

DIRECT VALUATION OF PERSON CARE BY HOUSEHOLDS

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Abstract: Person care, of which care of children is the major component, has not been previously measured by the output approach to valuation. This study measures person care using the output method with sample data from a small urban area and compares the results with the labor input method. Quantifying child care output rather than the labor inputs of parents and others considers child care from the child's viewpoint. This viewpoint allows measuring the portions of care given by various providers, e.g. parents, sitters. For school age children under 18, schools provided the most care. Parents provided the most care for only the very youngest children.

1. Introduction

Economists have long accepted that household production is just as much economic output as is the output produced in a market economy. Both require scarce resources in their production to provide human satisfaction. The main difference between the two lies in their measurability. Markets yield prices with which to value market output. With household production there are no market prices in the traditional sense, because household production is consumed within the household or given away. If it were sold, by definition it would be market output rather than household production.

The method originally used to measure household production may be termed the labor value approach. This method asked householders to keep diaries of their time usage for one or more days. The time spent on various household production activities (e.g. meal preparation) was multiplied by a typical wage rate for market work in that activity (e.g. a cook's wage) and aggregated on an annual basis for the sample. This sample aggregate was then extrapolated for a population total value.

Methodological simplicity was the main reason for using this approach. However, the method suffers from serious flaws. It ignores the contribution of inputs other than labor, particularly capital. Choosing the correct wage at which to value labor is problematic. Market wage rates may not reflect the productivity of householders, while using a householder's actual wage rate, assuming the householder is currently employed, may be inappropriate for household work.

An alternative method to measure household production is to use the same accounting concept used for market output. That method directly measures the quantities of the various types of outputs produced and multiplies them by their market

price. Household production may be defined as goods and services made by a household for use by its members and for which there is a market alternative. Thus, the price for the market alternative for each kind of household production can be used as the proxy for the market price of each household production output. Quantities of specific outputs can be measured if the outputs are sufficiently disaggregated -- e.g. one room vacuumed one time, one average residential lawn mowed one time.

This direct method of household production measurement avoids the two inherent flaws of the labor value approach. The market value of output includes the value added by each type of input. Labor input efficiency need not be known to measure household production by the output approach. (In fact, the output method allows the measurement of efficiency.) Fitzgerald and Wicks (1990) and Fitzgerald, Swenson, and Wicks (1996) have demonstrated empirically the feasibility of this approach.

These output based studies have measured all but one type of household production: person care, i.e. care of children, sick care, and elderly care.¹ This omission resulted from the misconception that there is no measure of the amount of person care output apart from the labor input of the householder providing the care. There is, however, an appropriate measure of person care that is not identical to the householder time spent producing it. That measure is based on the concept of one person being cared for, regardless of the amount of time devoted by someone else providing that care. For example, the full care of one child for one day of the child's life would be one unit of child care. The child's mother might provide 60 percent of that care, the father 30 percent, and a baby sitter 10 percent on a given day. In this instance, the mother would

provide .6 units of output of child care and the father .3 units. These units need not be proportionate to the number of hours devoted by each parent providing that care. Multiplying the number of output units by the market value of care of one child for one day would equal the value of the output amount. The same measurement method would apply for care of sick and elderly. These measures make no attempt to adjust for quality differences, a common problem in national income accounting.

2. Research Method

This paper presents the results of a project to measure directly the output of the person care component of household production using the output approach. It then compares those results with values measured by the labor input value approach. Finally, it illustrates the type of question that can be answered only with output information. Surveys of households in the Missoula, Montana urban area generated 299 usable surveys for the study. Households were selected by a pre-set geographic pattern based on 1990 Census neighborhood boundaries. Questionnaires were administered by personal interview at householders' residences during 1998 and 1999. An appendix contains a copy of the survey form. Individual names, addresses and phone numbers remain confidential and were only used for verification purposes.

To measure person care output, these questionnaires asked the number of days during the past year for which each household member provided each of the three types of person care (child care, sick care, and elderly care as specifically defined), and the average portion of the total care provided by that member on these days. The definition of each care type was formulated in consultation with local experts in the person care field. For instance, child care was defined as all activities which constitute the care or

nurturing of a child, i.e. feeding, changing, teaching, exercising, entertaining, cleaning, transporting, nursing, sitting, coaching, disciplining, playing, holding, or any other activity with the purpose of enhancing the child's life or fulfilling the child's needs.²

The questionnaires also recorded the average time spent by the caregiver for each type of care on the days she/he provided care. We gathered this information in order to compute the labor value to compare with the output method results. To be counted, the time had to have person care as its primary function during the time interval. Merely having a child or sick person present in a household does not mean person care is being provided. Finally, we gathered information concerning several demographic variables such as the age, gender, education, hours of employment, take home pay, and household composition (e.g. married, single) for each household member. Table 1 shows the means of some of these variables. These values are quite similar to those for the United States population.

