

Updated Values of Household Services from the American Time Use Survey: Values by Gender, Age and Employment Status

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Vocational professionals are often called upon to calculate the loss in the value of household services of individuals who have disabilities or who have been injured. A starting point to determine such a loss would be the pre-injury value of household services. One source of this value for a typical person comes from an article published in 1990 by Douglas, Kenny & Miller (DKM). The tables within this article indicate household service values for employed and unemployed males and females. The values reported by DKM are based on 1987 data and thus are steadily becoming outdated. The purpose of this paper is to update household value estimates depicted within the DKM article. First, data on household activities from the 2006 American Time Use Survey are used to estimate household activity. Time allocated to house work (in hours) is then valued by utilizing 2007 wage rates for persons employed in occupations similar to house work. Second, the DKM tables themselves are updated to 2007 values by using the employment cost index from the Bureau of Labor Statistics (BLS) as an inflation adjustment. Updated values for employed and unemployed males and females are reported. The two methods produce moderately different results for employed males but similar results for unemployed males and females and employed males.

DKM Published Values

In 1990 Douglas, Kenney and Miller (1990), hereafter referred to as DKM, published values of household services by gender, age, and employment status. The values for this table were obtained from several research studies conducted prior to 1987 and were based on 1987 dollars. They included two sets of values one of which was based on regressions calculated by Peskin (1983). Peskin's regression analysis explained the amount of housework based on demographic variables including gender, age, number of children of various ages in the household, marital status, and education. The table has been used by forensic economists use this table to estimate the value of household services by gender, age, and employment status. The values within the table indicated three important findings. First, females perform more household services than men. Second, employed persons perform less household services than unemployed persons. Third, both men and women perform less household services as they age, particularly after age 60. The tables are particu-

larly useful to economists who desire to estimate the value of household services over the lifetime of an injured person.

Dollar Value of a Day

Other sources of the value of household services, such as "the Dollar Value of a Day" (Krueger and Ward, updated periodically) provide valuable information only on a cross section of demographics. This source may provide, for example, the value of household services of an employed male with a child under age 18. This snap-shot of information provides little guidance as to the value of this same person ten, twenty, or more years in the future.

Two decades have passed since the DKM data became available. The purpose of this project was to update the 1987 values in DKM to 2007 values using data from the American Time Use Survey (ATUS). The ATUS data provide nationally representative estimates on how, when, and with whom Americans

spend their time. The data files include information collected from over 85,000 interviews conducted from 2003 to 2008. The Bureau of Economic Analysis (BEA) has used the data to estimate to value the unpaid services such as child care and household services.

In this paper the 2007 estimates from the ATUS are computed by multiplying the hours devoted to household services by 2007 wage rates for workers who perform the typical housework described by the ATUS. The authors also indicate how the 2007 estimated values differ from the DKM 1987 values updated to 2007 using the Employment Cost Index (ECI).

ATUS Data

Data from the ATUS are available from the United States Department of Commerce web site for the years 2003 through 2006. The data include a large range of activities and the time (in minutes per day) allocated to those activities. Three distinct categories of activity include household activities (HHACT), care of children in the household (CAREHH), and purchases for the household (PURCH_cons)¹. The data do not include an expanded concept of household activities as suggested by Tinari (1998) such as advice and counseling, education, and nurturing. Thus, the three categories mentioned represent the more "traditional" measure of household services. In addition to the broad category of household activities, HHACT, there are sub-categories within this definition that relate to housework, food preparation, lawn care, and household management. Interesting, the data indicate that, on average, the total time devoted to these sub-categories of HHACT is about half the total time devoted to household activities, care of children, CAREHH in the household, and consumer purchases, PURSCH_cons. In this study the latest available data from the 2006ATUS survey are used.

The 2006 Survey

The 2006 data include a total of 12,359 individuals as follows: females not employed (2,796), employed females (4,289), males not employed (1,323), and employed males (3,961). In addition to gender and employment status the 2006 survey identifies respondents by race, age, education, disability status, usual hours worked per week (if employed) and number of children in the household under the age of 18 as well as other variables of less interest for this paper.

If the ATUS data accurately accounts for time spent in household activities then the data should reflect known relationships between household work and demographic variables such as gender, age, employment status. In order to test whether this hypothesis was correct the following equation was developed:

$$TTHH = f(\text{sex, Age, agesq, empstat, disab, educ, numkid18, usualhours}) (1)$$

Where:

TTHH = total minutes per day of household services (HHACT + HHCARE+ PURCH_CONS),

sex = 0 if male, 1 if female,

age = age of respondent,

agesq = age squared,

empstat= 0 if not employed, 1 if employed,

disab = 0 if no disability, 1 if disability,

educ= years of education²

numkid18 = number of children under the age of 18 in the household,

usualhours = the usual number of hours worked per week if employed (if unemployed then the value of hours usually worked is zero).

