# APPENDIX C

# The Interdependence of Time and Money

In the panel's primary focus on the measurement of poverty in the United States, we discuss the rationale for, and the measurement of, a concept of poverty based on the lack of family resources needed to obtain an adequate level of food, clothing, shelter, and a little more. Setting the poverty threshold, we suggest, should be informed by the actual level of expenditure on these commodities by consumer units, with the threshold determined as an appropriate fraction of the median expenditure by a reference family type, with a small additional amount to allow for other expenditures.

The concept of poverty that we contend should be used as the U.S. official poverty measure—economic poverty—is based on having the money or near-money resources needed for consumption. We stress at several points in the volume that this concept of poverty should not be considered the only relevant measure of deprivation. A measure of economic poverty should be supplemented by other measures that might reflect psychological deprivation, exposure to extreme risks of physical harm, illiteracy, lack of adequate medical care, and so forth.

In this appendix we address an issue that is neither as separable from the measure of economic poverty as psychological or even health-related factors are, nor as easily incorporated into an economic measure as the flow of services from owned homes might be: how to treat the valuable resource of time. Because of the unique problems posed by this one issue, we devote this appendix to considering it alone.

## "TIME IS MONEY"

The old adage that "time is money" essentially says it all, but unfortunately it does not tell one how to measure the value of time when measuring the available economic resources in a family unit. Nor does it tell one how to take account of the fact that two families with similar economic resources might have vastly different time resources that somehow should be taken into account in determining their material well-being. In this section we first illustrate the dilemma and the seemingly inadequate strategy of just ignoring the value of time when measuring a family's command over resources. Next we show actual expenditure data that reinforce the concern that it is not appropriate simply to count all the dollars of income and ignore all the time resources.

### Illustration

To illustrate the issue simply, consider two households. Household A has one adult; household B has two adults; neither has any children. The official (1992) poverty thresholds for these households (averaged by age of the head) are $7,143 and $9,137, respectively. This pair of thresholds implies that household B requires 128 percent as much income as household A to be at comparable poverty thresholds.

With these numbers, we can illustrate the question of time; see Table C-1. Since there are 168 hours in each week, household A has a total of 168 hours available every week, and B has twice that much time, 336 hours, since both adults have 168. Suppose that within each week every person requires 70 hours for sleep, personal hygiene, and eating—8 hours for sleep and 2 hours for personal hygiene and eating. (We use these values only for illustration and profess no expertise about their magnitudes; if the numbers are changed, the same points apply.) Subtracting this 70 hours per week from the total of 168 leaves just under 100 hours per person for discretionary use, that is, for all other activities.

Next, assume that the adults in households A and B each have a wage rate of $3.57. We selected this arbitrary wage rate to yield exactly $7,143 in annual income per adult if that adult worked 40 hours each week for 50 weeks of the year. This wage rate permits the full-time earner in household A to achieve exactly the poverty threshold level of income. Subtracting that 40 hours from the discretionary weekly hours, the adult in that household has now 58 hours available for all remaining activities. But for household B, the two adults only need to be employed a combined total of 51 hours per week to earn the poverty threshold level of income. One of the two might work full time, for 40 hours a week, and the other work part time for about 11 hours a week; or they might both work part time, averaging a little over 25 hours of work per

TABLE C-1 A Comparison of the Value of Time in Two Households

| Factors in Valuing Time | Household Composition | |
| | A: One Adult | B: Two Adults |
| --- | --- | --- |
| Official Poverty Threshold, 1992[a] | $7,143 | $9,137 |
| Relation of Thresholds | 1.00 | 1.28 |
| Time Allocation, Weekly Hours | | |
| Total | 168 | 336 |
| Personal care (subtract) | -70 | -140 |
| Discretionary, net | 98 | 196 |
| Needed to earn poverty threshold @$3.57/hour (subtract) | -40 | -51 |
| Available, net | 58 | 145 |
| Available per person, net | 58 | 72.5 |
| Valuing the Nonmarket Time | | |
| Hours available per week | 58 | 145 |
| Annual value @$3.57/hour | $10,353 | $25,882 |
| Assuming No Scale Economies in Nonmarket Time | | |
| Scale | 1.00 | 2.00 |
| Monetary equivalent | $10,353 | $20,706 |
| Extra resources for B | — | $5,176 |
| Assuming the Same Scale Economies in Nonmarket Time as in Money Usage | | |
| Scale | 1.00 | 1.28 |
| Monetary equivalent | $10,353 | $13,252 |
| Extra resources for B | — | $12,630 |

[a] Weighted averages from Bureau of the Census (1993c: Table A).

week. After subtracting these work hours, household B has 145 hours available for all remaining activities.

