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Research Notes

A Comparison of Labor Time Estimates
between Diaries and Direct Questions:
An Example of Married Women in the
Flower Production Industry*

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Abstract

In the West, time estimates between direct questions and time diaries have long been debated in sociological and economic analyses of household labor and market labor; no similar studies have been conducted in Taiwan. The author interviewed self-employed married women in the flower production industry to examine differences in estimates of unpaid labor time between time diaries and direct questions. Survey and ethnographic data were used to validate the time diaries by investigating differences in diary estimates between weekdays and weekends, overestimates from direct questions, and possible explanations for overestimates. The results generally support the idea that time-diaries-keeping is an appropriate means of measuring labor time. The participants who reported long work hours tended to exaggerate their time spent on farm and household tasks. Given the divergent findings on social-psychological effects in a small sample of farm women, the results demonstrate a good frame of reference for subsequent methodological studies, particularly those related to lifestyle, time-use, and gender divisions in markets and household labor. The study limitations point to a need for revising measures of social desirability, refining analytical models of overestimates, conducting more research on time diary reliability and validity, making comparative analyses of multiple methods for time data collection, and replicating past studies using a representative national sample and longitudinal design.

Key Words: time diaries, stylized direct questions, social desirability, time-pressure perceptions, regression to the mean

比較日誌與直接詢問法對勞力時間的估計： 以已婚花農婦女為例

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中文摘要

在西方社會學及經濟學分析中，比較日誌與直接詢問法對勞力時間的估計已有二十年歷史，這類研究卻未見於台灣。本文以已婚花農婦女為例，分別比較時間日誌與兩種直接詢問法，在估計無酬勞力時間的差異。此比較著重在確定時間日誌法之有效性，直接詢問法的高估情形，與高估現象的可能解釋。面訪調查資料輔以深入訪談質化資料的分析結果顯示，時間日誌法適合於估計已婚花農婦女的農務與家務工作時間。工作時間的高估與婦女所回答的工作時間長短息息相關。儘管在時間高估的社會心理解釋上仍分歧，且研究對象侷限在特殊產業的農家婦女，本文的研究架構與分析方法卻適切的提供台灣社會科學領域中時間測量方法研究的重要參考，尤其是時間運用、生活型態、兩性無酬勞力分工等相關研究。對未來研究的建議包括修改社會讚許性的測量方法，重建對高估時間的模式分析，更多時間日誌的信度與效度的研究，多元方法綜合運用於時間測量方法的比較分析，鼓勵對其他自營職業婦女與其他學科領域從事類似的時間運用研究，以及從事具代表性樣本與追蹤樣本的反覆檢驗。

關鍵詞：時間日誌、直接詢問、社會讚許效應、時間壓力感效應、迴歸平均效應

A. Introduction

The time-budget approach has been employed in the studies of women's labor allocation between work and family for several decades. Direct questions are one of the common measures for estimating labor time by asking women how many hours they spend on paid work and housework. The accuracy of time estimates based on direct questions in comparison with diaries has been debated in the sociological and economic analyses of time-use, gender division of household labor, and market labor in the West for more than two decades (Szalai 1972; Davies 1990; Shelton 1996; Jacobs 1998; Pentland et al. 1999). No similar studies, to my knowledge, have been done in Taiwan.

Time-measure studies were mostly focused on market labor, while little attention has been paid to unpaid self-employed labor in the informal sector (Niemi 1993; Robinson and Bostrom 1994; Jacobs 1998). The validation of time-measure having the advantage of clearly explicating self-employed women's unpaid labor between the productive sphere and the reproductive sphere is, therefore, critical. It is particularly crucial since unpaid labor is usually conceptualized as household labor for the women who have paid jobs. Self-employed women without pay consequently encounter ambiguous division of reproductive and productive labor. The fulfillment of a methodological study is thus believed to enhance the sociological and economic analyses of women's unpaid labor (Gershuny and Sullivan 1998).

A typical example of interest to me is married women involved in the family-based farm production. Farm women's labor contributions to their

family farm are not only unpaid but also invisible in terms of labor statistics and output of agricultural production (Sachs 1983).¹ First, time spent on farm work is not necessarily on a regular basis. Time flexibility mostly comes from the autonomy of time allocation and the use of other family labor as supplementary labor input. Second, the time women spent working on the farm may overlap their time spent on domestic activities (Beneria 1999). The intermittent nature of women's work in agriculture and the overlap of their labor time spent on farm work and household work are likely to lead to the marginalization of women's position in agricultural production and the inequality of gender division of labor in the family, particularly for married couples.