The results are shown in Table 1.

The variables were selected on the basis of their expected impact on household activities. Previous research indicates that, on average, females do more household work than males. This is especially true for females who do not work outside the home. The age and age-squared variables are intended to capture the effect of aging. The selection of the two age variables allow for the expectation that time devoted to household increases with age but at a declining rate until it actually decreases after a maximum level. Employment status and number of hours usually worked are included because previous research shows that employed persons that work longer hours have fewer hours to devote to the household. The disability variable is included because a disability will impact the amount and nature of household activities just as it would employment outside the home. In addition, this variable is of particular interest to vocational professionals. Finally, the number of children present in the household is expected to increase hours devoted to the household work.

The results are as expected with females devoting nearly an hour per day more to household services than do males. All respondents perform more household services as they aged but the amount of services reaches a peak and then declines thereafter. For men, hours devoted to household services peak at age 48 if employed and 52 if not employed. For females the peak ages were 44 and 46, respectively.

Those who were employed allocated nearly an hour less per day to household activities. Disabled persons engaged in HHACT approximately two hours less per day than non-disabled persons. More education resulted in a very small increase in time devoted to household activities. For each child under 18 the typical respondent engaged in an additional 37 minutes of

Table 1

Ordinary Least Squares Results for Equation One: Dependent Variable is Minutes Per Day Devoted to Household Work

Variable	coefficient	t-statistic	probability
Constant	-39.813	2.145	.0320
Sex	46.392	12.735	.0000
Age	6.939	8.105	.0000
Agesq	-.068	6.947	.0000
Empstat	-56.517	6.805	.0000
Disab	-129.61	2.932	.0034
Educ	1.816	2.773	.0056
Numkid18	37.075	21.340	.0000
Usualhours	-1.207	7.264	.0000

Note. Adjusted R-squared = .1184; F-statistic= 124.488; Sample size is 7,351; t-statistics are in absolute value.

HHACT per day. Finally those respondents that worked more hours in a week outside the home devoted less time to house work.³ The adjusted R-squared for our single equation, (.1184) is less than the .36 for females in the Peskin (1984) equation but comparable to the .08 for males.

The results support the original findings of DKM (1990). Employed persons, males, and older persons do less housework than younger, unemployed, females.

Updating the 1990 Tables

Table 2 shows the original table published by DKM in 1990. In that table the authors reported two sets of data. One was based on Peskin's (1983) original regression.⁴ The other set of data was based on the work of Walker and Gauger (1980). Since the two sets of data were very similar only the "Peskin" values are included in this paper.

The next step in the analysis is to use the 2007 ATUS data to determine if these values were similar to those of the DKM study. Table 3 shows four equations related to employment status, gender, and age from the 2007 ATUS data.

The results shown in Table 3 also confirm the findings reported in DKM (1990). Females do more housework than males and their allocation to this work declines at a more rapid rate with age. Unemployed persons also allocate more time to house work.

The ordinary least squares (OLS) equations in Table 3 can be used to produce updated tables similar to those from DKM (1990). The regression statistics in Table 3 can be used by rehabilitation professional to estimate the amount of housework (minutes per day) by age for employed and unemployed males and females. Time

estimates can then be converted to dollar values by valuing housework based on market wages for the types of activities typically performed in the household.⁵ In order to use the regression statistics in Table 3 for this purpose an estimate of the 2007 wages for house workers is also needed. Table 4 shows the 2007 wages of those involved in typical housework based on the United States Department of Labor's Occupational Employment Statistics (OES).

The average wage rate for the six occupations was used to estimate the value of household services similar to those in DMK.⁶ Table 5 shows those calculated values based on ATUS data from 2006.

The values in Table 5 were calculated as follows. First, for each year (of age) the OLS equations in Table 3 are applied to arrive at the number of minutes per day in household activities for each of the four categories. Those minutes are multiplied by 365 and the divide by 60 to arrive at annual hours. Next, the annual hours are multiplied by the average wage from Table 4. Finally, to be consistent with the DKM (1990) tables the annual amounts are grouped and averaged at five-year intervals.