If the two households have exactly met their poverty threshold level of income, and all adults have the same (arbitrarily set) hourly wage rate, then the two households are equally well off in terms of economic resources. That is, after all, just what these poverty threshold levels are supposed to achieve. But notice that in household B, the remaining discretionary time is a total of 145 hours or 72.5 hours per person; in household A it is 58 hours. This fact highlights the underlying issue: having set poverty threshold levels of income for households A and B that reflect the economies of scale in living together (putting aside whether the scale economies are correctly measured or not) necessarily results in the larger household's having more discretionary time per adult than the smaller household. Thus, the two households are not equally

well off at the poverty thresholds, even though those thresholds were set at levels that were intended to achieve just that condition. After meeting their personal care needs and working enough (at a similar wage rate) to earn the poverty threshold level of income, each person in household B has 72.5 free hours, but the person in household A has only 58 hours. It looks as though the two people in household B are better off than the person in household A.

This particular illustration makes the point simply: if one ignores time in measuring poverty, one overlooks an important resource that can be converted into money. If we had used larger households in the illustration, the point could be made with even larger discrepancies. (Different values for the personal care needs or for the scale economies or for the wage rate in the illustration do not qualitatively change the conclusion.)

Moreover, since time is used in earning the money that meets the poverty thresholds, time is not just an example of a separate and independent resource that has been overlooked or set aside. Unlike many other resources, this resource —time—is generally correlated with the money earned. In many cases, it is traded for money in the labor market. Thus, for many family units, time is systematically and negatively correlated with money: those who have more leisure or home time have less money, and those who spend more time in the labor market earning money have correspondingly less discretionary time for other activities.

To return to the illustrative example above, one can get an estimate of the monetary value of the extra time in household B in comparison with household A (see Table C-1). To do so, one needs to decide two things: what money value to use in measuring the time value of the discretionary time, and what (if any) scale economies to assume in the use of that nonmarket time. For the former, we use the market wage rate of $3.57. (Again, the point made here could be made with many other arbitrarily set nonmarket time valuations.) Regarding scale economies, we use two extreme assumptions to suggest bounds on the point: first, that there are no scale economies in nonmarket time use; second, that the economies of scale are the same as the scale economies in using money.

The 58 discretionary hours available to household A have the value $10,353, and the 145 discretionary hours in household B have the value $25,882. Under the assumption that there are no scale economies in using this nonmarket time, household B would need twice as much time as A to achieve the same per capita outcome, which is $20,706 worth of time, leaving as a residual an extra bit of time in household B that is valued at $5,176. That extra resource—the time valued at $5,176—seems to be inconsistent with viewing the two households as equally well off. Under the assumption that scale economies are the same for nonmarket time as for purchased commodities, household B needs only $13,252 in time value to obtain what household A obtains ($10,353 × 1.28); this implies that household B has an extra bit of time

that is valued at \$12,630. Again, household B seems to be better off than household A, and that is inconsistent with the goals that were set in establishing poverty thresholds for the two households. These dollar values on the available discretionary time simply quantify the point made earlier: the household with more discretionary time appears to be better off than the other one.

## Expenditure Data

The illustrative example depicts the logic that if both time and money have value, and if poverty thresholds are defined on the basis of equivalence in money income only, then no matter how the money equivalents are set, the combined value of the time and money that households have at their disposal is misspecified. If the money alone is correctly calculated, when one looks at the value of time there is an apparent inconsistency.

In this section, we discuss a related aspect of the interdependence of time and money: those families that have more than one adult employed in the job market appear to spend at least some, and perhaps a sizable portion, of the second earner's added income on goods and services that are associated with earning that money. Thus, it is arguable that some portion of those earnings is not in fact a net increase in the family's real income and does not reflect a real increase in command over resources. If this is so, it raises the question of how to adjust for this simple substitution of money for nonmarket time when one measures a family's level of income.

The relevant data on expenditures are not hard to find, but the implications for what should be done to account for the differences are not so easy to find. Lazear and Michael (1980b) compare two sets of households from the 1972-1973 Consumer Expenditure Survey (CEX), both with two adults and no children, one set with one earner and the other with two earners. The before-tax income for these two sets differed by 35 percent (with the two-earner couples having the higher income, of course). In terms of total current consumption, however, the difference was only 17 percent. That is, the two-earner families both faced higher taxes and saved a higher portion of their income, so in terms of spending on goods and services, the difference, on average, was far less than the difference in gross (before-tax) income. More revealing, the two-earner families spent much more than one-earner families on items that can be considered market substitutes for home-produced goods: restaurant expenditures were 55 percent higher, dry cleaning services were 42 percent higher, and women's clothing was 60 percent higher, while expenditures on food at home were actually 15 percent lower. (Rental expenditures by renters were 12 percent higher.)