Among all agricultural products in Taiwan, flower farming is characterized by the intensive use of manual and female labor. According to official statistics, self-employed women in the agricultural, forestry, fishery and husbandry sectors spent an average of 41.48 hours a week on farm work, while their male counterparts spent 42.99 hours (Directorate General of Budget Accounting and Statistics 2003, 2004b). Relatively, previous studies showed that women spent nine hours a day on the flower farm during busy seasons and five to seven hours during slack seasons (Tu 2001). This group of women spent two more hours on housework than their husbands did, while there were only 50 percent or less of the husbands who helped with the housework

¹ Although male farmers are also unpaid, they are usually recognized in official statistics as well as in agricultural production. Farm women, to the contrary, are often pushed by patriarchal authority into domestic rather than farm work and thus less likely to be recognized (Sachs 1983).

(Tu 2000).

Given that flower women's housework does not change/decrease in accordance with their hard work on the farm and their husbands' lack of involvement in household, a search for a precise way to explicate their essential role in horticultural farming (Boserup 1970; Berlan-Darque 1988), in terms of their substantive time allocated to farm and household labor, deserves our attention. I thus take those married women who grow flowers as an example and pioneer a methodological study by comparing time diaries and direct questions for estimating unpaid working time. Such a comparison includes the validation of diary measure in terms of week-to-week and seasonal variation, report gap between time diaries and direct questions, and the possible explanations for the report gap. It is to confirm whether time diaries are more accurate than direct questions based on the comparative analysis. This study, though based on a particular case, is believed to give Taiwanese sociologists and economists an insight into the conceptualization and measurement of paid and unpaid labor and intra-household resource allocation.

B. Literature Review

Among the two commonly used measures of labor time, direct questions simply ask respondents how many hours on average they spend on specified activities during a reference period, usually one week. The accuracy of information collected by this method depends on the quality of questions being asked and the respondents' cognitive process for answering such

questions. The activities stylized as a list need to be precisely defined, being comprehensive, and exclusive to one another (Floro 1995; Winkler 2002). Such requirements usually turn out to be tedious and discourage cooperation from the respondents. Consequently, this method is more reliable in the collection of time-use data for routine activities than for irregular activities (Juster 1985). If measurement errors are controlled, stylized direct questions² will cost less while allowing for a rapid appraisal of the distribution of labor time (Floro 1995).

Time diaries, the other method, are designed as a schedule or table for respondents to report their activities during a 24-hour period, indicating the starting and finishing points of the activities. The duration of each activity is usually in 5- to 30-minute intervals (Robinson 1985; Bishop et al. 1975; Stinson 1999). The diary method enables respondents to report activities in their own terms and permits researchers to carry out a complementary consistency check of responses (e.g., total working hours vs. total hours spent on each activity). One distinctive feature of time diaries is that overlapping activities can be clearly recorded (Juster 1985; Floro 1995; Stinson 1999). The accuracy of the diary method is, however, strongly associated with the extent to which selected diary days are representative of the general pattern of time-use during seasonal and weekly cycles. The high cost in time and money decreases the feasibility of time diaries in practice (Robinson 1985; Juster 1985; Floro 1995; Shelton and John 1996).

² Hereafter, stylized direct question or stylized measure is all correspondent with direct question as implied by the previous literature. Stylized estimates are then based on the report from direct questions.

As far as cost and reliability are concerned, these two methods have been constantly compared during the past two decades. The growing preference for time diaries emerged from concerns about the quality of time-use data. Evidence from previous studies has pointed to the strong likelihood that time diaries are more reliable than stylized direct questions for estimating time spent on market and non-market work (Goldschmidt-Clermont 1993; Hill 1985a; Joyce and Stewart 1999). The endorsement of time diaries has been mostly based on measurement errors, particularly concerning the extent to which the nature and design of direct questions create a burden for respondents, or encourage overstatements, as well as the unstable quality of the data collected. The argument that time diaries are superior to stylized direct questions has been centered on report gaps associated with cognitive load, activity simultaneity, social desirability, time-pressure perception, and “regression to the mean.”

1. Cognitive Load

The most striking difference between stylized direct questions and time diaries lies in the cognitive processes demanded of respondents. In direct questions, the activities on which one spends time are roughly defined, while some examples as supplementary elaboration are provided. In contrast to time diaries, which enable respondents to report time spent on activities in their own terms, direct questions are strongly influenced by how respondents perceive the activities defined by researchers. The respondents may need to go through a long cognitive process in answering stylized direct questions depending on how they interpret the activities (Winkler 2002; Schwartz et al.

2002).

The cognitive burden imposed by stylized direct questions also comes from difficulties experienced by the respondents' in retrieving the information. Such a cognitive burden is typically heavy when the reference period is "per week last year" or "per day last year." Some direct questions used "last week" instead of "last year" to reduce memory load, but still yielded results that appear less reliable than the diary method, in which a particular day, usually yesterday, provides cues for respondents to recall and report activities naturally occurring in daily life (Jacobs 1998; Robinson and Gershuny 1994).