Discussions with providers charging for person care were sources for pricing output of the three types of care. Pricing of child care was the most important and the most difficult. It was the most important because child care comprises all but several percent of person care. The difficulty occurred because most child care provided in the marketplace differs from household care. Baby sitters and child care facilities generally give care that is more limited than household care. Baby-sitting tends to include only limited activities, and child care facilities are usually available only during traditional work hours. Institutionally provided care such as group homes tends to have troubled youths as clients. Foster homes tend to be compensated only for variable costs such as food.

However, nannies provide care that tends quite closely to fit a comprehensive definition of child care. We thus used the compensation of the 16 nannies in the Missoula area that we were able to identify and interview as the basis for pricing child care output. Each nanny's daily compensation, which included the estimated value of any room and/or board she received, was adjusted by the portion of her duties that were child care and the portion of the child's total care which she provided to find her price for one unit of child care.³ The median of these computations indicated a unit price of \$49.50 per child per day.

It should be noted that when child care is provided by nannies, both this care and parental care occurs mostly in the home. While the dwelling in which care is provided could be deemed a capital input for child care, both the output approach of this paper and the labor value approach exclude the value added by this input. As a result, child care values from the two approaches will not differ by the respective inclusion and exclusion of capital inputs as is the case for other types of household production. The net rental value of owner occupied housing can and logically should be included in GDP. However, this topic is one for consideration elsewhere. The imputed value of this housing will not depend on whether parents or nannies care for the children living there.

For sick and elderly care, charges by home health agencies for care not requiring professional expertise were the source of pricing data. We used the median price for each activity to value the person care output. These medians were \$98.88 for sick care and \$66.67 for elderly care per person per day.

3. Results and Conclusions

For each person in the sample, we multiplied the number of days during the last year she/he engaged in each type of person care, the portion of a unit of care she provided on the average of those days, and the median provider price for that activity. These annual output totals allowed computation of the average amount of output by household and household member types.

We tested whether these results differ from those that would result from the labor value method. Table 2 shows these average output amounts. Clearly, the values of child care and total person care are substantial. For instance, the average value of child care was \$3,345 for the sample households. The average value for the 35 percent of the households with children was \$9,526. We extrapolated the values of child and total person care to the nation by multiplying the mean sample amounts by the total number of U. S. households. The resulting \$352 billion is 4.1 percent of 1998 GDP as currently measured excluding household production.

Table 3 shows mean child and person care values for husbands and wives. The separate figures for wives and husbands quantify the common knowledge that mothers usually assume the bulk of child care responsibilities. One may note that in households with more than one child, the amount of care per child is much less than in only child households and that fathers provide a somewhat increased portion of the care. In the fourth, fifth, and sixth rows of the table, the different amounts of work for wives and husbands reflect the fact that on average wives work less hours than husbands in the marketplace.

The figures in this table show only the net result of parental behavior. In the table's last three lines pertaining to market employment, the numbers cannot be used to establish cause and effect relationship. While there is an inverse relationship between a wife's market employment and the amount of child care they provide, these two variables are endogenous. Further research is needed to indicate the effect of employment on child care and visa versa. Wolf and Soldo (1994) examine this for elderly care. It is interesting to note that the apparent trade-offs between work and care of children does not appear to exist for husbands.

Because of earlier widespread use of the labor value approach to measure household production, it is appropriate to compare these results using the output method with those obtained with the labor value method. Our questionnaire data concerning the time devoted to the several types of person care reported by the sample households allowed this comparison. For each household, we multiplied these average hours by the respective median wages of \$6.75, \$6.92 and \$6.80 per hour reported by Missoula providers for non-professional workers in child, sick, and elderly care. Table 4 presents the annual labor value estimates for the sample households using these numbers. The labor value estimates for child and person care were much larger than the output method estimates. The differences between the means of the output and labor value approaches were significant at the one percent error level. A likely reason for this difference is the low compensation of nannies in the study area.