It appears that much of the income earned by the second earner is spent on making it possible to earn that income. Thus, the net addition to the family's resources is less than the added income, since that income is at least

partially offset by less time in the nonmarket activities by that second earner. On the basis of this evidence, Michael (1985:136) argues: "Almost certainly the impact on real income [of the second earner's wage earnings] is a small fraction of the change in money income."

A more recent article by Jacobs, Shipp, and Brown (1989) uses the 1984-1986 CEX data and includes families that have children, so they can observe expenditures on child care, which the Lazear and Michael study did not consider. This study concludes (p. 15): "When a wife becomes a second earner, husband-wife families spend more on work-related and timesaving items such as child care and food away from home." They exploit the quarterly data from the CEX and compare family spending patterns in the second quarter of the survey year to that in the fifth quarter, looking specifically at those families in which the wife began employment between those two times and comparing the changes to a control group in which the wife was not employed throughout the year. The results were inconclusive in this strategy, but when a multivariate regression model was used, controlling for household characteristics, they find (Jacobs, Shipp, and Brown, 1989:21):

> Families in which the wife is employed spend significantly more on food away from home, child care, women's apparel and gasoline and motor oil than do families in which the wife does not work outside the home.

Another recent study by Hanson and Ooms (1991) uses the 1980-1983 CEX data and suggests a further refinement. They conclude that the two-earner families that have relatively low levels of husband's earnings actually expend proportionately more on "work-related expenditures and taxes" (an increment of 69 percent) in comparison with families with middle levels of husband's earnings (an increment of 56 percent) or to families with upper levels of husband's earnings (an increment of only 29 percent). So to disregard work-related expenditures may be particularly problematic for lower income families.

## Discussion

All these studies simply show the not-remarkable fact that when a second adult in the family enters the work force and earns income, some of that income is spent buying in the marketplace goods and services other families secure by nonmarket efforts. A skeptic might well ask: "So what? Isn't this also the case for the first earner? If the household had zero earners, wouldn't that household be inclined to do even more nonmarket production—growing its own food, sewing its own clothing, and so forth?" This point is correct, but a poverty threshold implicitly assumes some amount of nonmarket time and some likely amount of labor market effort: thus, a threshold of, say, $15,000 in money income for a family of some particular size and structure has embedded within it some implicit amount of time in the home. But when one

begins to compare households of different sizes and structures, one confronts the fact that there is a violation of the implicit assumption that the differences in money somehow also correspond to the differences in available nonmarket time. When it is clear that the nonmarket time in different families is far from proportionate to the money income in those two families, one may become uneasy in treating those families as equally well off.

Consider the extreme example in which one family obtains the threshold level of money from labor market earnings and another family of identical structure and size receives the same income completely from government assistance programs. It is discomforting to characterize these two families as exactly equally well off: the second family has much more nonmarket time available than the working family, and somehow this should be taken into account.

The illustration of households A and B above emphasized that when one looks only at the available money, a family's available total resources, including discretionary time, is almost surely misspecified. The expenditure data from the several CEX studies make the same point in reverse: some of the money earned is used to facilitate the earnings itself, and other of the money earned is used to buy in the marketplace goods and services that are typically produced at home by families with less earnings. Both these observations emphasize the intricately intertwined linkages between money and time. Time is money and to some degree the two are interchangeable: to disregard time is to misspecify the available resources in the family unit. Yet time and money are not fully interchangeable in all cases, of course; there are many uses of money that have no own-time substitute. For instance, no amount of one's own time can heal an abscessed tooth—a dentist is needed and, for that, money (or, at least, barter) is essential.

In an effort to measure economic poverty, it is easiest to just ignore nonmarket time, and treat money as money, but the panel finds this inadequate. In fact, we argue in the text that near-money—food stamps, school lunches, and housing subsidies, for example—should be counted as part of a family's resources in comparing resources with the poverty threshold. In the proposed poverty measure, we convert near-money to money equivalence. If time is near-money, perhaps it, too, should be converted to money in the measurement of a family's resources. Similarly, in the text we argue that some expenditures are necessary to obtain labor market earnings—child care and other work-related expenses, for example—and should be subtracted from earnings in measuring the available money resources. In the proposed poverty measure, we convert gross money into net money available to expend on food, clothing, and shelter, and a little more. If time at home can be used to obtain food or clothing or shelter, perhaps it, too, should be valued in measuring a family's resources to obtain these commodities up to the poverty threshold levels.