Two aspects of cognitive load — comprehension and memory — explain the likelihood of obtaining more accurate responses from time diaries than from direct questions (Floro 1995). While respondents tended to overestimate time at work in response to direct questions as compared with time diaries (Press and Townsley 1998), a longer reference period allows people to round up their working hours, which in turn lead to inflated estimates (Juster and Stafford 1991; Niemi 1993; Robinson and Bostrom 1994; Robinson and Gershuny 1994). Previous studies of household work also suggest that this kind of overestimates commonly happen when calculating time spent on activities that occur frequently and regularly which require a certain length of time to be completed (Marini and Shelton 1993; Juster and Stafford 1991). Time spent in less structured and irregular activities, such as house maintenance, however, tends to be underreported in responses to direct questions due to burdensome recollection (Shelton and John 1996; Bianchi et al. 2000).

2. Activity Simultaneity

Another source of overestimates from direct questions is that people tend to double count time spent on different activities performed simultaneously (Press and Townsley 1998). Overlapping activities are common among the self-employed, for example, when women's performance of housework is done simultaneously with market work or leisure activities (Marini and Shelton 1993; Floro 1995). In contrast, time diaries are designed to fully express time spent on simultaneous activities (Robinson 1985; Robinson and Gershuny 1994). For this reason, diary estimates yield more primary and secondary activities but less time unaccounted for than direct-question estimates (Juster 1985).

3. Social Desirability and Time-Pressure Perception

Given that respondents are able to accurately remember and report their time spent on simultaneous activities, the over-report of time at housework and/or paid work may partly come from response motivation. Such a psychological explanation can be further elaborated in terms of social desirability and time-pressure perceptions.

Concerning the former, the respondents may be aware of the purpose of the survey questions and thus reconstruct their responses to direct questions in a way they think is socially desirable. For example, the respondents may want to portray themselves as hard workers in their market and/or domestic roles and therefore exaggerate their work hours to meet social expectations (Niemi 1993; Robinson and Bostrom 1994; Winkler 2002). It has been suggested that married couples with traditional gender-role attitudes tend to over-report

housework hours in response to direct questions in comparison with time-diary reports (Press and Townsley 1998). The other social-psychological explanation for such a reporting gap is also associated with the respondents' perceptions of time pressure. People who perceive themselves subject to time pressure tend to exaggerate their working time in response to direct questions (Goldschmidt-Clermont 1993; Hill 1985a; Jacobs 1998).

4. Regression to the Mean

When using time diaries as a baseline, the previous studies indicated that the respondents working long hours tend to exaggerate their time at paid work, while those working few hours tend to underestimate their working time. The reporting gap derived from long working hours is considered to be the statistical artifact and called "regression to the mean" implying that overestimates may compensate for underestimates (Robinson and Gershuny 1994; Robinson and Bostrom 1994; Jacobs 1998). Nevertheless, "regression to the mean" being identified in market-labor studies deserves further examination in the studies of unpaid market and non-market labor.

C. Data and Methods

As indicated by previous literature, diary method has been commonly employed as a quality check for results obtained from direct questions (Juster 1985; Robinson 1985; Niemi 1993; Jacobs 1998). First, time diaries are less likely than direct questions to present respondents with cognitive burden and to leave a room for double counting participation in simultaneous activities.

Second, time diaries are not inclined to provide respondents with the chance to reconstruct a report of working time, especially that which is hinted by perceived social expectations and time pressure. Based on these two main reasons, two research questions in the comparison between time diaries and direct questions are raised.

1. Is the time on farm work and housework estimated by direct questions significantly higher than that estimated by time diaries?

2. If there are overestimates resulting from direct questions, are the overestimates associated with increased working hours, perception of time pressure, and role-identities?

Survey data and ethnographic data supplementary to survey data were used in the final analysis.³ Sixty married women growing flowers were randomly sampled from two towns in Jang-hwa county celebrated for its flower production, while 49 women agreed to be interviewed face-to-face. Most of the 49 women had only elementary-school education or less (67.3% of them graduated from elementary school) (Appendix 1). Their average age was 46.85 and the average farm size they operated was .83 hectare. Nine in-depth interviews conducted in Chia-yi were collected as the pre-test of the survey. Most of the women among in-depth interviews were over 50 years old, had school education, and had two or more children (Appendix 2). Four of them had a farmland of more than one hectare, while half of them are

³ Both types of data were collected from the survey project funded by National Science Council in 2000 (NSC 89-2412-H-001-002). The original purpose of this project was to explore married women's allocation of time on flower farm and household work.

renting parts of their land. Most of their husbands had no off-farm paid jobs but had hired farm labor during harvest seasons.

Three measures of unpaid-labor time, consisting of time diaries and two direct questions with different reference periods, were designed for the survey. Time diaries were designed for the women to recall the activities they did during a 24-hour period from midnight to midnight (Harvey 1993; Robinson 1985). Following the guidelines suggested in the literature, an open format was used to record the time at which primary and secondary activities of 15-minute intervals occur (Juster 1985; Ujimoto 1990; Floro 1995). In order to reduce the bias caused by the intraweek-interweek variation, interviewers were requested to complete at least eight interviews on weekends among the 30 interviews assigned to each of them. As a result, 69.4% and 30.6% of the days recalled by the women were weekdays and weekends respectively.

