

AN EVALUATION OF TIME BUDGET STUDIES AS COMPLEMENTS TO CONVENTIONAL LABOR FORCE SURVEYS

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1. Introduction

Labor force, employment, and unemployment data are gathered for many purposes. These data are used as indicators of aggregate economic activity, as measures of labor supply or potential labor supply, and as variables explaining various kinds of economic and non-economic behavior. The current approach to measuring employment and unemployment in developing countries derives from labor force concepts used in developed countries. The applicability of these concepts to developing countries has come under sharp attack (Myrdal, 1967 and Hauser, 1974). The purpose of this paper is to examine the role of time budget studies as complements to, or substitutes for, the usual questions asked in labor force surveys.

Section 2 of this paper evaluates conventional labor force questions from the perspective of economic models of household time allocation. The value of time budget studies for the analysis of questions for which labor force data are gathered is outlined. Section 3 discusses alternative ways of gathering time use data, and Section 4

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states the major problems in interpreting these data. Section 5 presents time allocation data gathered from households in Laguna, Philippines. Section 6 concludes.

2. Labor Force Questions and Economic Models of Time Use

Conventional labor force measures are classifications of how people use their time or would like to use their time. People who supply labor "for the production of economic goods and services" (United Nations, 1967) (i.e., engage in a specified set of activities) are counted as employed. The number of hours worked is ordinarily tabulated. People who do not work are classified as either unemployed or not in the labor force. Persons are counted as unemployed if they would like to work but have been unable to find employment. Active search for a job is sometimes a requirement for a person to be considered unemployed. Individuals who work, and would like to work more hours, are sometimes classified as underemployed.

Since labor force measures are classifications of time use in economic activities, it is important to consider economic models of individual and household time allocation before evaluating their usefulness in describing or analyzing behavior. The traditional model of individual labor supply behavior classifies the time of an individual into two categories—work and leisure. Work is a source of income which, when combined with non-labor income, enables an individual to purchase market produced goods. These goods and leisure yield satisfaction or utility to the individual. The amount of work an individual performs depends on his preferences for goods and leisure, non-labor income, and the wage rate he faces. An increase in the wage rate raises the value of each hour worked, leading the individual to work longer hours (a substitution of work for leisure). Simultaneously, the individual enjoys a higher income for any given number of hours worked, which may lead him to work fewer hours since leisure yields satisfaction. The net effect is *a priori* indeterminate. An immediate implication of this model is that classification of individuals by hours worked is not simple. For example, an increase in hours worked may indicate improved employment opportunities, or, alternatively, an increase in hours worked may be the supply response to reduced wage rates.

Besides variations in hours worked data, variation in unemploy-

ment rates are used as indicators of economic activity. The unemployment category is designed to measure persons who are involuntarily out of work. Unfortunately, the unemployment rate is also difficult to evaluate without further information. For instance, the number of measured unemployed in developing countries is sometimes low because sources of non-labor income are limited, so that virtually any work, no matter how low the wage, is better than no income at all. In addition, measured unemployment may rise during periods of economic expansion, because the presence of employment opportunities paying high wages encourages persons previously not in the labor force to seek employment. They contribute to unemployment during their job search.

Another important problem in the application of conventional labor force definitions is determining the set of activities to be defined as involving "the production of economic goods and services". Following the work of Becker (1965) and Lancaster (1966), economists have begun to view households as little factories, in which the time of family members, purchased goods, and household capital are used to produce "consumables" (e.g., the health status of family members) yielding utility to the family. Family time, capital, and purchased inputs can also be used to produce goods which are marketed and for which the family receives income. In the simplest case, the family exports only time to the market and receives wage income. In turn, the income earned from the sale of goods and time and non-labor income (plus borrowing) is used to purchase market goods and time of nonhousehold members or for saving. Given prices of market goods and wages, the family maximizes its utility function subject to a set of production functions, the budget constraint, time constraints for each household member, and constraints that the services of each capital good used for production be less than or equal to available capital services. In this model, all time of family members is considered to be productive—even sleep is a productive activity which uses time and capital goods and yields utility. Only a small and rather arbitrary subset of these activities is included in the list of activities considered to be supplied for the production of economic goods and services in labor force surveys. Thus, all wage earning time is ordinarily included and time spent in producing agricultural commodities is typically included regardless of whether the output is sold in the marketplace or consumed at home, while the treatment of, say, the time spent

