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CARE TIME IN THE U.S.: MEASURES, DETERMINANTS, AND IMPLICATIONS

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A Dissertation Presented

by

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DEDICATION

To those who perished with the sinking of the *Sewol* ferry. May society never again fail in one of its most fundamental duties: ensuring the well-being of children.

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ABSTRACT

CARE TIME IN THE U.S.: MEASURES, DETERMINANTS, AND IMPLICATIONS

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These essays focus on improving both the measurement and valuation of time devoted to family care, as well as exploring factors, such as gender, age, and earnings, that affect time allocation. The first essay examines whether time devoted to primary child care activities can be truly understood to represent the total amount of time devoted to child care (as is implied by the focus on primary care activities that dominates the time-use literature), exploring problems of conventional definitions of child care and utilizations of time-use surveys. The second essay explores the measurement issues of relative temporal burden on "sandwich" family caregivers by comparing time spent on child care and adult care. Re-categorizing activities of caring for adults and children in the ATUS in terms of Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) allows for greater comparability with studies that measure needs based on assistance with these activities. Building on the improved measures of care time developed in the first two essays, the third essay develops a household production satellite account, highlighting the importance of the value of supervisory or "on-call"

time and various specialists' wages, the ratio of caregivers to care recipients ("intensity" of care), the educational attainment of caregivers.

Key words: Child care, adult care, time allocation, sandwich caregivers, activities of daily living, instrumental activities of daily living, measurement and valuation of care time, satellite household production accounts, American Time Use Survey

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INTRODUCTION

These three essays explore the quantitative dimensions of unpaid family care of children and adults receiving assistance (including those with disabilities and the frail elderly) in the U.S using the American Time Use Survey (ATUS). Family care for children and adults has attracted the attention of numerous researchers during the last decade partly as a result of increases in maternal employment and the extended life expectancy of the elderly. The determinants of caregivers' time devoted to children are an important area of study not only because they affect adult living standards and leisure but also because childhood conditions influence children's present well-being and enhance outcomes for children in their adult life (Case et al., 2005; Garces et al., 2002). Likewise, the determinants of family time devoted to needy adults have implications for the welfare of both caregivers and care recipients.

This dissertation consists of three essays addressing issues in measurement and valuation of time devoted to family care. The first essay explores a question whether time devoted to primary child care activities truly represents the total amount of time devoted to child care. Previous research has defined child care too narrowly, focusing on specific child care activities by mothers and generating misleading findings regarding the impact of economic, demographic, and cultural factors on maternal time devoted to children. In this essay, I use pooled data from ATUS 2003-2012 to explore significant differences among three types of child care time: activities, supervisory care, and social time. I argue that the conventional focus on explicit "activities" with children understates the magnitude of time inputs into the care of children by diverting attention from the larger responsibilities of "supervisory" care. Both descriptive and multivariate analyses show that the

determinants of time devoted to child care – particularly the impacts of race/ethnicity and household structure – vary significantly, depending on how child care is defined. Measurement of primary care alone may lead to the misleading conclusion that white and highly educated mothers devote more time to their children than other mothers. The second essay explores the relative temporal burden on "sandwich" family caregivers by comparing time spent on child care and adult care. Rather than looking at care time as an aggregate measure, it disaggregates care time devoted to children and adults as much as the data allows and re-categorizes activities of caring for adults and children in the ATUS in terms of Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), allowing for greater comparability with studies that measure needs based on assistance with these activities. The third essay builds on previous satellite accounts that treat households as production units, but challenges their measurement and valuation of time devoted to child care, making a case for the inclusion of supervisory child care time that does not overlap with other productive activities. We suggest several other methodological refinements for estimates based on analysis of data from the ATUS application of a vector of specialized replacement cost wage estimates for different child care activities rather than a single wage, and adjustments for the ratio of children to adults present and for the educational attainment of caregivers. Our estimates of the value of child care alone in 2004 and 2010 exceed previous estimates of the value of all non-market household production in the U.S. The end result is an upward adjustment of Gross Domestic Product by about 43% compared to previous adjustments of about 27%.

CHAPTER 1

MANY KINDS OF CHILD CARE:

EVIDENCE FROM THE AMERICAN TIME USE SURVEY, 2003-2012

Introduction

Parental time devoted to children can take a number of diverse forms. However, most empirical time-use studies measure child care time coded as a primary activity (such as feeding, bathing, or transporting a child) reported by parents (Budig and Folbre, 2004; Monna and Gauthier, 2008). On average, mothers in the United States spend less than two hours a day and fathers less than one hour on primary child care activities (Bianchi 2000; Bianchi et al., 2006; Folbre, 2008; Robinson and Godbey, 1997). Such measures suggest that parenting is not a very demanding activity.

But the temporal constraints that children impose on families reach far beyond primary child care by parents to include both supervisory care and participation in social and leisure activities. Supervisory time clearly imposes constraints on parental labor supply. A caregiver who takes responsibility for a young infant cannot leave that child unattended even when she or he is not engaged in primary child care. Supervisory time is also relevant to economies of scale in childrearing, because it is easier to supervise several children at once than to tend to their physical needs.

The composition of total child care time has important implications for understanding differences in maternal time devoted to children. Those who report more time in primary child care may report less time in other forms of care, reflecting cultural values or perhaps even differences in the way that respondents interpret the meaning of

survey questions. Also, it may be easier for household members other than parents to provide supervisory care or social time with children than it is for them to help with primary care activities. Such differences in substitutability may be particularly important for single mothers who are likely to live with adults other than spouses and for black and Hispanic mothers who are more likely than white mothers to share a home with an extended household member (Field and Casper, 2001; Sarkisian and Gerstel, 2007).