The two direct-questions were “how many hours on average did you spend on farm and household work respectively on a typical day last year, during the busy and slack seasons?” and “how many hours did you spend on the following farm and household chores on average during a typical week last year?” Concerning the second direct question, farm chores including planning for investment in farm production, equipment maintenance, field work, harvesting, farm bookkeeping, and marketing, as well as household chores, including cooking, cleaning the house, grocery shopping, household bookkeeping, childcare, and clothes washing were listed in a layout. Respondents answered each one of them during busy and slack seasons separately.

All working hours estimated by diaries and direct questions were converted into minutes for the purpose of comparison. In order to fit into the same unit of analysis — one day, “a synthetic day” was named and calculated by dividing the sum of the time spent on the specified chores per week by seven. The daily labor time reported in response to the other direct question was then called “a stylized day”. Besides, time spent in primary and secondary activities as reported in dairies was all counted. Two time overestimates to measure the discrepancy between diary estimates and two stylized estimates were employed, each being the product of subtracting diary estimates from stylized-day estimates and synthetic-day estimates.

Role identity was defined in five categories according to Bokemeier and Garkovich (1987): (1) homemaker: a woman whose main farm activities involve running errands and traditional homemaking chores, (2) agricultural helper: a woman who participates in agricultural production mainly during busy time, (3) business manager: a woman whose main responsibilities are bookkeeping, information gathering, and financial decision making, nonetheless having her husband as the primary operator, (4) full agricultural partner: a woman who shares equally in the work, responsibilities, or decision making on all aspects of farm operation with her husband, and (5) independent agricultural producer: a woman who manages the farm largely by herself. Thirty-seven percent of the women considered themselves as homemakers, followed by full agricultural partners (30.4%) and agricultural helpers (23.9%) (Appendix 1). In the multivariate analysis, four dummy variables were created using homemakers as the reference group.

The perception of time pressure was measured by a time-crunch scale

designed by Robinson and Godbey (1999). Ten statements concerning a person's time use such as time spent with family members and friends, self-identity, and so on were included in the scale (Appendix 3). The response to each statement was marked according to five rates: (1) strongly disagree, (2) disagree, (3) undecided, (4) agree, and (5) strongly agree. All the responses were arranged so that high scores were oriented towards the feeling of being in a time-crunch. Cronbach's Alpha test suggested that the ten statements form a reliable Likert scale ($\text{Alpha} = .7215$). Total scores for the scale were simply the summation of scores from each statement and ranged from 10 to 50.

D. Results

1. Validation of Time Diaries

According to Table 1, the difference in farm and household working hours between weekends and weekdays was not statistically significant. This particular discrepancy in working hours between weekends and weekdays was, however, similar to that found by previous studies (Hill 1985b). That is, women's time spent on household work on weekends was more than that spent during weekdays, while their time spent on market work during weekdays than that on weekends.

Table 1 Diary Estimates between Weekend and Weekday¹ (hours/day)

	Farm Work		Household Work	
	Weekend	Weekday	Weekend	Weekday
Mean	6.32	7.77	4.76	3.75
S.D. ²	4.51	2.15	3.84	2.05
Valid N ³	15	34	15	34

1. Paired-samples t-test was used to compare the difference in diary estimates between weekend and weekday in terms of farm work time and household work time.

2. S.D. = Standard Deviation.

3. See Page 213 for sample selection concerning the variation in the number of valid cases between weekend and weekday.

The insignificant difference in intraweek versus interweek working time implied that the reported diary day was legitimate to represent a work week, and hence valid as a baseline for evaluating stylized measures. Two more reasons may support the legitimacy. The first is the flexible arrangement of farm work, which is highly dependent on weather. The second is based on ethnographic data in which almost all of the women disagree with the notion that farmers actually have weekends. Take Ho as an example, she did not like to tell us the size of the farm her family owned or cultivated. When asked about her workload, nevertheless, she spoke up.

Question: Do you work every day from Monday to Sunday or work less on Saturday and Sunday?

Ho : ...We don't have days off all week, even all month. Farmers don't have a weekend. They work for themselves, not for others.

Question: Really? You don't take a rest after five days of hard work?

Ho: No, No, No....You can ask her [who works on the neighbor farm]!
[bitter smiles....] It is impossible....Although I hope so...because we need to
earn more money...Farming is not profitable.

As discussed earlier, the time allocation of farm work can be flexible. The flexibility may be mostly attributed to seasonal difference. As suggested by ethnographic data, the women started their farm work at sunrise and stopped working at sunset. During summer, they usually went to work on the farm early in the morning but came back home in the late evening. Their work schedule in winter was different from that in summer in that they would return home sooner. For an early bird like Tseng, she went to work at five o'clock in the morning and left the farm at seven o'clock in the evening in summer. However, in order to avoid sun burn, her time for a rest at noon in summer was more than that in winter. In this way, here was, in fact, no difference in the total hours of farm work between summer and winter.