Not only do the output and labor value method of measuring person care yield different aggregate output figures, they also produce intra-household differences. For married couple households with children, regressing the value of household produced

child care obtained by the output approach on the value from the labor value approach yielded an adjusted R^2 of .494 for wives and .355 for husbands. Table 5 shows the specific regression results.⁴ Parental hours devoted to child care are an imperfect proxy for child care output.

These differences are noteworthy. The previous study which comprehensively compared the results from measuring household production by the alternative output and labor approaches, but which excluded person care, found the output value exceeded the labor value.⁵ The differences found in the current study would offset a considerable portion of that difference.

There are reasons other than accurate measurement of household production for which direct measurement is useful. For instance, the question of the portion of a child's care given by different providers can be addressed only with output data. Hours of care providers' time could answer this question only if all providers were equally productive in achieving child care as defined above, a condition which appears unlikely. For an example, an hour of care by a teenage baby sitter may not be of the same quality---i.e. fit as many dimensions of the definition---as an hour of parental care. On the other hand, a good grade school teacher may simultaneously provide care to 25 children. The care per hour of the teacher's time will likely exceed one twenty-fifth of the care from an hour of a parent's care for the child in question.

Table 6 shows the portions of children's care supplied by the various kinds of care providers to the 155 minor children in the 92 sample households of married couples with minor children. The numbers are striking. For these 155 children, the average portion of care provided by parents was only 36.5 percent.⁶ This small

percentage is an important reason why parental child care as measured by the output approach is only 4.1 percent of 1998 GDP. Only for children under six are parents the primary source of care. On average, schools were the largest providers. For the total sample, schools delivered 37.2 percent of the care. Their portion for children over six exceeded 46 percent. These school percentages have important implications for public funding of schools. The total value of child care from schools extrapolated to the U. S. would be \$344 billion in 1998 dollars.

These figures look at child care from the viewpoint of the child. This has not been the traditional perspective for considering child care. Traditional analysis has dealt with child care from the viewpoint of caregivers. A major reason for the focus on care providers has been that data measuring the amount of child care was limited to caregiver hours and contact hours with children. The caregivers' viewpoint is appropriate for certain important issues. One of these is the availability of day care to facilitate market employment by mothers. Another is the enjoyment, i.e. psychic income, which parents receive from child care. However, information from the caregivers' perspective does not measure child care output from children's viewpoint.

In summary, household production is a substantial component of the total economic output of a nation. Because of the many reasons for knowing a nation's output and its components, it is important to measure it correctly. Conceptually, measuring output itself is superior to using a proxy such as the value of labor input. This study demonstrates the feasibility of measuring households' output of child and other person care. Person care was the one component of household production that had not previously been measured by an output method.

Measurement of person care output also allows consideration of this care from the viewpoint of its recipients. This viewpoint adds to the number of child care issues that can be rigorously analyzed. Not only does it allow quantification of the notably small portion of child care provided by parents, but it also provides a part of the data required to test hypotheses concerning the determinants of the amount of parental care.

ENDNOTES

1. See Fitzgerald, Swenson, and Wicks, 1996.

2. Care of sick was defined as follows: "Active care of any other person in the household who is injured, physically ill, substantially disabled or suffering from a disease. Just because someone in the household is sick does not mean that active care is being provided by anyone in the household. Common colds and the flu are not normally illnesses which require active care." The definition of elderly care was, "Active care of any other person in the household who is elderly (i.e. feeding excluding preparation of the meal, entertaining, cleaning, transporting, nursing, dressing, supervising, shopping, or any other activity with the purpose of enhancing the elderly person's life or fulfilling an elderly person's needs.)" We excluded care for one's self, because such activity is better deemed bodily maintenance. Bodily maintenance may be variously considered an input necessary for a person's other activities, i.e. market and household work and leisure; consumption; or a leisure activity. Since its major components, sleeping and eating, do not have market alternatives, it generally does not fit the definition of household production.

3. The computation for measuring the price of one unit of child care as defined above was $P = [C(1-D)]/S$, where

P = price of one unit of child care

C = compensation per average day employed. (The employment need not have been full time.)

D = portion of duties for non-child care, e.g. house cleaning, meal preparation

S = share of total child care as defined for this project which was provided by the nanny.

4. Measurement error in reported hours of care would tend to reduce the coefficients on hours and measurement error in direct output would tend to reduce the R^2 . In addition, correlation between these measurement errors would bias the coefficients.