washing clothes is included only if not for home consumption. Substantial amounts of household time spent in productive activities may be missed in conventional surveys. In rural Nepal, for example, a majority of women are classified as economically inactive, yet a study of eight villages by Meena Acharya (1981, Table 6, p. 22) found that women over age 15 worked an average of 4.6 hours per day in conventional economic activities (animal husbandry, agriculture, manufacture, and income earning activities outside the household) compared to 5.8 hours for men in the same age group. In addition, women spent 2.1 hours per day on hunting and gathering, fuel and water collection, household construction and food processing (excluding cooking and servicing) compared to .9 hours per day by men. Clearly, conventional surveys understate considerably women's economic activities, and omission of the latter set of activities for men yields an underestimate of their hours of work by about 13 percent.¹

As development proceeds, changes in prices, wages, production processes, and preferences lead to shifts in the location of production of many goods and services from the home to the market place, thereby altering the proportion of time or number of persons included in the employed category by labor force surveys. Consequently, the concentration of these surveys on only a small subset of productive activities yields an inaccurate picture of contemporary economic activity and an inadequate, and possibly misleading, description of trends in activity.

One approach to measuring time use which meets the objectives raised above is to analyze the household's use of time in all activities. Variations in time use from year to year can shed light on labor supply questions and on shifts between market and non-market production. If, in addition, the value of time in various activities can be measured, one can then analyze the gains and losses to households with variations in aggregate economic activity, as well as the net gains from participating in market activities. The remainder of this paper concentrates on methods for gathering time data. Methods of measuring household output and valuing the time of household members are discussed in Boulier (1977), Butz and Greenburg (1975), Gronau (1976), and Havrylyshyn (1976). Boulier (1977)

1. Boserup (1976) provides a good description of the problems encountered in measuring the labor force participation of women.

provides estimates for the sample of Philippine households described in Section 5.

3. Methods of Gathering Time Data

There are three major methods of gathering time data: 1) retrospective questionnaires, 2) observation, and 3) self-kept records.² These methods are described below.

In retrospective questionnaires, individuals are asked about the time devoted to various activities in a recent period of time—the last hour, the last day, etc. Combinations of time units can also be used. For instance, one might ask how many hours the individual cared for poultry today and how many days in the last week, if weekly averages are sought. The choice of time interval is not a simple matter. Presumably, the shorter the interval, the more accurate the data. For a sample of West Java village households interviewed twelve times in one year, Wigna (1980, p. 10) reports that average annual hours spent in income-producing work by men and by women estimated from interviews based on thirty-day recall periods averaged only about 60 to 70 percent of hours estimated from interviews based on one-day recalls. If there is considerable variation in time use from interval to interval, the researcher faces the choice of gathering time data for longer intervals or asking the question more often to the same set of households. Tradeoffs of cost and data accuracy will undoubtedly vary from country to country.

There are several other choices to be made in gathering the data. First, there is the matter of the choice of respondent. Each individual may be asked separately about his own activities, or some individuals may be asked about the time allocation of others. The latter alternative is ordinarily less reliable, except in the case of young children. That estimates of time spent in various activities depends on the respondent was shown in our Philippine survey, since it was found that husbands' reports of wives' time spent in activities involving home production (e.g., weaving) were often inconsistent with wives' reports of their own time. There was no persistent pattern of inconsistency. That is, some husbands reported more time

2. Birdsall (1981) and Szalai (1972) include bibliographies of time budget studies; Birdsall (1981) and Stone (1972) discuss the analysis of time budget data; and Engle and Butz (1981) discuss methodological issues in collecting time budget data.

spent by their wives and others less. Inaccurate responses to questions about the time use of others is not necessarily due to lack of knowledge. White (1975) reports that Indonesian parents commonly depreciate the time contributions of children to household activities.