Another kind of seasonal difference was, however, found likely to be significant according to in-depth interviews and the analysis of survey data. Wang told us there was a similarity in seasonal working hours but a difference in the workload between busy and slack seasons.

Wang: If it is hot in summer, we start working at six o'clock...come back at eight thirty or nine o'clock. We go back to work around four o'clock in the afternoon and stop working at eight at night....but in winter, we stop working at five thirty in the afternoon....

Question: Working hours between summer and winter seem to be equal?

Wang: Yes! Almost equal....however, whether it is harvest season or not makes a difference....When we need to harvest the flowers, I may work overnight....

In addition, paired-samples t-tests of two stylized measures indicated significant variation in farm working hours between busy and slack seasons (at the .001 significant level) (Table 2). The average working hours on the farm during busy season outnumbered that during slack season by about three to six hours. On the other hand, significant variation in housework time between busy and slack seasons was found only in terms of a synthetic day (at the .01 significant level). Seasonal differences in farm and household working hours in the later discussion will be then defined as busy-slack seasonal difference.

2. Measure Comparison and Reporting Gaps

The results of paired-sample t-tests shown in Table 2 also indicated that only farm working time estimated by a diary day during busy season, on

Table 2 Differences in Estimates between Two Seasons and between Two Stylized Measures (hours/day)

Types	Diary		Stylized Day				Synthetic Day			
			Busy Season		Slack Season		Busy Season		Slack Season	
	Farm	HHD ¹	Farm	HHD	Farm	HHD	Farm	HHD	Farm	HHD
Mean	7.32	4.05	10.35 ^{c***}	4.51	7.57	4.43	12.24 ^{c***}	3.54 ^b	7.65	4.25
S.D. ²	3.09	2.72	3.38	5.63	2.09	1.54	7.50	4.79	3.61	4.03

1. HHD = household.

2. S.D. = Standard Deviation, N = 49.

3. Paired-samples t-test of estimates between seasons: ^ap<.05, ^bp<.01, ^cp<.001.

4. Paired-samples t-test of estimates between measures: *p<.05, **p<.01, ***p<.001.

average, is significantly shorter than that by a stylized day and a synthetic day for three and five hours respectively (at the .001 significant level). Except for household working hours during busy season in a synthetic day, it is likely that working hours estimated by the two direct questions is higher than those estimated by time diaries.

The precise reporting gaps in farm and household working hours between diary measure and stylized measures during the same season were further examined. On average, the overestimates of farm work hours in a synthetic day were found to be significantly greater than those in a stylized day (at the .001 significant level) (Table 3). This finding echoes the previous studies that a long-reference period in direct questions induces the exaggeration of reported farm work time instead of reported housework time. Cognitive-load results in the overestimates of highly structured and routinely performed activities as suggested by previous literature (Juster and Stafford 1991; Bianchi et al. 2000).

Table 3 Differences in Overestimates between Two Seasons and between Two Stylized Measures (hours/day)

	Stylized Day				Synthetic Day			
	Busy Season		Slack Season		Busy Season		Slack Season	
	Farm	HHD ¹	Farm	HHD	Farm	HHD	Farm	HHD
Mean	3.02 ^{c***}	0.46	0.32	0.63	6.77 ^c	0.25	0.03 ^c	1.18
S.D. ²	3.98	6.24	3.43	2.94	5.44	4.57	4.20	4.17

See Table 2.

When comparing the two seasons, the exaggeration of farm working time during busy season was found to be significantly greater than that during slack season for both stylized measures. The exaggeration of household

working time estimated by a synthetic day during busy season was found significantly less than that during slack season (at the .001 significant level). It implies a significant trade-off in time investment between work and family.

To make sense of the exaggeration across seasons, furthermore, the choice of a day designated for recording diary time, during busy or slack season, requires further consideration. According to in-depth interviews and direct observation, busy season for flower production was considered as harvest season. This season usually starts after winter and, as explained by Ho, is “from the end of a year...to Mother’s day (May day)⁴....” It is thus sufficient to classify February and March, the months that time diaries were collected for the present study, as busy season. The overestimates found in busy season in the present study are then more accurate than those in slack season.

3. Explanations for Reporting Gaps

Stepwise regression was employed to explore the possible factors explaining the over-report of direct questions in comparison with time diaries. Eight multiple regressions for eight overestimates of time spent on farm work and housework during busy and slack seasons in a stylized day and a synthetic day were performed. The factors included in the initial analysis were reported working hours, role-identity, and time-pressure perception as independent variables, while age and educational years were put into the

⁴ May day is actually an idiom pronounced as Wu-Wue-Jie in Fulao language referring to the busy days for flower marketing.

regression models later as control variables.⁵ The number of factors which remained in the eight regression models was different. Only reported working hours was found to be consistently significant across models (Tables 4-5). All finalized models, except for the model of farm work during slack season, had a moderate to strong explanation power (R-square from .415 to .858).