In this paper, I use nationally representative data from the 2003-2012 American Time Use Survey (ATUS) to show that the impact of race, ethnicity, and household structure on maternal time devoted to children is mediated by significant differences in the types of child care provided. In particular, I show that less-educated, non-white mothers partially compensate for lower levels of time in primary child care activities by providing more supervisory and social time to children. Further, I offer evidence that coresident adults in households with single mothers significantly reduce the supervisory child care provided by mothers themselves.

The first section of this paper offers a critical review of previous research on both the measurement and the determinants of maternal child care time. The second section describes differences in the amounts of activity time, supervisory time, and social time provided by mothers, followed by a multivariate analysis of the determinants of specific categories of maternal child care time. The final section discusses the implications of the results, emphasizing that different types of mothers provide different types of care.

Measures and Determinants of Maternal Time with Children

Measurement Issues

Parental time with children covers a very wide range of responsibilities, but is typically measured in terms of answers to questions such as "What were you doing during this time period?" Yet most people are multitasking beings who engage in more than one activity at the same time, which explains why many national time-use surveys also ask "Were you doing anything else at the same time?" as a way of measuring secondary activities (Folbre and Yoon 2007a; Gauthier et al. 2004). For instance, one can feed a baby while listening to music or watching television. Unfortunately there is no question concerning secondary activities asked by the ATUS.

Several studies use historical time-use data collected prior to the ATUS to measure secondary child care activities in the U.S. (Bianchi 2000; Robinson and Godbey 1997). Robinson and Godbey (1997) show that adding time devoted to secondary child care activities increased the total amount of time devoted to child care by 50 percent. Similarly, Robinson and Bianchi (1998-1999) update the historical time-diary data collected in 1965, 1975, and 1985 to measure how Americans spend their time. Using these data, Bianchi (2000) documents that on average, secondary child care represents between 30 percent and 35 percent of the total parental time devoted to child care.

Even measures of secondary child care fail to capture supervisory or "on call" time, because these typically represent constraints rather than activities—being present in order to keep an "eye on" or an "ear open" for children who are entertaining themselves or playing with others. Even though infants sleep most of the time during a day, they

wake up at random times and when they do, require adults' immediate attention. Caregivers often use baby monitors in order to be able to respond to them more effectively. Other technological innovations, including cell phones and tablets with capacity for real time face chats, can also complement supervisory time.

The ATUS specifically asked respondents engaged in all activities "whether a child under the age of 13 was in your care." The question covers only the time period between when the first child under age 13 woke up and the last child under age 13 went to bed on a diary day and is restricted to time that the respondent was awake. The published summary tables of the ATUS report supervisory time as a "secondary" child care activity, which is somewhat misleading, since it is not necessarily an "activity."[1] It does not correspond to the activities defined as "secondary child care" in other international surveys (U.K. and Australia) and its quantitative relationship to them remains unresolved in the literature. Answers to the "in your care" question are best treated as a measure of supervisory time, and are described as such in this essay.

Another form of time spent with children is defined by the presence of children rather than any specific activity or responsibilities. For instance, respondents in the ATUS answer the question "Who was with you/ who accompanied you?" for each activity on a diary day. The "with whom" question captures personal and social interaction with children. Parents often spend time with children during self-reported leisure activities (Mattingly and Bianchi, 2003; Bittman and Wajcman, 2004). Family time at the dinner table is often considered especially important, especially for working mothers (Kendig and Bianchi, 2006). While social time with children is almost certainly less demanding than engaging in specific child care activities, parents may choose leisure

[1] See more details at http://www.bls.gov/new.release/atus.t10.thm.

activities compatible with children's needs, and children may derive significant benefits from social interaction.

A child-based time-use survey, the Child Development Supplement of the Panel Survey of Income Dynamics (CDS-PSID), conducted in 1997 and in 2003, also offers measures of activity time, supervisory time, and social time, and excludes children's sleep time from consideration. One study using this data demonstrates that supervisory time (termed "passive care") far exceeds care activity time, but does not explore social time (Folbre et al., 2005). The study also notes that exclusion of time that children are sleeping leads to a significant understatement of constraints on maternal time use.

In sum, previous research has raised the issue of appropriate definitions of child care, but left many questions unresolved.

Determinants of Maternal Time with Children

Most research on the determinants of time devoted to children focus on independent variables that can be categorized as economic, demographic, or cultural factors. However interesting the results, they are typically flawed by failure to consider forms of child care other than direct care activities.

Economic Factors

Historical research suggests that the time mothers devote to child care activities has increased slightly since the 1960s, despite increases in maternal employment (Bianchi et al., 2006). Some specific child care activities, such as bathing, feeding, and reading aloud, can be conducted either before or after hours of paid employment. Supervisory

care, on the other hand, is less easily rescheduled, because it is, by its very nature, spread throughout the day. It is also possible that cultural definitions of child care have changed over time, and now encompass more diffuse supervisory and leisure activities.

