the husband or the partner

children and hours spent in farm-related activities. We also control for labor market and farm characteristics.

V. Results

Descriptive Statistics

For the entire sample, 52.5 percent of the farm women experienced time stress often or very often. The distribution of time stress among the farm women is shown in Table 1. The analysis takes into account the off-farm income earned by the women instead of gross household income. Respondents were asked how much they earned from non-farm job in 2000. Our data shows that among those who experience time stress very often 31.2 percent are in the highest income category. Number of individuals who experience time stress very often increases with increase in income level.

Farm women characteristics considered are age and education level. Younger and more educated women are more at risk of stress because they need to juggle household, farm and off-farm work duties. A study by Deary *et.al*. (1997) of job related stress among farmers in UK found that younger farmers perceived more stress. We find that higher level of stress is experienced by younger women and those with some vocational training and post graduates.

Presence of children and weekly hours spent on farm related are the household characteristics considered. Women having kids between the age group 5 to 11 experience more stress. Women with kids in this age group may be returning to the job market on a full time basis and may actually be burdened with more work. Table 1 also shows that increased time spent on farm related activities increases time stress perceived by the farm women.

Among the farm characteristics, type of farm (crop, livestock or both crop and livestock) and size of land owned are considered. Traditionally, it has been found that crop farms require less work effort compared to the other two types (livestock farms and farms that have both livestock and crop) of farms and hence time stress among women working in crop farms would be lower. Mixed type farming or dairy farmers reported high levels of time stress in the study of job-related stress of 318 UK farmers (Deary *et al.* 1997). Table 1 corroborates this fact. Stress among mid-sized (between 100 and 499 acres) land holdings is higher.

Main characteristics of the respondents by off-farm work status of the husband or partner are summarized in Table 2, first by women who work both farm and off work and then by those who perform only farm work[3]. Time stress is consistently perceived more among women who work both on and off-farm and more among women whose husband or partner works off-farm. Higher educated women are more in the category of working both farm and off-farm work and women with young children and larger farms stay on the farm and don't work off-farm.

Determinants of time stress among the farm women in Pennsylvania

Table 3 presents the results of the ordered probit functions related to whether farm women are rarely, sometimes, often or very often stressed[4]. The basic hypothesis of our model is that individuals who earn higher income would also report higher time stress. The estimates in Table 3 support this hypothesis. Effect of off-farm income of the farm

[3] There were very few observations for the category where women performed only off-farm work and hence not included in the table.

[4]Similar results were obtained when probit model was estimated for time stress variable.

women on time stress is positive and significant especially for higher category of income. Women in higher age categories experience less stress compared to younger women.

Table 3 shows that education has a positive relation with stress perceptions. With less than high school education as the reference group, women with vocational training and graduate education beyond college have positive and significant effect on stress.

With children less than 5 years of age as the reference category, women with children between the age group 5 and 11 have positive and significant relation with time stress. Women with very young children (less than 5) along with farm work may not be performing full-time off-farm work as opposed to women with children with older children who may be employed full-time off-farm. Number of hours spent doing farm related activities has positive and significant effect on time stress.

High population density and high unemployment rates also increase perception of time stress among the farm women. In case of the farm type (with farms that have both livestock and crop as the reference category), crop farms have negative and significant relation with perceived stress.

There is a possibility of potential simultaneity between current time stress and current income. This is not a problem in our case as the analysis takes into account the income earned in 2000 which itself is a very good proxy for current income.

VI. Conclusions

This research not only attempts to apply economic theory to subjective outcome such as time stress but also tries to evaluate what makes farming a high stress occupation especially for farm women in the United States. Using the utility maximization theory, we show that higher off-farm income increases the perception of time stress as

hypothesized by Hamermesh and Lee (2003). Here stress as a subjective outcome is equated to an objective outcome, time use.

Results show that participation in off-farm work does not reduce the amount of work a women does at home and on the farm. It only reduces the leisure time and increases the time stress among the farm women in Pennsylvania. The study finds that some of the factors that determine the high stress levels are young age, higher education, younger children and increased hours worked on farm activities.