Table 4 Multiple Regression¹ of Overestimates in a Stylized-day

Overestimates Independent Variables	Farm Work		Housework	
	Busy Season	Slack Season	Busy Season	Slack Season
	β (S.E.) ²	β (S.E.)	β (S.E.)	β (S.E.)
Intercept	-431.10 (96.44)***	-384.50 (117.90)**	-132.60 (44.90)**	-463.20 (102.70)***
Working hours	0.81 (0.12)***	0.87 (0.25)***	1.00 (0.06)***	1.14 (0.23)***
Independent producer ³	--	-- ⁴	204.10 (73.92)**	42.54 (13.65)**
Education (year)	16.38 (6.64)*	--	-19.12 (5.40)***	--
Age	--	--	--	5.60 (1.78)**
Adjusted R-square	0.471***	0.191***	0.858***	0.415***

1. Stepwise selection option was used, while missing values were replaced with the mean for all variables in the model.
2. S.E. = Standard Error, N = 48.
3. Homemakers are assigned as the reference group.
4. "--" stands for the variables excluded from the model.
5. * P<.05, ** P<.01, *** P<.001.

⁵ One would argue that other variables such as farm scale, husband's labor input, hired labor, other family labor, and childbearing should be considered in the model. As I consider this paper as an exploratory study, the variables proposed in the present model were based on what was suggested in the previous methodological studies of time at market work and time-use (see literature review on pp. 206-211). Without solid theoretical suggestion, those variables at household level were currently excluded from the modeling of women's overestimates of farm working and housework time and remained to be profoundly tested for subsequent studies.

Table 5 Multiple Regression¹ of Overestimates in a Synthetic-day

Overestimates Independent Variables	Farm Work		Housework	
	Busy Season	Slack Season	Busy Season	Slack Season
	β (S.E.) ²	β (S.E.)	β (S.E.)	β (S.E.)
Intercept	-392.20 (85.90)***	-382.10 (59.20)***	-127.90 (35.70)***	-137.40 (23.80)***
Working hours	0.83 (0.07)***	0.84 (0.12)***	0.77 (0.06)***	0.66 (0.06)***
Independent producer ³	-- ⁴	--	159.10 (63.96)*	--
Education (year)	14.19 (6.53)*	--	-10.29 (5.08)*	--
Adjusted R-square	0.734***	0.508***	0.807***	0.770***

See Table 4.

The results indicated that the exaggeration of working time, for both farm work and housework across seasons, was found to be significantly affected by reported working hours in terms of a stylized day and a synthetic day (Tables 4-5). Those who worked for a long time were likely to inflate their working hours. In other words, reporting gap may come from a statistical artifact — regression to the mean. Such an effect exists in terms of not only unpaid market labor time but also household labor time.

Seasonal difference in this effect was further tested under the hypothesis that the effect of reported working hours on report gaps during busy season would be equal or less than that during slack season.⁶ The results of one-sided t-test of regression coefficients between two seasons suggested that the regression-to-the-mean effects for both farm work and housework during busy season are larger than those during slack season. That is, the

⁶ One-sided t-test of two regression coefficients between busy and slack seasons was used based on the formula for computing t value: $t = (b_1 - b_2) / \{ [S^2_{y1x1} / S^2_{x1} * (n-1)] + [S^2_{y2x2} / S^2_{x2} * (n-1)] \}$. The premise of this formula is unequal residual variance (Sachs 1984).

exaggeration of working time was likely to be found when the work was done during busy season.

The social-desirability effect was found only in terms of housework. Those who portray themselves as independent producers, compared with homemakers, tend to over-report their time spent on housework (Tables 4-5). The possible explanation for the opposite findings may be that women identifying themselves as independent agricultural producers take full charge of farm production and are thus knowledgeable about farm activities. Their report of farm working time may, therefore, be much more precise. A typical example is Wu, who allocated her time between farm work and household work very well, based on her narration and the interviewer's point of view. A rule of thumb for her was to work as regularly as possible.

Wu:See! Most of the tasks... are all man-like jobs...but I do it all myself...like fertilizing, spraying pesticide....

Question: ...but you are so slim!

Wu: ...In fact, let me tell you. Those tasks are not very difficult, once you get used to them....If they [men] can handle it, so can I...though may be a bit slower....

....

Question: You work more than eight hours?

Wu: Yes, sometimes...for example when cutting flowers....we didn't go to sleep until midnight....

Question: You can do it because you are still young!

Wu: No...I think I manage my time efficiently.... I don't take a rest. I go

shopping and drive my child back home at noon....I try to work no more than 8 hours a day....”

Finally, in light of the time-pressure-perception effect, those who feel pressured in the allocation of their daily time did not necessarily inflate their working hours. It is, however, premature to jump into any conclusion simply based on the limited number of valid cases. As discussed earlier, farm women have much more freedom to allocate their time between farm work and housework, which may be performed simultaneously. The flexibility of time use may somehow decrease their perceptions of time pressure. Concerning this rationale, narratives collected in this study may provide explanations one way or another. Ho usually worked more than eight hours on the farm and did not think it hard to arrange her working time.