If one argues for subtracting expenditures that substitute for time at home doing certain tasks, such as child care, when measuring the relevant level of family income for determining poverty status, then it seems logical to argue that time at home does legitimately enter into the determination of the relevant measure of money income in determining poverty status. If so, the issue becomes what level of nonmarket time is implicitly assumed in setting the poverty threshold levels of money income for a household of one adult, or for a family with two adults and no children, or a family with one child, and so on. To be frank, we do not know how to incorporate time in a feasible and manageable way. Consequently, we do not know how to adjust for more or less time as one measures money resources to compare with those poverty thresholds. We next review two suggestions from the literature.

## RESEARCH APPROACHES

### Time Poor: A Measurement

Perhaps the best statement of the problem with ignoring time that has an associated suggestion regarding its solution is Vickery (1977), who stressed the importance of time as a resource and suggested a two-dimensional poverty definition. As shown in Figure C-1, Vickery suggested that a poverty threshold should have both a minimum money level, such as M0 in that figure, and also a minimum time level, such as T0, and with some tradeoff, as depicted by the curved line segment AB. Households with resources to the left of T0 would be considered time-poor, and those below M0 would be considered monetarily poor; those to the right and above M0, T0, and AB would be considered not poor. Of course, setting the level T0 and the tradeoff AB would require judgement, as does setting the minimum income level, M0. (Vickery had some suggestions about these minimum levels.)

We suggest that a key element in this determination of poverty would be a household's ability to convert time into money—the wage rate of the adult(s) in the unit—which we depict at two levels in lines L and H in the figure. As drawn, the household with the lower wage rate, L, would be considered in poverty; the household with the higher wage rate, H, would not be considered in poverty. Notice that the second household might choose a position along its wage line at which its nonmarket time was in fact below time poverty, but it could as well select a position along its wage line that put its income below money poverty. In neither case would the household be considered in poverty, however, since these choices are discretionary.

Notice that this strategy for defining which households are in poverty places the burden of the definition of poverty heavily on the notion of the wage rate, the best indicator of the potential tradeoff between time and money. To define poverty by the wage rate instead of by the actual income received
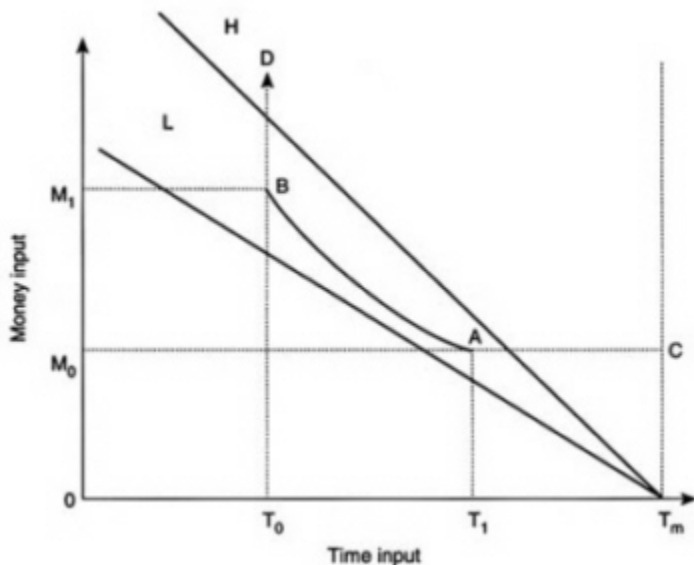
**FIGURE C-1** Time and money tradeoffs in the poverty threshold for a household.
SOURCE: Adapted from Vickery (1977).

can, in fact, resolve much of the problem of disregarding time, but it places a very heavy burden on the determination of the relevant, available wage rate for the adults in the household. Even when that wage is determined, there is the issue of whether it is in fact available and, if so, for how many hours. In fact, using a given wage rate as depicted in Figure C-1 assumes that the adult can trade any number of hours for dollars at that wage rate. But the presence of unemployment, of various rigidities in hours of work on certain jobs, and the high rate of job turnover, especially among those who are less skilled, causes one to doubt that assumption. And if that wage is not actually available, this theoretically appealing strategy for measuring poverty would be quite difficult to implement empirically. Considering the complexity of measuring the relevant wage rate for all persons and units and of knowing the constraints on its availability across hours of work and from week to week, we as a panel do not recommend adopting this strategy for measuring poverty. In light of the practical difficulties it raises, we do not consider it a feasible alternative. It is possible that with further research this analytically attractive alternative would become tractable and implementable, but it is not so today.