A second important matter is the organization of time questions. There are several possible procedures for gathering time data. One method is to ask an individual to recount his or her day beginning with the moment the person awakens (White, 1975). This method yields information about the sequencing of activities and gives estimates which exhaust totally the twenty-four hours in a day. However, this procedure may yield inaccurate information if respondents omit activities which require little time or seem unimportant to them. Consequently, the method should probably be supplemented by probing for such activities. A second method is to organize the questionnaire by individual and then ask about a set of activities for each individual. A third method is to list activities and then ask who performed the activities and the amount of time each person spent performing the activity. We found this last method to work successfully in the Philippines. Considerable experimentation is needed to select the list of activities, so that important activities are not omitted. Our questionnaire asked women about the time they spent in performing activities occurring in and around the home. Men were asked about agricultural activities, wage earning jobs, and various kinds of market activities. If more than one respondent answers questions about time use, care must be taken to ensure that duplication of reports does not occur (i.e., women reporting about income producing home production and men reporting the same time under business activities).

The second major approach to gathering time data is to observe activities directly. One or more interviewers are stationed in or by the house to record activities on time sheets. The method still requires some retrospective reports of time use since not all individuals spend a full day near the home. A possible serious bias is that the presence of the interviewer will influence the activities of family members. A check on observer bias can be attempted by stationing an interviewer for two or more days at some households. If average behavior on the second day or subsequent days differs markedly from behavior on the first day and if differences show consistent patterns, there is some indication of observation bias.

A third method is to have respondents keep time charts of their own activities, noting activities performed at (say) hourly intervals. Aside from the obvious bias that keeping the time chart requires, like being time-consuming and interfering with the usual flow of activities, the method demands relatively well-educated and highly motivated respondents. It is possible to combine diaries of time use with retrospective reports.

In a study involving twelve countries, respondents were contacted on the day prior to the one for which time use data were sought and were instructed to keep a time record (Szalai, 1972). On the day following the day of observation, respondents were interviewed to supplement recorded events. We found this approach unsuccessful in the Philippines. In practice, the method yielded retrospective reports of the previous days' activities.

In comparing the methods, one can say that self-kept time charts are probably not usable in developing countries, and that observation is likely to yield the most accurate estimates of time allocations, although some care must be taken to determine whether there is observer bias. In our Philippine survey, we observed households for two days and used only the reports from the second day, because interviewers stated that households appeared to be modifying their behavior because of the presence of the interviewer. When households do not have watches or clocks or other methods for telling time, retrospective reporting or time charts cannot be used as substitutes for observation. Observation is, of course, the most expensive method of gathering time data.

4. Problems of Interpreting Time Data

There are two major problems in measuring and interpreting time data. The first has to do with "jointness" of activities and the second with the intensity of effort. Jointness arises when individuals perform two or more activities simultaneously. For instance, a woman can breastfeed and stir the supper soup at the same time or mind the family business and care for children simultaneously. If each activity is listed separately, it is even possible for retrospective reports to yield more than 24 hours of time allocated to a set of activities. A related problem occurs in observational studies. If intervals over which time observations are noted are long, one can perform more than one activity in the interval. Thus, if a woman

spends one-half hour caring for children and one-half hour cooking supper and the minimum unit over which time is recorded is one hour, the woman has performed two activities. This difficulty is reduced by shortening the time interval. Since interviewers cannot be expected to record activities second by second, a compromise time, determined by experimentation, is needed. A partial solution is to have the observer code two activities for the time interval. While this method does not solve the problem, it at least gathers information on the ability of individuals to combine activities, an important question in its own right (McCabe and Rosenzweig, 1976). In the Philippines, we used open ended intervals and permitted the recording of at most two simultaneously performed activities.