Question: Have you had any difficulty to arrange your time?

Ho: Actually, no. We work for ourselves and so are free to arrange our working time....When we want to work longer, we can do so. That's it! There is no time limit for us.

Question: When your work has not been finished during busy season, do you go ahead to sleep, leaving it for the next day, or get it done before sleep?

Ho: We do our best to finish as much as we can....Sometimes we did not go to sleep until 11 o'clock at night.

In contrast, Huang mostly worked less than eight hours a day but felt

tired all the time.

Question: Do you feel tired when housework waits for you after you finish farm work?

Huang: Of course...very tired...and have no one to talk to....After my daughters come home, I always ask them to help around....

Question: How about when your children were still small (preschool)?

Huang: My mother took care of them until they were three years old....I brought them to the farm to play while I was working....[I] didn't have any choice. No one can take care of them for me....

The evidence from limited narratives implies that family members such as parents-in-law, daughters, and daughters-in-law may be more important than time-pressure perception affecting the over-report of household and farm working time. As in Taiwan rooted by the patriarchal gender division of household labor, the extent to which household labor input from family members affects the estimates of women's farm and household working time needs to be taken into account so as to express women's unpaid labor time precisely. The answer to this question is dependent on the validity and reliability of different time measures and indeed deserves more thorough investigation.⁷

⁷ Also see footnote 5. With valid measures, the estimates of actual working hours can be calculated based on the formula concerned with the allocation of intra-household resource suggested by home economists. Which formula is appropriate goes beyond the scope of this study.

E. Conclusion and Suggestions

This paper compared diary estimates and two stylized estimates of the time spent by self-employed farm women on unpaid work. The comparison was restricted to married women in the flower production industry. Similar to the previous findings, diary estimates were found to be lower than two stylized estimates. The overestimates from a synthetic day was found to be higher than those from a stylized day and implies that cognitive-load in long reference period induces the over-report of working hours, particularly for much more structured and regular activities like farm work. The over-report of time spent on farm work and household work was found to be significantly related to reported working hours. Time-pressure perception was found to be almost unrelated to the exaggeration of reported working hours, while significant role-identity effect on housework time existed. Those identifying themselves as independent producers were more likely than those considering themselves as homemakers to exaggerate their time on housework. This finding was opposite to that suggested in previous literature.

Given to the divergent findings, this study echoes previous literature and implies that the time budget approach for studying self-employed married women in flower growing should be used with caution conceptually and methodologically. There is no doubt that the women in the present study undertake double unpaid workloads. In order to visualize their substantial labor input, the broad sense of active labor instead of the narrow concept of market labor should be emphasized. A valid measure representing the broad definition of active labor in terms of time allocation is thus required.

When dealing with married women in the flower production industry, time diaries are still strongly recommended, since they allow the collection of unpaid labor time data with high quality. First, in the simple question “how many hours do you spent on farm work (or housework)?”, the definition of farm work or housework still needs to be clarified to avoid missing information. For example, tasks such as bookkeeping, supervision, and supporting jobs are important to the success of family farms but tend to be ignored by the respondents without clear mutual understanding. This problem can be fixed by using daily activities, which are commonly defined and easily realized. Second, it is inadequate to explicitly present the complicated nature of the allocation of unpaid labor without regard to irregular and coexisting work activities which flower women often confront with. One way to solve this problem is to have a layout of the activities (tasks) in which we can document clearly the simultaneous activities (tasks) easily recalled by the respondents with detail time interval in hours and minutes.

Such a conclusion drawing on a particular group of farm women cannot represent farm women or other self-employment in informal sectors as a whole. Flower production is only a small proportion in agricultural production with a gender division of farm and household labor different from other crops like rice, especially in terms of seasonal difference and the overlap of work and family. It is, therefore, not suitable to generalize the validation of diary measure only based on this particular group. This study, however, has properly demonstrated the variety of applications of time-use methodology and provided a good frame of reference for subsequent methodological research among multidisciplinary studies such as lifestyle,

family cycle, gender division of household labor, and labor force participation in Taiwan.

As pointed out earlier, time-use research has not yet been common in Taiwan. As far as the surveys using time diaries as the way of collecting time data are concerned, only two national surveys of time use were conducted by the Directorate General of Budget Accounting and Statistics — “Time Utilization Survey” in 1984 and “Investigation: Leisure and Life” in 1990, while “Investigation: Time Utilization” is currently executing. Given this situation, similar studies as the current one should be conducted as soon as possible. The current study is believed to play a crucial role in motivating the methodological studies which is seeking a good measure of time use.