5. Fitzgerald and Wicks, 1990.

6. Even the percentage may be an overstatement. As described above, the data source was parental interviews in each household. In estimating the portion of care provided by each provider, parents seem more likely to overstate rather than understate their role.

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APPENDIX: Survey Form

PERSON CARE PROJECT

ID # _____

Household type:
 ___ married couple
 ___ single
 ___ roommate

Checker: _____
 Date: _____
 Interviewer: _____
 Neighborhood #: _____
 Address: _____

Household members: (As applicable, list mother as 1, father as 2, then children and others.)

<u>Name</u>	<u>Relationship</u>	<u>Age</u>	<u>Years of formal Education</u>
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Yearly gross income of household:
 ___ less than \$20,000
 ___ \$20,000 - \$50,000
 ___ over \$50,000

Hours worked per 2 weeks:

Take home pay per 2 weeks:

Own or rent home:
 ___ own ___rent

1. _____
 2. _____
 3. _____
 4. _____
 5. _____
 6. _____

1. _____
 2. _____
 3. _____
 4. _____
 5. _____
 6. _____

ID# _____

CHILD CARE defined:

Child care is all activities which constitute the care or nurturing of a child i.e. feeding, changing, teaching, exercising, entertaining, cleaning, transporting, nursing, sitting, coaching, discipline, playing, holding, or any other activity with the purpose of enhancing the child's life or fulfilling the child's needs.) Child care does **NOT** include a child caring for him/herself.

During **last year**, **portion** of total care provided by:

<u>Child #1</u>	<u>Person</u>	<u>ID# (p. 1)</u>	<u>% of total care</u>
age of child	Mother	_____	_____
_____	Father	_____	_____
	Other member of household	_____	_____
	School		_____
	Baby sitter		_____
	Child care facility		_____
	Other relative or friend		_____
	Total		100%
Child #2	Mother	_____	_____
age of child:	Father	_____	_____
_____	Other member of household	_____	_____
	School		_____
	Baby sitter		_____
	Child care facility		_____
	Other relative or friend		_____
	Total		100%

ID# _____

CHILD CARE continued:

During last year, portion of total care provided by:

<u>Child #</u> _____	<u>Person</u>	<u>ID# (p. 1)</u>	<u>% of total care</u>
age of	Mother	_____	_____
child	Father	_____	_____
_____	Other member of household	_____	_____
	School		_____
	Baby sitter		_____
	Child care facility		_____
	Other relative or friend		_____
	Total		100%

Child # _____	Mother	_____	_____
age of	Father	_____	_____
child:	Other member of household	_____	_____
_____	School		_____
	Baby sitter		_____
	Child care facility		_____
	Other relative or friend		_____
	Total		100%

ID# _____

CARE OF SICK defined:

Active care of any other person in the household who is injured, physically ill, or suffering from a disease. Just because someone in the household is sick does not mean that active care is being provided by anyone in the household. Common colds and the flu are not normally illnesses which require active care.

Below, please list only sick household members who received active care from someone else in the household during the past year.

<u>ID# (from p. 1)</u> <u>of sick person</u>	<u>Number of days</u> <u>care provided</u>	<u>Person</u> <u>providing care</u> <u>(ID# from p.1)</u>	<u>% of</u> <u>total care</u>
_____(ID#)	_____	_____(ID#)	_____
Description of care by household members: _____ _____		_____(ID#)	_____
		_____(ID#)	_____
		doctor(s)	_____
		other health professional(s)	_____
		other: _____	_____
		total	100%

_____(ID#)	_____	_____(ID#)	_____
Description of care by household members: _____ _____		_____(ID#)	_____
		_____(ID#)	_____
		doctor(s)	_____
		other health professional(s)	_____
		other: _____	_____
		total	100%

ID#_____

CARE OF ELDERLY defined:

Active care of any other person in the household who is elderly (i.e. feeding excluding preparation of the meal, entertaining, cleaning, transporting, nursing, dressing, supervising, shopping, or any other activity with the purpose of enhancing an elderly person's life or fulfilling an elderly person's needs.)

Below, please list only elderly household members who received active care from someone else in the household during the past year.