These definitional issues could help explain why some studies report a positive impact of maternal employment on child care activity time (Bryant and Zick, 1996), even though most seem to show a negative impact (Nock and Kingston, 1988; Zick and Bryant, 1996). Even more significant, the elasticity of time devoted to child care activities with respect to hours of maternal employment is surprisingly low. For instance, Zick and Bryant (1996) find that an additional hour of paid work for a mother results in only a three-minute decrease in direct child care activities per day. Sayer et al. (2004) show that employed mothers tend to reduce their leisure time and sleep in order to care for children either before they leave for or after they return from work. Many parents work non-standard hours and split shifts in order to make sure that one parent is at home during the night and one during the day even if spending part of that time sleeping (Presser, 1994). While we might expect the economic gains that accrue from maternal employment to be offset by losses of mothers' time, this does not appear to have happened, at least not for time devoted to child care activities. Bianchi (2000) noted that although non-employed mothers spend about twice as much time at home as employed mothers, most of the additional time is spent cooking and doing housework rather than playing and engaging in educational activities with children. Analyses by Bianchi and others indicate that the time mothers spend on primary care activities and social time has not been affected by the increases in maternal employment (Sandberg and Hofferth, 2001).[2]

[2] For a review of the literature on the effects of maternal employment on children see Waldfogel et al. (2002) and Brooks-Gunn, et al. (2002).

Type of care is also relevant to studies of the impact of paternal involvement on maternal time. Fathers tend to spend more time caring for children in combination with mothers than on their own (Budig and Folbre, 2004; Craig 2006). Bittman et al. (2004) show that a spouse's market work hours are positively and significantly linked to a father's time in routine caring activities for children, but not necessarily developmental care activities such as reading to a child. When fathers devote longer hours to paid employment, they are less likely to share meals with their children (Cooksey and Fondell, 1996).

Research on the impact of wages on time devoted to children also suggests a relatively small effect, with some reporting a negative, some a positive sign. Focusing exclusively on married couples using time diary data of 1975 randomly selected U.S. households from Juster and Stafford (1985), Kooreman and Kapteyn (1987) find that increases in the fathers' wages positively affect mothers' activity-based time for children. However, mothers' wages have no effect on husbands' activity-based time with children. A recent study by Kimmel and Connelly (2007) shows that working mothers with higher wages spend more time in activities devoted to children. Their analysis explicitly excludes "activities where children are present but caregiving is not reported as the primary activity," leaving open the possibility that working mothers accommodate their schedules by reducing supervisory and social time (Kimmel and Connelly, 2007, 672).

Research on the impact of family income on parental time yields mixed results that could be related to measurement issues. Some find that family income is positively associated with maternal child care activities (Bryant and Zick, 1996; Lareau, 2003). An analysis of the 1975 time diaries collected at the University of Michigan, on the other

hand, shows that an increase in household income reduces the time spent on child care activities by about two minutes per day (Nock and Kingston, 1988). Hofferth (2001), using data from the CDS-PSID, shows that family income is significantly and negatively associated with children's television watching and positively with time spent eating meals by children and in day care. It is possible that mothers with higher household income might be able to hire a nanny to supervise children but might try to compensate for loss of temporal flexibility by adding hours of social time with children (mostly, leisure time) that can be scheduled after paid work. It is entirely likely that family income increases the tendency to outsource child care activities and supervisory time, but increases scope for increased leisure and social time.

Activity-based measures used in the previous studies do not capture parental ability to stay home from work if a child is sick, or show up at soccer game or school play that a child considers important. Yet evidence suggests that maternal monitoring and supervision may be particularly relevant to the well-being of young adolescents in low-income families (Gennetian et al., 2002).

Cultural Factors

From a neoclassical economic perspective, caregivers' tastes and preferences are taken as exogenously given. However, both heterodox economic and sociological approaches emphasize the impact of cultural values on individual decisions. Cultural values are likely to vary by race/ethnicity and also by level of education. Caregivers' attitudes and beliefs are influenced by social expectations. Education affects parental attitudes, as well as directly affecting their earnings and opportunity cost of time devoted

to paid employment. Findings from previous research show that black mothers spent less time in child care activities than white mothers (Milkie et al., 2004; Nock and Kingston 1988). Because black fathers are less likely to reside with their biological children, they tend to spend less time engaging in activities with their children than white fathers (Hofferth, 2003). In contrast, Hispanic families tend to have very strong familial orientations, relying on resident grandparents for child care more than other ethnic groups (Fuller et al., 1996). Over time, the meaning of child care has shifted from an emphasis on meeting physical needs to developmental concerns (Hofferth, 2006). However, the extent of this shift may vary across different subgroups of the population. Ethnographer Annette Lareau (2003, 2011) explores cross-class variations in parenting style contrasting "the accomplishment of natural development," a "hands-off" style that often characterizes the approach of lower income and otherwise disadvantaged families with "concerted cultivation," an intensive style aimed at improving children's educational attainment and future job market success, and which often reflects the values of more educated and higher income groups. The first style is more compatible with reliance on extended family members, neighbors, and other members of the community, while the second comports better with highly structured activities such as music lessons and sports events.

Cultural factors may well explain why more highly educated parents tend to spend more time on care activities than their less educated counterparts (Bianchi et al., 2006; Craig, 2006; Sayer et al., 2004). A desire for concerted cultivation may outweigh the effects of higher opportunity cost. Maternal education is also related to the type of child care activities mothers engage in with their children: More highly educated mothers

spend more time reading to their children and less time watching television with them (Timmer et al., 1985; Hofferth, 2003). On the other hand, little is known about the effect of maternal education on supervisory or social time with children.

Demographic Factors

Demographic factors shaping parental child care include the gender of caregiver and care recipient, the number and ages of children in the household, and living arrangements, such as the number of coresident adults. These factors are particularly likely to have varying impacts over the lifecycle. For instance, when children are still young, less interaction between children might take place during time devoted to child care by caregivers. However, as children grow up, they often assist with child care for their younger siblings, lightening the burden for their parents or grandparents. Coresident older children and adults are likely to be especially important resources for supervisory and social time with younger children, whether or not they also substantially participate in care activities.