The suggestions on the point of departure to the future study are based on the limitations of the present study and the implications for similar studies in other fields. First, concerning farm women, the insignificant and opposite effects of time-pressure perception and role-identity on the exaggeration of work time induce further debates. The debates may lie in peculiar work allocation for farm women and the measurement of social desirability. With regard to the former, flexible time arrangement may relieve farm women’s feeling of being in time-crunch and decrease or reserve psychological effects. In light of the latter, the measurement of role identity to represent social desirability may need to be refined, as no woman considered herself a business manager. To measure social desirability, gender-role attitudes in general, instead of specific role-identity as used in this study, is suggested and needs to be retested in the future.

Second, in particular, implied by narratives in the present study, the

extent to which the variables at household level, including other family labor, hired labor, and husband's labor input, as related to the exaggeration of working hours may need to be further examined. The exploration can be conducted by including those variables in the multivariate modeling of the overestimates and ethnographic data analysis.

Third, the re-test of the social-desirability effect and other model of overestimates can be fulfilled by increasing the number of research subjects as well as extending the subjects to the women involved in other types of farm production. A comparative analysis of different groups of farm women is particularly encouraged by taking the extent to which farm production is in need of intensive female labor into consideration.

Fourth, diary estimates in the present study were actually collected in busy season because the designated days for collecting diary data were chosen from the busy season only. The validation of diary measure, rigidly speaking, should be only applicable to women's time allocation during busy season. In the future, diaries during the slack season should be also collected. Diary days are suggested to be more than one day in a week and be randomly selected.

Fifth, in practical terms, time diaries are recommended when the cost of using this method is not an issue. With regard to the alternative method, direct questions using a long reference period are not recommended when the over-reporting of time spent is the main concern. Whether this recommendation can be extended to the conceptualization and measurement of women and men in the informal sector remains unexplored. Concerning the validation of time diaries, studies concerning the flexibility of format for time schedule, the

types of activities designed and other validity check in time schedule, the duration of time intervals in time schedule, the choice of reference period, and the days selected for time diaries are urgently encouraged.

Finally, such kinds of validation studies can not be fulfilled without the combination of qualitative and quantitative data analysis. Time-use studies using representative national sample or longitudinal study design are strongly suggested. Qualitative data including direct field observation and in-depth interview are however, important as either a major source of measure validation or complementary studies.

Biographical Note

Su-hao Tu, Assistant Research Fellow, Center for Survey Research, Research Center for Humanities and Social Science, Academia Sinica. Main research areas are survey methodology, gender studies, rural sociology, and environmental sociology. Recent studies include interviewer effect on non response, attitudes toward gender roles, marriage and childbearing, and time use.

Appendices

Appendix 1: Survey Sample Description

	Mean (S.D.) ¹	%	Valid N
Age (year)	46.85 (10.920)		49
Farm Size Operated (hectare)	0.83 (0.454)		48
≥ 1 hectare		32.9	
Education			49
None		10.2	
Elementary and less		67.3	
Junior High		12.2	
Senior High		18.4	
College and more		2.0	
Net Farm Income			41
Loss		12.2	
Even		17.1	
Gain		70.7	
Role Identity			46
Homemaker		37.0	
Agricultural Helper		23.9	
Business Manager		0.0	
Full Agricultural Partner		30.4	
Independent Agricultural Producer		8.7	

1. S.D. = Standard Deviation.

Appendix 2: Background Information of In-depth Interviewee

	Age	Education Degree	Children Son/Daughter	Husband's Off-farm Job	Farm Size (hectare)	Rent-in Size (hectare)	Hired Labor
1. Huang	47	elementary	3/1	no	0.4	0.0	yes
2. Wu	34	senior high	1/2	yes	0.6	0.6	no
3. Wang	52	elementary	2/0	no	1.0	0.5-0.6	no
4. Hsieh	50	no	2/3	yes	2.0	0.0	yes
5. Ho	57	elementary	2/1	no	<1.0 ¹	? ¹	yes
6. Lee	60	junior high	3/2	yes	1.6	0.0	yes
7. Hsiaw	70	no	5/1	no	0.0	0.4	no
8. Tseng	55	elementary	2/1	no	0.5-0.6	0.2-0.3	no
9. Hsu	52	elementary	3/1	no	3.0	1.0	yes

1. The ambiguous answer was based on five times of probing.

Appendix 3: Items on Time Crunch Scale

1. I often feel under stress when I don't have enough time.
2. When I need more time, I tend to cut back on my sleep.
3. At the end of the day, I often feel that I haven't accomplished what I set out to do.
4. I worry that I don't spend enough time with my family or friends.
5. I feel that I'm constantly under stress — trying to accomplish more than I can handle.
6. I feel trapped in a daily routine.
7. When I'm working long hours, I often feel guilty that I'm not at home.
8. I consider myself a workaholic.
9. I just don't have time for fun anymore.
10. Sometimes I feel that my spouse doesn't know who I am anymore.

Cronbach's Alpha = .7215

	Mean	Standard Deviation	Valid Cases
Scale Scores	29.49	6.07	49

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