The Employment Cost Index (ECI) published by the United States Department of Labor was used to update the DMK (1990) values to 2007. The ECI in 2007 was approximately twice the index in 1987. The ECI indicates the relative value of labor so that the DMK estimates can be brought up to 2007 values. As an example, if the ECI in 2007 is 108 and the 1987 ECI is 57 this indicates that the value of labor in 2007 is 1.89 (108/57) greater than the value of labor in 1987. So, if the (hourly) value of labor in 1987 is six dollars the estimated value in 2007 would be \$11.37 (1.89 x \$6.00)

The authors assumed that time devoted to housework has not changed since 1987 and that the ECI is the ap-

Table 2
DKM Values

Age	Men Employed	Men Not Employed	Women Employed	Women Not Employed
20-24	\$2,893	\$5,665	\$5,359	\$10,570
25-29	\$3,347	\$6,118	\$7,083	\$12,294
30-34	\$3,737	\$6,509	\$8,275	\$13,486
35-39	\$3,976	\$6,748	\$8,619	\$13,829
40-44	\$4,094	\$6,866	\$8,323	\$13,534
45-49	\$4,111	\$6,883	\$7,725	\$12,935
50-54	\$4,111	\$6,883	\$7,725	\$12,935
55-59	\$4,216	\$6,988	\$7,717	\$12,928
60-64	\$4,216	\$6,988	\$7,717	\$12,928
65-69	\$4,216	\$6,988	\$7,524	\$12,605
70-74	\$3,002	\$4,975	\$5,357	\$8,975
75-79	\$2,041	\$3,383	\$3,643	\$6,103

Note. Values are from DKM's 1990 paper, Table 6, p. 39

Table 3

Results of Ordinary Least Squares Estimates of Effect of Age, Employment Status, and Sex on Household Activities. Dependent variable is Minutes per Day Devoted to Housework

	Emp. Males	Unemp. Males	Emp. Females	Unemp. Females
Variable Constant	-68.223 (3.425)***	-86.694 (4.202)***	-39.139 (1.793)*	-23.710 (1.201)
Age	9.409 (9.934)***	11.372 (10.556)***	12.1959 (11.535)***	16.312 (18.160)***
Agesq	-.0971 (9.015)***	-.110 (9.773)***	-.140 (11.491)***	-.177 (18.158)***
Adj. R-squared	.027	.086	.030	.149
F-statistic	55.975***	63.34***	626.908***	243.92***
Number	3,961	1,323	4,289	2,796

Note. * $p < .1$, ** $p < .05$, *** $p < .01$.

propriate inflator for valuing household services. A comparison of the 2007 ATUS and the updated DKM estimates is an indirect test of these two assumptions. Tables 6 and 7 show the DMK updated values (using the ECI) and the per cent differences between the ATUS values calculated in this paper and the DKM updated values.

The results for men show that the ATUS data produce somewhat higher values than an updating of the 1987 values using the ECI. The largest increase in values occurs for employed men, and to a smaller extent, unemployed men. For unemployed men the estimates are similar in the 30 to 69 year age range. The results of both methods are nearly identical for employed and un-

employed females, especially for ages less than 65. Overall, the results suggest that the ATUS data reasonably approximates the DKM values for household services. The comparison indicates that, relative to the DMK updated values using the ECI, the 2006 ATUS data suggests a wider discrepancy for employed males and smaller discrepancies for the remaining three categories. Also, the differences appear to widen in all four categories for the very young and the very old. For a particular individual estimates of the value of household services can be made both from the DKM tables updated by the ECI or from the ATUS tables developed here. This is important because using the DKM data can be criticized as employing dated figures.

Table 4

2007 Hourly Wage Rates for Occupations Related to Housework

Occupation	Hourly Wage Rate
Residential Advisors	\$12.00
Cooks, Private Household	\$13.59
Grounds and Maintenance Workers	\$12.33
Child Care Workers	\$9.46
Taxi Drivers	\$10.93
Personal Care Workers	\$10.72
Average	\$11.51

Source: United States Department of Labor, Occupation Employment Statistics, 2007

Table 5

Estimated Annual Values of Household Services from 2006 American Time Use Survey

Age	Men Employed	Men Not Employed	Females Employed	Females Not Employed
20-24	\$7,374	\$8,851	\$12,968	\$20,069
25-29	\$9,246	\$11,255	\$15,113	\$23,149
30-34	\$10,727	\$13,215	\$16,694	\$25,517
35-39	\$11,818	\$14,731	\$17,710	\$27,173
40-44	\$12,517	\$15,803	\$18,162	\$28,117
45-49	\$12,825	\$16,432	\$18,049	\$28,350
50-54	\$12,742	\$16,616	\$17,373	\$27,871
55-59	\$12,268	\$16,357	\$16,132	\$26,680
60-64	\$11,403	\$15,655	\$14,326	\$24,777
65-69	\$10,147	\$14,508	\$11,957	\$22,163
70-74	\$8,500	\$12,917	\$9,022	\$18,837
75-79	\$6,462	\$10,883	\$5,524	\$14,799