Previous studies have documented the impact of gender on different types of child care activities (Bianchi, 2000; Sayer et al., 2004). For instance, fathers are more likely than mothers to engage in child care tasks such as playing with a child or taking a child to the park, rather than routine tasks such as bathing and feeding (Craig, 2007; Sayer et al., 2004). Examining both primary and secondary activity data from the 1997 Australian Bureau of Statistics Time Use Survey, Craig (2006) shows that the characteristics of men's child care activities include less physical labor, less rigid schedules, and fewer multi-tasking activities than women's activities. It seems likely, therefore, that men are

more likely to engage in supervisory care or social time with children than in primary care activities.

Besides the caregiver's gender, a child's gender may also play a significant role, with some studies showing that sons get more activity time from fathers and that girls benefit if boys are present in the household. Boys in all-boy families get more of fathers' time in primary care and social time than do girls in all-girl families, and in mixed-gender families, boys get more direct and indirect time (direct primary activities and indirect leisure time) with fathers than their sisters (Mammen, 2011). With the use of more disaggregated child care activities using the 2003 ATUS, Mammen (2011) finds that girls with brothers spend more time watching TV with fathers. One might expect similar patterns to emerge from analysis of supervisory and social time; on the other hand, child gender might have a weaker effect on more diffuse aspects of time use.

Controlling for mothers' age, single mothers, especially never-married mothers, tend to have younger children than married mothers. Mothers' time devoted to physical and recreational child care tends to be greater when children are very young (0-2) (Bianchi et al., 2006; Folbre and Yoon, 2007a). However, as children become school-aged, the educational time investment by mothers increases. As children age, supervisory time does not decline as steeply as interactive child care (Folbre, 2008).

Most studies of time devoted to child care have focused on parents, and care by other relatives and non-relatives deserves more attention than it has thus far received (Craig and Bittman, 2008; Aalto and Varjonen, 2006). Differences in types of child care time are also relevant to an analysis of contributions that adults other than parents make to child care. Mothers living with other coresident adults may enjoy important assistance

with child care responsibilities (Single-Rushton and McLanahan, 2002). Child care provided by other coresident adults is more common in disadvantaged groups – among lower income families with less-educated, young, or single mothers (Baydar and Brooks-Gunn, 1998; Scott et al., 2005; Vandell et al., 2003). Female extended family members such as mothers and mothers-in-law are particularly likely to help out (Presser, 1994; Short et al., 2006). In this context, supervisory time may be even more important than care activity time.

Other Factors

Not all factors relevant to parental time allocation fit under the rubrics above. Day of the week clearly matters. Parents spend more time in care activities on weekends than on weekdays (Yeung et al., 2001). Physical care and supervisory care necessarily take place on a daily basis and cannot be postponed. On the other hand, social time with children, including leisure time spent in their company, can be concentrated on weekends. Along with weekend dummy variables, seasonal dummy variables (especially for summer) affect the time spent on child care activities. Kalenkoski et al. (2007) show that mothers provide less primary care during summers in the U.S. and in the United Kingdom, because of a shift toward recreational activities. Thus, type of child care may also vary seasonally.

Data and Methods

Data and Sample

To test the hypothesis that the effects of standard economic, demographic, and cultural factors on overall child care time vary significantly across distinct types of child care, I examine the effects of these factors on three distinct measures of child care time (activity time, supervisory time, and social time).[3] I use pooled data from the American Time Use Survey (ATUS), a nationally representative continuous time-use survey, for the years 2003-2012. The ATUS is an ongoing national survey that has been conducted monthly by the U.S. Bureau of the Census for the U.S. Bureau of Labor Statistics since January 2003. Respondents are randomly selected individuals from households that have completed their participation in the Current Population Survey (CPS), representative of the U.S. civilian non-institutional population ages 15 and over. Respondents are asked to list demographic characteristics of household members such as gender, age, and the relationships to the respondent, and labor force information for the respondent and their household members including spouse/cohabiting partner. I delete observations with allocated data or with inconsistent demographic information between the CPS and ATUS surveys.

ATUS respondents are asked to sequentially report their primary activities during the 24-hour period from 4:00 AM the day before the interview to 4:00 AM of the day of the interview. For each reported activity, the interviewer asks how long the activity lasted, who was in the room or accompanied the respondent during the activity, and

[3] The analysis of further disaggregated primary child care activities is available upon request.

where the activity took place. This study limits the sample in the ATUS to those who are mothers (aged 18 and over) and living with at least one household child under the age of 13: 4,167 in 2003, 2,673 in 2004, 2,868 in 2005, 2,828 in 2006, 2,535 in 2007, 2,605 in 2008, 2,671 in 2009, 2,704 in 2010, 2,449 in 2011, and 2,396 in 2012. It further divides mothers who are aged 18 and over and living with at least one household child under the age of 13 by marital status – married, cohabiting, and single. The "In-Your-Care" question is only posed to those with household children under the age of 13. Therefore, to be consistent with other measures of child care activities, I focus on mothers who are living with at least one child under the age of 13. Application of the ATUS final weight adjusts for nonresponse and ensures proper subgroup and day-of-week representation.

Dependent Variables

The main variables of interest are the amounts of time spent by mothers on different types of child care – primary care activities, supervisory care (non-overlapping primary child care),[4] and non-overlapping social time. Complete coding details are provided in Appendix Table A1. Primary child care activities include physical care, feeding children, helping and teaching, talking and reading, indoor and outdoor play, and medical care for children, managing phone calls for children, as well as travel related to child care and attending children's sports or art events.