The second difficulty in the measurement and interpretation of time data is the problem of intensity of effort. Suppose a respondent says that he spent eight hours in crop cultivation. The investigator cannot determine without considerable expense (e.g., measurement of calories expended) whether the respondent worked hard or enjoyed considerable on-the-job leisure. Variation in effort intensity may be large in agricultural areas with pronounced seasonal labor requirements. And, if effort intensity is variable, it is quite possible that a reduction in the demand for labor will not lead to a reduction in reported hours worked, only effort.³

5. Time Allocation in Laguna Households

Table 1 presents estimates of time allocation in a sample of households in Laguna, Philippines.⁴ Part A of Table 1 gives the

3. Stafford and Duncan (1977, Table 2, p. 15), who have addressed these issues with time diary data for the United States, find that about 10 percent of work time is spent in coffee and other scheduled work breaks, informal breaks, personal business, and lunch breaks more than 60 minutes, and suggest that failure to adjust conventional estimates of work time for such breaks yields erroneous patterns of age-work profiles, gives misleading estimates of union and non-union wage differentials, and may account for a portion of the decline in estimated labor productivity if the extent of on-the-job leisure has increased through time. In addition, by comparing workers' evaluations of work intensity relative to workers' evaluations of the energy and effort involved in watching television, Stafford and Duncan conclude that there are substantial differences in work effort by occupation, union status, and gender.

4. Households in the sample were chosen by simple random sampling from household lists prepared for 34 rural barrios selected to give a mixture of

A. RETROSPECTIVE QUESTIONNAIRE^a
(Hours per Week)

	B. OBSERVATION ^b (Hours per Day)							
	Father		Mother		Children			
	Cycle 1	Cycle 2	Cycle 1	Cycle 2	Cycle 1	Cycle 2		
(a) Crops	22.03	1.31	1.54	2.84	3.22	.81	2.29	2.68
(b) Fishing	.43			.24	.31	.01	.18	.29
(c) Poultry and Livestock	9.84	4.47	1.38	.61	.82	.21	.36	.51
(d) Wage	15.72	4.29	6.67	1.34	1.96	.79	1.22	.96
(e) Business and Professions	2.06	3.76	.22	.87	.72	.56	.70	.58
(f) Income Producing Home Production	2.04	2.80	2.31	.05	.13	.12	.14	.05
(g) Repairs	—	—	—	.08	.01	.07	.14	.01
(h) Marketing	—	—	—	.23	.05	.05	.01	—
<i>Total Income Earning Time</i>	52.13	16.33	12.43	6.26	7.22	2.57	5.04	5.08
(i) Non-income Home Production	2.85	40.94	17.00	.68	.95	5.55	2.66	3.13
(j) Child Care	.30	9.38	3.16	.31	.53	2.33	.65	.34
<i>Total Non-Income Time</i>	3.15	50.22	20.16	.99	1.48	7.88	3.31	3.47

^aData from Boulier (1977).

^bData from King (1976).

average number of hours worked per week by family members for 366 farm households interviewed in May through July of 1975. The Cycle 1 and Cycle 2 data in Part B of Table 1 are based on the second day of a two-day observation of a sub-sample of 98 households, where the observations took place approximately three months (Cycle 1) and six months (Cycle 2) after the date of the original survey. The estimates of child time refer to an average of about four children per household. Because the households are not the same for the time estimates and because the data are gathered in different seasons of the year, the retrospective report estimates of time use are not directly comparable to the observation estimates.

The retrospective report data are estimates of the average number of hours worked per week in the year preceding the survey. For crop cultivation and fishing, the average number of hours per week is calculated by multiplying the average number of hours per day spent in the activity in the past month times the number of days worked and dividing by 4.35 weeks per month. The last month is assumed to be a typical month for the purpose of converting these data to average hours worked in the past year. May, June, and July are months of relatively intense activity of crop cultivation in Laguna, so that estimates of time spent in crop cultivation are probably overstated. On the other hand, the time of children devoted to economic activity may be somewhat understated since school begins in June. A similar procedure is used for time caring for livestock and poultry for which questions asked minutes per day and days worked in the last month. For wage earning time and time spent engaged in a profession, the number of hours worked per week in the last month is multiplied by the number of months worked in the last year divided by twelve for both primary and secondary jobs. For business activities, the number of days worked per week in the last month is multiplied by eight hours per day times the number of months worked in the past year divided by twelve. Time spent in income-producing home production is summed from responses to questions about hours worked in the past week devoted to home gardening, washing and ironing for sale, furniture making and handicrafts, food preservation for sale, woven crafts, and other