Rationale for Using the Tables

Many rehabilitation professionals and economists may not use tables such as those discussed in this paper because they feel the tables not reflect the actual amount of time allocated to household activities of a particular individual. They would prefer to estimate the actual time allocated to household activities of a specific individual rather than using the data that is based on the "average" person as reflected in the tables. However, there are valid reasons to rely on the data in these tables. First, knowing what HHACT a particular individual engages in the present does not allow an expert to predict the level of activities in the future. There are often life style changes that are difficult, if not impossible to predict based on the changing needs of the household over time. Over a lifetime individuals may get divorced, have children, or move to a larger or smaller residence. Since these lifestyle changes cannot be predicted it may be useful to as-

sume that the housework performed by a particular individual will reflect the statistical averages in the tables contained in this paper over his or her lifetime. Second, the data in such tables indicate that the value of household services decline with age, for both males and females. Therefore, knowing the value of household services in the present provides no parameters or insight regarding the magnitude of the documented decline at different ages. The values in the tables can be used to estimate this magnitude.

Summary

There have been no updates to the DKM tables that reflect the more recent information concerning time spent on and the value of household services. Updating the DKM tables by employing an inflation factor such as the employment cost index can be challenged on the basis that the 1987 values are dated. This pa-

Table 6
DKM Updated Values, 2007

Age	Men Employed	Men Not Employed	Women Employed	Women Not Employed
20-24	\$5,870	\$11,495	\$10,874	\$21,447
25-29	\$6,791	\$12,414	\$14,372	\$24,945
30-34	\$7,583	\$13,207	\$16,791	\$27,364
35-39	\$8,068	\$13,692	\$17,489	\$28,060
40-44	\$8,307	\$13,932	\$16,888	\$27,461
45-49	\$8,342	\$13,966	\$15,675	\$26,246
50-54	\$8,342	\$13,966	\$15,675	\$26,246
55-59	\$8,555	\$14,179	\$15,658	\$26,232
60-64	\$8,555	\$14,179	\$15,658	\$26,232
65-69	\$8,555	\$14,179	\$15,267	\$25,576
70-74	\$6,091	\$10,095	\$10,870	\$18,211
75-79	\$4,141	\$6,864	\$7,392	\$12,383

Table 7
Percent Differences Between Updated DMK and ATUS Values

Age	Men Employed	Men Not Employed	Women Employed	Women Not Employed
0-24	20.39%	-29.87%	16.15%	-6.872
5-29	26.55%	-10.30%	4.90%	-7.763
0-34	29.32%	0.06%	-0.58%	-7.243
5-39	31.73%	7.05%	1.25%	-3.264
0-44	33.63%	11.84%	7.01%	2.334
5-49	34.96%	15.01%	13.16%	7.425
0-54	34.54%	15.95%	9.77%	5.835
5-59	30.27%	13.32%	2.93%	1.686
0-64	24.98%	9.42%	-9.30%	-5.876
5-69	15.70%	2.27%	-27.69%	-15.407
0-74	28.34%	21.85%	-20.47%	3.327
5-79	35.92%	36.93%	-33.81%	16.32

per compared updated DKM tables on the value of household services for employed and unemployed males and females using the employment cost index as an inflator for the DKM tables and the 2006 ATUS data on household activities valued at 2007 market wage rates for household activities.

For employed males the ATUS data demonstrates only a moderate discrepancy in the two values. For the remaining three categories the discrepancies are less pronounced. For all categories discrepancies increase for the young and the old. On balance, this research suggests that vocational experts should feel comfortable in using either the DKM tables or the ATUS tables reported here.

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Endnotes

¹ The reader should be aware that there is a category called HHSEV which is household services purchased, such as paying a carpet cleaning company. This is not the value of household services as used in this paper.

² Years of education were denoted by actual years for grades 1 through 12, 14 for some college but no degree or an associate's degree, 16 for a bachelor's degree, and 18 for a master's degree, doctoral degree or professional degree.

³ The sample size for the regression was less than the full sample because the variable usualhours has missing data on the remaining observations.

⁴ The major variables in the Peskin equation were: employment status, variables for the number of children in the household and their ages, marital status, age (but not age squared), education, family income, home ownership, and the presence (or not) of paid help in the home.

⁵ This was also the method used by Peskin. This will allow a comparison between the DMK and our values. Market wages can be obtained from United States Department of Labor estimates.

⁶ We assume a 365 day year and no variation in house work between weekdays and weekends. We also assume eight per cent legally mandated fringe benefits so the average compensation for the occupations listed in table four is \$12.43. We also assume that this wage rate is less than the value of the individual's job market activity. For a discussion of this issue see Larimore (1991). Finally, we take no side on the issue of whether or not actual expenditures for household services by injured persons are required in order for the loss in the ability to perform housework is compensable or not. For more on this issue, see Ireland and Riccardi.

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