The second form of child care is supervisory care, distinguished from other forms of care like primary care activities or social time with any or all children. To avoid double counting, I include only supervisory care that does not overlap with primary care

[4] "In-your-care" is the term used in ATUS questionnaire. In this paper, I use the term, "supervisory child care," as equivalent to "in-your-care".

activities. For example, if one adult is supervising one child while interacting with another child at the same time, the time is calculated as interactive care time rather than considered time spent on supervisory child care.

The third component of total child care time is the sum of time "with a child" as reported in responses to the question "who else was there" during each activity. The ATUS specifically asks if there was another person "in the same room" when the activity was being conducted. It is possible to list multiple individuals, including adults and children. Time "with a child" could overlap with primary child care activities or with supervisory care; in those instances it was excluded. That is, time "with a child" is composed primarily of leisure and social activities in which neither primary care activities nor supervisory responsibilities were reported.

Independent Variables

Independent variables are divided into four categories: 1) economic variables, 2) cultural variables, 3) demographic and household variables, and 4) other variables. Economic variables include usual work hours per week, employment status, and household income. Employment status is divided into four categories: full time, part time, unemployed, and not in the labor force. Full time status is the reference group in multivariate analysis. Household income is measured with response choices ranging from (1) less than $5,000 to (16) $150,000 and over. Household income is converted to dollar amounts by assigning the midpoint of each income category and expressing income in thousands of dollars. I also use mother's own earnings as well as household income because mother's own earnings is a measure of the opportunity cost of her own time.

Therefore, the marginal effect of differences in household income for single mothers is expected to be even greater than for married mothers. I use logarithm transformation of both household income and mother's hourly wage to improve normality of distribution and effect size.[5]

Cultural variables include education and race/ethnicity.[6] The level of education is coded into four categories: less than high school, high school graduate only, some college education, and college graduate and beyond. Less than high school is the reference category in the multivariate analysis. Race/ethnicity is defined by four categories: Hispanic, non-Hispanic White, non-Hispanic Black, and other. Non-Hispanic White is the reference group.

The demographic and household variables include marital status and caregiver's age (continuous variable). All never-married, divorced or separated, or widowed mothers are assigned to the single-mother sample, which also includes married whose partners are not present in the households. Cohabiting mothers are defined as mothers who reported the presence of cohabiting partners. The demographic control variable also includes a dummy variable whether married or cohabiting spouse is present or not. In the ATUS, age of youngest child is a continuous variable ranging from 0 to 12 years of age. The

[5] To solve the problem of zero wages (which still remains in logarithm transformation), various methods have been developed in the empirical literature. The most common approaches are to add some small positive value (Flowerdew and Aitkin, 1982) to all observations or get rid of the zero-valued observations (Eichengreen and Irwin, 1996). Given the limitations of both approaches, I have chosen to add small numbers to wages when wages are reported to be zeros. I add a small number (10^{-20}), medium-sized number (0.001), and fairly large number (1) for robustness checks. A fairly large number is recommended for logarithm transformation because the logarithm of a number less than (or equal to) zero is undefined. Osborne (2002, 2010). To check robustness of the results from Table 1.4 with different wage treatments, see Appendix Table A2.

[6] Educational attainment is sometimes treated as an economic variable because of its effects on earnings. I treat it as a cultural variable here as a direct result of Lareau's ethnographic research, cited above. In any case, my categorization does not affect my empirical findings.

number of children under 13 years of age in the household is a continuous variable. The presence of a boy is a dummy variable that indicates the presence of a male child under 13 years of age in the household. The regression models also include two different sets of control variables measuring characteristics of other coresident adults. I include dummy variables indicating presence of coresident female and male adults separately. Coresident adult (female or male) is defined as a person who is neither a child nor a partner of a mother but rather another nonnuclear household member, such as a parent, sibling, or other relative living in the same household. To estimate the effects of coresident adults' employment status on mothers' time spent on the various types of child care, I also include two dummy variables for employed coresident female adult and employed coresident male adult.

Finally, the regression models control for aspects of the diary relevant to time of week and of year, using indicator variables for year, weekend, and summer season indicating whether the diary month was June, July, or August (as a control to account for off-season periods for school-aged children). I expect that summer matters for mothers of young children because of school vacation and changes in the types of care and even sleep patterns of children with the increased daylight hours and warm temperatures. A dummy variable for whether the respondent resides in metropolitan area or not is also included.

Table 1.1 presents the characteristics of the sample used in this analysis. The sample includes mothers who are 18 and over and reside with at least one child under 13 years of age. Of 27,896 mothers in the sample, 67 percent are married mothers, 3.7 percent are cohabiting mothers, and 29.3 percent are single mothers (Table 1.1).

Cohabiting mothers and single mothers are younger, less educated, and have fewer children. Single mothers tend to work fewer hours in the labor market than cohabiting and married mothers but they are more likely to be employed full-time. Single mothers also have a lower household income (almost 50 percent less than married mothers), and are less likely to be white and well-educated. About 37 percent of single mothers live with at least one employed coresident household member.

I report ordinary least squares (OLS) regressions of mothers' hours per day in primary child care activities, supervisory care, and social time with children.[7] All analyses are weighted to adjust for the sample stratification, distribution of weekdays and weekends, and different response rates across demographic groups and days of the week. I run OLS regressions using a pooled sample (all mothers) including both single and partnered mothers, to estimate the effects of economic, cultural, and demographic variables and to test for interaction effects between four types of coresident adults with single mothers.