household economic activities (e.g., fishing barrios and rice cultivation barrios). Boulier (1976) and King (1976) analyze the determinants of time allocation using the Laguna data.

activities. Together these activities are denoted "work time," even though some of the time in crop cultivation, poultry and livestock care, fishing, and gardening is really time devoted to production for home consumption.

Childcare time is time devoted to feeding, bathing and dressing and cuddling and watching infants (0-2 year olds) and other preschool children. Non-income home production time is time spent in the last week in the following activities:

- (a) Marketing of food,
- (b) Washing dishes,
- (c) Cleaning backyard,
- (d) Cleaning house,
- (e) Cooking and preparing food,
- (f) Other feeding time,
- (g) Washing and ironing clothes,
- (h) Getting water and firewood, and
- (i) Mending, sewing, or repairing children's clothes.

All home production time, whether income or non-income, and child care time data are taken from questionnaires given to mothers. Other income-earning time data are taken from the fathers' questionnaires. Questionnaires were checked to eliminate duplication in the reporting of time (e.g., weaving reported as home production by mothers and as business time by fathers). When such duplication occurred, mothers' reports of their own time and children's time were used.

In comparing the time estimates by the two methods, let us consider household members separately. For fathers, total income earning time per week derived from the retrospective questionnaire exceeds the estimates from the observation method (the daily average multiplied by seven). The excess arises from more time spent in the care of poultry and livestock, wage earning activity, and income-producing home production, with somewhat less time spent in business and professional activity and in fishing. These differences seem to be largely differences in sampled households. The retrospective reports include many non-rice producing farmers, while the observations include only rice-producing households, although they also engage in other kinds of farming (e.g., coconut raising). Compared to the observation estimates, retrospective reports show only about one-half the amount of time devoted to non-income

home production and about one-seventh the amount of time devoted to child care. In part, the differences may stem from the fact that retrospective reports on fathers' time spent on these activities are obtained from their spouses.

The two estimates of time spent by mothers in income-producing activities are similar, although the detailed composition of time is somewhat different. Time devoted to non-income home production is about 15 percent higher in the retrospective reports, and child care time is about 30 percent lower.

The retrospective reports of children's time spent in income-earning activities is only about one-third the amount obtained by the observation method, with large differences occurring in crop cultivation, care of poultry and livestock, and business and professions. Child care time estimates are similar and non-income home production time is about four hours per week lower. All things considered, the retrospective reports of child activities are far smaller than the time estimates obtained from the observation method.

6. Conclusion

In this paper, conventional methods of gathering labor force data have been described and criticized, and methods of gathering time budget data have been described and problems of data interpretation outlined. A comparison of two methods of gathering time data for a small sample of households was attempted, although the comparison was hindered by differences in the sampled households and differences in the dates at which data were gathered. For adults, retrospective reports of time allocation were broadly similar to estimates of time allocation obtained by observation, although estimated non-income home production time of fathers is markedly lower in the retrospective reports. Retrospective reports of child activities are far smaller than those obtained by direct observation.

Time budget data when combined with other economic and demographic information can provide answers to many of the questions for which labor force data are gathered. However, because of our limited experience in gathering and analyzing time budget data and because of the cost of gathering such information, time budget surveys are probably not a substitute for conventional labor force surveys. Rather, the principal benefits of time budget surveys would appear to be guiding the formulation of labor force questions

to insure that important productive categories of time use are not omitted from labor force surveys and studies on the microeconomics of household behavior.

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