<u>ID# (from p. 1)</u> <u>elderly</u> <u>person</u>	<u>Number of days</u> <u>care provided</u>	<u>Person</u> <u>providing care</u> <u>(ID# from p.1)</u>	<u>% of</u> <u>total care</u>
_____(ID#)	_____	_____(ID#)	_____
		_____(ID#)	_____
		_____(ID#)	_____
		other care provider	_____
		the elderly person	_____
		total	100%

_____(ID#)	_____	_____(ID#)	_____
		_____(ID#)	_____
		_____(ID#)	_____
		other care provider	_____
		the elderly person	_____
		total	100%

TIME SPENT ON PERSON CARE
by household members during past year

PERSON CARE TIME: This includes only the time spent actively engaged at child, sick, or elderly care when care was the primary activity. Merely being at home with the child, sick, or elderly person---awake or asleep---is **NOT** time actively spent at person care. If you are primarily doing something else (e.g. meal preparation or cleaning the house) that is **NOT** time actively spent at person care. See the child, sick, and elderly care definitions.

	No. of days during Person year actively <u>(from P. 1) provided care</u>	Average number of hours per day when actively providing care <u>was the primary activity</u>
--	--	--

CHILD CARE:

		.-----
		.-----
		.-----
		.-----

CARE OF SICK:

		.-----
		.-----
		.-----

CARE OF ELDERLY:

		.-----
		.-----
		.-----

TABLE 1
Sample and U.S. Population Characteristics

	SAMPLE	U.S.¹
Households	299	102,528
People per household	3.07	2.62
Pct. married couples	55%	53%
Pct. Households with children	35%	34%
Pct. owner occupied housing	48%	46%

¹ All figures for 1998. Source: Statistical Abstract of the United States 1999. Tables 51, 70, 73, and 727.

TABLE 2

Household Output Values for Person Care

	Total Households		Married Households Sample Mean	Single Head Households Sample Mean	Roommate Households Sample Mean
	Sample Mean	Extrapolation to U.S. Total			
Number of households	299	102.528 mil.	164	42	93
Child Care Output Value	\$3,345	\$343 bil.	\$5,256	\$2,659	\$286
Percent non-zero	35.1	assumed 35.1	56.1	26.2	2.2
Total Care Output Value¹	\$3433	\$352.bil	\$5,413	\$2,662	\$288
Percent non-zero	37.1	assumed 37	57.3	26.2	4.3

¹ Total care includes child care, care of sick, and care of elderly.

² Extrapolation will not match due to rounding.

TABLE 3**Individual Output Values for Child Care by Married Parents**

	Wives		Husbands	
	Number of Households	Mean	Number of Households	Mean
All households with children	92	\$6,218	92	\$3,004
Households with one child	53	5,250	53	2,151
Households with more than one child	39	7,533	39	4,164
Wives working more than 60 hours; husbands more than 80 hours per week	55	5,059	30	3,510
Wives working between 1 and 60 hours; husbands 80 hours per week	29	6,997	55	2,776
Wives working 0 hours; husbands working less than 80 hours per week	8	11,360	7	2,633

TABLE 4**Comparison of Output and Labor Value Estimates for Households**

	Simple Mean	Paired t Test, Output Value with Labor Value
Output value: child care	\$3,345	
Labor value: child care	\$4,926	t = 6.18**
Output value: total care	\$3,433	
Labor value: total care	\$5,017	t = 6.15**

** Statistically significant at the 1 percent error level.

The paired sample t test used the formula:

$t = (\bar{d} - 0) / (sd/\{n\}^{1/2})$, where \bar{d} is the average of each individual's output value minus their labor value.

TABLE 5**Regression of Output Value on Labor Value of Child Care
In Married Couple Households with Children**

	Coefficient of Labor Value	Constant	T Value	N	Adjusted r²
Wives	0.446 (0.047)	1966.9 (550.1)	9.47	92	.494
Husbands	0.466 (0.065)	922.2 (353.1)	7.15	92	.355

Standard errors are in parentheses.

TABLE 6**Portions of Individual Children's Care Afforded by Various Types of Providers**

Child's Age	Mother	Father	Other Family Member	School	Sitter	Child Care	Other, Friend/Relative	Self	N
Less than 18	.244	.121	.006	.372	.034	.024	.025	.173	135
Less than 6	.504	.201	.004	.011	.097	.099	.083	.000	27
6-13	.220	.122	.009	.459	.030	.009	.016	.133	67
Greater than 13, less than 18	.112	.066	.001	.467	.000	.000	.002	.352	41