Results

Descriptive Results

Descriptive results help set the stage for multivariate analysis. Table 1.2 presents the average hours per day in the three time categories of child care for the mothers in the sample by race and ethnicity. Looking at Table 1.2, we see substantial differences between the types of child care. All mothers regardless of race/ethnicity spend

[7] I also estimated Tobit regressions, but since the results are similar, I report only OLS results, following recommendations by Stewart (2006). Tobit estimates are available upon request.

significantly more time on supervisory care (7 hours per day vs. 2.1 hours per day) and social time (3.8 hours per day vs. 2.1 hours per day) than primary child care activities. Note that exclusion of overlapping time means that both supervisory and social time are conservatively estimated. Total child care, measured in these terms, comes to more than 12 hours per day for all mothers of children under 13. Table 1.2 also shows substantial differences in the means of primary child care activities, supervisory care, and social time depending on race and ethnicity of mothers. White mothers spend more total time on child care than mothers of other racial and ethnic groups, but black mothers spend more on social time, and Hispanic mothers on supervisory care. The ratios of supervisory care and social time to primary care activities time are higher for both black and Hispanic mothers. Averages are about the same for mothers of other races as for whites. The t-tests comparing the mean differences between mothers by race and ethnicity in each child care category show that they are not statistically significantly different from zero.

Further descriptive information is presented in Table 1.3, which reports averages by employment status. Full-time employed mothers who have at least one child under the age of 13 spend an average of 1.6 hours a day in child care activities, 5.8 hours a day in supervisory care, and 5.8 hours a day in social time. Average daily hours spent on primary care activities and supervisory care increase when mothers are not in the labor force (compare column (2) and (5)). Surprisingly, the time devoted to social time decreases substantially among mothers outside paid employment, perhaps because of age differences among children (mothers of older children are more likely to be working part-time or full-time). In order to further examine the impact of socio-demographic factors

and coresident adult factor on different types of child care, I move to multivariate analysis.

Multivariate Regression Results

Economic Variables

Table 1.4 presents the estimated marginal effects on hours per day in three types of child care time for mothers living with at least one child under 13. A quick glance down the columns confirms the findings of Table 1.2 and 1.3 that primary child care activities are distinct from supervisory care and social time. For example, usual work hours have a larger negative effect on supervisory care than on primary care activities, and a positive effect on social time. The same pattern is evident with the dummy variable for full-time employment. Household income has a negative (though just barely significant) impact on supervisory time, and hourly wage a negative effect on both time in primary care activities and supervisory care time (See Table 1.4). It is consistent with previous research that the effect of wages on primary care is miniscule (1 percent increase in women's wage reduces 0.13 minutes or 0.67 minutes depending on the treatment of logarithm of wage. See Appendix Table A2).[8]

Full-time employed mothers spend less time on primary care activities and supervisory care than mothers who are not in the labor force. However, social time with children for full-time employed mothers is 90 minutes higher compared to those who are not in the labor force. The estimated coefficients for household income and mothers' own hourly wage show positive effects on time spent on primary care activities, but the

[8] One might argue that the wage effect is small on child care time because the effect might have been washed by other related control variables such as employment status and household income.

increase is miniscule. Household income is negatively associated with supervisory care but positively associated with social time. This suggests that mothers with higher household income are able to hire a nanny to substitute for their supervisory care time.

Cultural Variables

Level of education has a significant and positive effect on time spent in primary care activities, with the size of the coefficients increasing along with educational level. But increased educational attainment is not associated with more time in supervisory care, with little difference among the coefficients for the three education dummies. Notably, all the education dummies have a significant and negative effect on social time with children, slightly smaller for "some college" but larger for "college and beyond."

The impact of race and ethnicity also varies significantly across different types of child care. The effect of being black or Hispanic on time in primary care activities is significantly negative, but that pattern does not hold for supervisory or social time. Indeed, being Hispanic has a positive and significant effect on supervisory child care time. These results, along with those on the educational variables, support Annette Lareau's observations of significant cultural influences on parenting styles.

Demographic and Household Variables

The amount of time that single mothers (with no husband or coresident partner) devote to primary child care activities is not significantly different from that of married mothers. However, being single has a significant large negative effect on supervisory time and a significant large positive effect on social time, even controlling for all factors discussed above (See Table 1.4).

The influence of different types of coresident adults is of particular interest, because it sheds some light on informal child care arrangements. The presence of a female coresident adult significantly reduces a mother's time spent on primary child care activities and supervisory care (26 minutes less for primary care activities and 52 minutes less for supervisory care). Interestingly, the presence of a coresident male (other than spouse or partner) has an even larger effect (with a slight margin), reducing mother's time spent on primary child care activities by about 27 minutes per day and on supervisory care by about 59 minutes per day.

The employment status of coresident adults has even larger significant effects on different types of child care. The presence of at least one employed coresident female adult is associated with a reduction of 49 minutes in primary care activities and 101 minutes in supervisory care. Yet employed coresident female and male adults increase mothers' social time with children. Perhaps the very presence of other adults in the household along with children changes the way in which mothers perceive child care responsibilities. Employed coresident adults are probably younger and in better health than coresident adults who are not employed. The presence of an employed coresident adult both relieves child care responsibilities and creates more income security in the household, perhaps enabling mothers to utilize some paid child care. Again, an employed coresident male adult has a larger negative effect on mother's time on primary care activities and supervisory time than an employed female coresident adult. It is possible that this gendered effect reflects the presence of a cohabiting man who is not reported as a regular partner.

The effect of number of children on maternal child care time is surprisingly small, and significant only for primary care activities. An additional child leads mothers to spend 8 minutes more time on primary child care activities. The presence of boy child does increase mothers' time spent on primary child care activities, but it also decreases other types of care. These effects, however, are not significant. Because married mothers have more children, on average, there is a greater likelihood of having both boys and girls in these households.