Table 1: Distribution of Time Stress among Farm Woman in Pennsylvania

Variables	Rarely	Sometimes	Often	Very Often
Her off-farm income categories				
No off-farm Income	9.97	39.43	30.66	19.94
Less than $5000	8.75	40.00	27.50	23.75
Between $5000 and $29000	4.57	39.27	29.22	26.94
More than $30000	4.80	36.00	28.00	31.20
Farm woman characteristics				
Age categories				
Less than 35	4.35	41.74	25.22	28.70
35 to 54 years	3.87	37.08	30.23	28.82
More than 54 years	15.06	39.78	31.01	14.16
Education				
Less than high school	10.96	40.41	31.51	17.12
High school graduate	8.81	38.70	30.27	22.22
Vocational school and some college	6.41	39.32	26.92	27.35
4-year college degree	8.33	38.89	31.48	21.30
Graduate or professional education beyond college	4.44	37.78	28.89	28.89
Household characteristics				
Presence of children				
Less than 5 years old	5.77	41.67	27.56	25.00
5 to 11 years	3.76	36.84	28.57	30.83
Older than 12 years	6.51	39.07	29.30	25.12
Weekly hours spent on farm related activities				
Not at all	20.00	41.54	21.54	16.92
1 to 20 hours	10.02	41.34	28.93	19.71
21 to 40 hours	5.67	40.89	32.39	21.05
Over 40 hours	0.00	26.71	36.02	37.27
Farm characteristics				
Farm type				
Crop farm	16.96	35.67	29.24	18.13
Livestock farm	8.40	34.45	31.93	25.21
Both crop and livestock farm	6.10	40.26	29.61	24.03
Total acres of land owned				
Less than 99 acres	8.89	41.65	28.55	20.90
Between 100 and 499 acres	6.64	33.89	32.56	26.91
More than 500 acres	8.28	40.13	28.66	22.93

Table 2: Characteristics of Farm Woman by Off-farm Status of the Husband/Partner

Variables	Husband/Partner works off-farm Woman works		Husband/ Partner does not work off-farm Woman works	
	Both farm and off-farm work	**Farm work only**	**Both farm and off-farm work**	**Farm work only**
Time stress				
Sometimes	42.93	44.16	43.40	50.78
Often	57.07	55.84	56.60	49.22
Farm woman characteristics				
Age categories				
Less than 35	15.09	11.31	10.83	9.36
35 to 54 years	59.43	45.24	58.75	41.10
More than 54	25.47	43.45	30.42	49.54
Education				
Less than high school	5.24	16.15	5.13	20.49
High school graduate	35.71	49.69	39.74	53.70
Vocational school and some college	28.09	23.61	31.20	14.42
4-year college degree	12.86	9.32	12.39	7.78
Graduate or professional education beyond college	18.10	1.24	11.54	3.61
Household characteristics				
Presence of children				
Less than 5 years old	11.63	13.69	7.79	16.12
5 to 11 years	18.14	28.57	15.57	25.46
Older than 12 years	52.56	55.95	56.15	57.14
Weekly hours spent on farm related activities				
Not at all	3.81	1.83	2.56	2.65
1 to 20 hours	71.43	55.49	68.38	51.70
21 to 40 hours	17.62	23.17	18.38	26.14
Over 40 hours	7.14	19.51	10.68	19.51
Farm characteristics				
Farm type				
Crop farm	26.40	22.64	12.05	12.13
Livestock farm	13.71	10.06	15.18	8.95
Both crop and livestock farm	59.90	67.30	72.77	78.93
Total acres of land owned				
Less than 99 acres	38.54	27.78	14.40	17.50
Between 100 and 499 acres	51.22	62.97	66.52	65.57
More than 500 acres	10.24	9.26	19.07	16.92
Number of observations	430	863	430	863

Table 3: Ordered Probit Results of Determinants of Time Stress

Variables	Coefficients	t-stat
Her off-farm income categories		
Less than $5000	0.0986	0.74
Between $5000 and $29000	0.2732	2.9***
More than $30000	0.3951	3.19***
Reference: No off-farm income		
Farm woman characteristics		
Age categories		
Less than 35 years	-0.0557	-0.44
More than 54 years	-0.2886	-3.33***
Reference: 35 to 54 years		
Education		
High school graduate	0.1308	1.25
Vocational school and some college	0.2024	1.68*
4-year college degree	0.1473	1.03
Graduate or professional education beyond college	0.2692	1.65*
Reference: Less than high school		
Household characteristics		
Presence of children		
5 to 11 years	0.2250	2.45**
Older than 12 years	0.0669	0.88
Reference: Less than 5 years old		
Weekly hours spent on farm related activities		
1 to 20 hours	0.3175	2.05**
21 to 40 hours	0.4899	2.91***
Over 40 hours	1.0310	5.71***
Reference: Not at all		
Labor market characteristics		
Population density, 2000	0.0004	2.08**
County unemployment rate, 1996	0.0521	2.23**
Farm characteristics		
Farm type		
Livestock farm	-0.0208	-0.18
Crop farm	-0.2018	-1.98**
Reference: Both livestock and crop farms		
Total acres of land owned		
Between 100 and 499 acres	0.0373	0.45
More than 500 acres	-0.0589	-0.5
Reference: Less than99 acres		
First intercept	-0.4826	
Second Intercept	0.9661	
Third Intercept	1.8431	
Number of observations	1050	
Pseudo R-square	0.0506	

*** = statistically significant at the 0.01 level; ** = significant at 0.05 level; *

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