## Calculating Earnings Capacity

The use of the wage rate as the key determinant of the poverty status of a household unit is very similar to the solution to the problem advocated by Haveman in a series of articles (see Garfinkel and Haveman, 1977; Haveman, 1992, 1993; Haveman and Buron, 1991, 1993). The strategy suggested by Haveman and his colleagues is to estimate the earnings capacity of the adults in the household and to use that capacity, for a person employed in a full-time job minus the costs incurred in having that job, as the estimate of income against which a poverty threshold is compared. As Haveman (1992:12) puts it: "Does a family have the skills and capabilities to earn its way out of poverty were it fully to use them?" If so, the suggestion is to define that family as not in poverty; if not, to define that family as in poverty.

This suggestion is quite similar to the suggestion above of relying on the level of the market wage rate (adjusting for the necessary costs of employment) as the measure of poverty status. Haveman has, in fact, implemented his suggestion, using the Current Population Survey (CPS), to estimate the earnings capacity of the families and unrelated individuals in the CPS and then to consider the composition and magnitude of poverty so defined.

There can be philosophical differences about whether it is preferable to measure poverty on the basis of the actual income received or the potential income that might be received if the family unit "played by the rules" and worked for pay as much as some other family does. Once the allocation of time becomes a focus, this distinction between actual and potential earnings is relevant. We as a panel have taken no position on the matter of the preferable measure, because we stress a preemptive issue: estimating the wage potential with the precision necessary to implement this method of measuring official poverty in the United States is not yet feasible. Neither the wage rate that might be earned if a job were available, nor the likelihood of finding a job that offered that wage rate for the number of hours preferred by the individual, is a calculation that can easily be made. Thus, we do not take a position on the matter of the relative attractiveness of using a wage rate definition or an actual income definition of family resources. We urge continued research to address this matter, but do not consider it sufficiently resolved to warrant implementation now.

A few of the issues not yet resolved—which convinced us that earnings capacity is not yet feasible as an alternative to income for determining poverty status—include the following:

(1) Is it preferable to use the actual earnings of those who have full-time earnings or to use an imputed earnings potential for those families as well as for those who have no actual earnings? Imputation is surely necessary for those who do not have actual earnings, but then it is not clear how to link these imputed cases to the many others with full-time or part-time earnings.

(2)  Is it preferable to use the actual wage rate for units with part-time employment and scale up their potential earnings to full time or to use an imputed wage rate for them as well?

(3)  How does one build into the estimates derived from imputation an appropriate variability based on the error term of the estimation model for those units that require imputation?

(4)  How should one estimate the capacity for those who have retired or are elderly and have not had a history of earnings at an earlier age?

Furthermore, if earnings capacity were fully measurable and brought into the measurement of poverty, then other analytic issues would be raised. For example, by introducing leisure time as a commodity that is purchased with the available resources of time and money, there is then a need to take account of the fact that those with a high wage rate face a relatively high price for that commodity. Until it is clear how to estimate the capacity to earn with greater precision and consistency than is now the case, an earnings capacity definition of resources should not be the basis of the poverty measure. Even when enough is known about how to integrate time and money resources in the measurement of poverty, it will also be necessary to consider how that introduction might alter the level that is set as the threshold for poverty. It would not be reasonable to simply add the value of some or all nonmarket time without considering how that modification on the resource side should affect the level of the threshold.

## CONCLUSION

There is at present no feasible way to improve the measurement of poverty by incorporating the time allocation of families. We encourage further research that might yield a better solution in the near future, but we see no way adequately to address this perplexing issue now. The earnings capacity estimate of available income, suggested by Haveman and colleagues, and the wage rate usage as suggested above in the context of Vickery's analytic figure, both address the issue, but they are not warranted as a replacement for the current strategy of estimating income directly. Although there are important contributions in the literature regarding how Americans actually spend their nonmarket time (e.g., see Juster and Stafford, 1985; Robinson, 1977; and Walker and Woods, 1976), and analytically how to understand its allocation (e.g., Becker, 1965), we know of no implementable solution to the concern addressed here.

Thus, many concerns about the treatment or nontreatment of time are unresolved. One of these concerns is that some families are probably considered to be impoverished that could spend enough time working for pay to earn enough to get themselves out of poverty but do not do so. At the other

end of the spectrum is concern that some families probably devote so much of their limited time and energy to earning money, that despite having income a little above the poverty threshold, they are "time poor" and quite impoverished. Both of these concerns, among others, need to be addressed by further work on the proper method for introducing the value of time into the measurement of poverty.