Other Variables

The season in which the diary was collected does affect child care. In summer, less time is devoted to supervisory care (a small but significantly negative effect, 16 minutes) but slightly more (statistically significant) on primary child care activities (11 minutes). This is surprising, since school is not providing the five to six hours of child care that is normal during other parts of the year for school-aged children. Structured summer activities, such as participation in sports, may help explain this pattern. Weekends are clearly different from weekdays: the effect of weekends is statistically significant across all three types of care, negative for primary care activities and social time but positive for supervisory care. On weekend days, mothers spend 38 fewer minutes on primary care, but 169 more minutes (i.e., 2.8 hours a day) on supervisory care. The extra supervisory time for children is counterbalanced by reduced social time (142 minutes = 2.37 hours a day). This may be because mothers on weekends often spend their time on other household chores. Metropolitan dwellers may spend more or less time commuting to work and traveling related to shopping, but the OLS result does not show any significant effect of residing in a metropolitan area on any types of child care.

A Closer Look at Household Structure

To examine the effects of household structure in more detail, I report the regression results for these variables for married, cohabiting, and single mothers separately in Table 1.5 (the full set of results is presented in Appendix Table A3).[9] Key variables reported in Table 1.5 are the presence of coresident adults. The effect of coresident female adult varies substantially depending on the mother's marital status. A coresident female adult actually increases married mothers' time on primary care activities, while it decreases it for single mothers. For supervisory care time, both married mothers and single mothers with coresident adults (both female and male) spend less time than those without coresident adults. As indicated above, employment of a coresident adult is probably a proxy for their ability and willingness to contribute to both child care and family income. The descriptive results in Table 1.1 show that cohabiting mothers live in households similar to those of married mothers. Yet the effect of coresident adults in Table 1.5 for cohabiting mothers is significantly different from that for married mothers. Specifically, the presence of an employed coresident male adult increases cohabiting mothers' time on supervisory care by 241 minutes (i.e. 4 hours a day), while it decreases married mothers' time by 58 minutes. One possible explanation is that employed coresident male adults in married mothers' households are grandfathers likely to help with children, while those in cohabiting mothers' households are younger kin (brothers or uncles) less likely to provide supervisory care.

[9] The Ramsey RESET test suggests no evidence of functional form misspecification.

Conclusion

In this paper, I show that past findings focusing exclusively on child care as a primary activity are incomplete and potentially misleading. Clearly, the direct activities mothers engage in with children consume far less time than fulfilling the responsibility for overseeing them and for socializing with them. Moreover, the composition of total child care time varies significantly by marital status, income, education, and race/ethnicity. The impact of marital status and race/ethnicity on non-overlapping supervisory care time and non-overlapping social time is larger than its impact on primary care activities. Indeed, primary care activities vary little across households because they likely represent activities that are physical and cultural necessities, allowing less room for discretionary choices.

Consistent with previous research, multivariate analysis shows strong and consistent associations between cultural factors (like levels of education and race/ethnicity) and primary child care time. However, the effects of these variables on supervisory care and social time are quite distinct, lending support to Annette Lareau's hypothesis that cultural values shape parenting styles. Measurement of primary care alone may lead to the misleading conclusion that white and highly-educated mothers devote more time to their children than other mothers. The results reported above show that greater time in primary care is countervailed to some extent by less supervisory care and social time.

Single mothers do not have the support for parenting from a partner that married or cohabiting mothers have. Assistance from coresident adults is particularly important for them, reducing their burden in a variety of ways. This study shows that, for most

mothers, the presence of coresident adults tends to reduce time spent on both primary activities and supervisory care but increase social time with children. It further shows that these effects are particularly large and significant for single mothers.

The amount and type of specific activities that mothers engage in with their children may be particularly relevant for children's developmental outcomes. But the time that parents spend supervising and socializing with their children deserves greater attention. As suggested in this paper, a broader definition of child care makes possible such broader considerations, yielding a better picture of contributions, by mothers, fathers, and other caregivers, to the production of future generations.

Table 1.1 Means and Percentage of Selected Characteristics by Marital Status of All Mothers with Children under 13 Years of Age (ATUS 2003-2012)

	All Mothers	Married Mothers	Cohabiting Mothers	Single Mothers
Total sample size	27896	18708	1021	8167
Total percentage	100	67	3.7	29.3
Economic Variables				
Usual Work Hours per Week	19.8	20	20.3	19.3
Employment status				
Employed full-time	41.7	41.6	40.1	42
Employed part-time	17.9	18.5	18.4	16.1
Unemployed	5	3.3	9.4	8.7
Not in the labor force	35.4	36.6	32.1	33.2
Household Income (in 10,000s)	5.6	6.6	3.8	3.4
Cultural Variables				
Education				
Less Than High School	15.1	11.8	21.5	21.9
High School Graduate	28.7	25.9	37.8	34.3
Some College, no degree	27.4	25.3	31	31.9
College Graduate and Beyond	28.8	37	9.7	11.9
Race/Ethnicity				
White (Non-Hispanic)	58.6	65.1	61.7	41.7
Black (Non-Hispanic)	13.6	7	11.5	30.3
Hispanic	21.6	21	20.6	23.1
Other (Non-Hispanic)	6.2	6.9	6.2	4.9
Demographic/Household Variables				
Living arrangement				
No coresident adults other than spouse or partner present	70.1	80.9	80.9	41.5
Adult other than spouse or partner present, one or more employed	14.5	5.7	8.8	37.1
Adult other than spouse or partner present, none employed	15.4	13.3	10.3	21.4
Number of Adults	2.3	2.2	2.3	2.2
Mothers' Age	35.6	36.7	30.2	33.8
Age of Youngest Child	4.9	4.8	3.8	5.3
Number of Children	2.1	2.1	1.9	2
Gender of Child				
Presence of a boy	66.4	67.5	64.2	64.1
No boy present	33.6	32.5	35.8	35.9
Other Variables				
Summer	82.8	82.9	77.7	83.4
Metropolitan	70.1	70.9	65.4	70.7

Note: Sample size is unweighted; percentage and means are weighted. Standard deviations provided in parentheses.

Table 1.2 Average Time Devoted to Child Care Activities and Other Types of Child Care by Race/Ethnicity of Mothers with Children under 13 Years of Age (ATUS 2003-2012, Hours per day)

	All Mothers	White	Black	Hispanic	Other Race
	(1)	(2)	(3)	(4)	(5)
Primary Child Care Activities	2.1	2.3	1.6	1.9	2.2
Supervisory Care (not-overlapped with primary activities)	7.0	7.0	6.4	7.2	7.0
Social Time	3.8	3.7	4.4	3.5	3.6
Total	12.8	13.1	12.3	12.6	12.9
Ratio of Supervisory to Primary Care Activities	3.3	3.1	4.0	3.9	3.2
Ratio of Social Time to Primary Care Activities	1.8	1.6	2.7	1.9	1.6

Table 1.3 Time Devoted to Child Care Activities and Other Types of Child Care by Employment Status of Mothers with Children under the Age of 13 (ATUS 2003-2012, Daily Hours)

	All Mothers	Full-time	Part-Time	Unemployed	Not in the Labor Force
	(1)	(2)	(3)	(4)	(5)
Primary Child Care	2.1	1.6	2.2	2.0	2.6
Supervisory Care (not-overlapped with primary activities)	7.0	5.8	6.7	7.3	8.2
Social Time	3.8	5.8	4.0	2.9	1.7
Total	12.8	13.3	12.8	12.2	12.5
Ratio of Supervisory to Primary Care Activities	3.3	3.6	3.1	3.8	3.2
Ratio of Social Time to Primary Care Activities	1.8	3.6	1.8	1.5	0.6

Table 1.4 Regression Results: Maternal Time Devoted to Different Types of Child Care (ATUS 2003-2012, Mothers 18 and over and living with at least one child under 13)

	Primary Care Activities (1)	Supervisory Care (2)	Social Time (3)
Economic Variables			
Usual Work Hours	-0.92***	-1.73***	3.59***
	(0.09)	(0.23)	(0.23)
Full-time	-20.00***	-68.69***	97.53***
	(3.99)	(9.89)	(9.96)
Part-time	-8.98***	-51.20***	51.23***
	(3.34)	(7.69)	(7.12)
Unemployed	-17.46***	-31.04***	32.59***
	(4.80)	(11.01)	(8.93)
Log(Household Income)	5.58***	-7.88**	7.06***
	(1.33)	(3.14)	(2.63)
Log(Hourly Wage)	-0.20*	-1.55***	2.28***
	(0.10)	(0.23)	(0.25)
Cultural Variables			
High School Graduate	16.53***	26.27***	-19.26***
	(3.38)	(8.19)	(6.94)
Some College	22.66***	21.22**	-12.62*
	(3.39)	(8.55)	(7.33)
College and Beyond	46.72***	31.13***	-31.76***
	(3.83)	(8.83)	(7.48)
Black (Non-Hispanic)	-23.24***	-8.95	11.47*
	(2.99)	(7.34)	(6.59)
Hispanic	-18.94***	19.76***	0.91
	(2.63)	(6.24)	(5.60)
Other Race	-6.51	6.9	1.86
	(4.16)	(8.62)	(7.49)
Demographic and Household Variables			
Single	-3.18	-58.61***	43.13***
	(2.60)	(5.90)	(5.07)
Coresident Female Adult	-25.98***	-52.35***	44.83***
	(5.20)	(13.81)	(11.38)
Coresident Male Adult	-29.69***	-59.11***	33.10***
	(3.19)	(7.93)	(6.31)
Employed Coresident Female Adult	-48.72***	-100.73***	70.04***
	(5.06)	(13.79)	(13.26)
Employed Coresident Male Adult	-52.57***	-163.74***	101.71***
	(4.30)	(10.77)	(9.39)
Mother's Age	-0.38***	-1.47***	-0.67***
	(0.10)	(0.27)	(0.24)
Number of Children	7.96***	7.66***	-1.87
	(1.08)	(2.35)	(1.93)
Age of Youngest Child	-9.81***	-4.49***	5.89***
	(0.26)	(0.62)	(0.59)
Presence of Boy	1.73	-1.64	-2.88
	(1.96)	(4.52)	(3.93)

(continued)

Table 1.4 (Continued)

	Primary Care Activities (1)	Supervisory Care (2)	Social Time (3)
Other Variables			
Summer	11.30***	-14.99**	2.92
	(2.44)	(5.84)	(4.80)
Weekend	-38.38***	169.33***	-141.88***
	(1.69)	(4.04)	(3.40)
Metropolitan	6.71**	-14.83**	-1.16
	(2.61)	(5.91)	(5.10)
Constant	153.23***	630.15***	34.11
	(14.10)	(33.08)	(28.08)
N	27896	27896	27896
R-squared	0.222	0.204	0.31

Note: Year dummies were included in the analysis but not reported.

For zero hourly wage, 1 is added to hourly wage (1cent) to avoid the unspecification of logarithm of zero wage. See Appendix Table A2 for robustness check with smaller numbers.

Standard errors are presented in parentheses.

$p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 1.5 Regression Results: Time Devoted to Different Types of Child Care by Marital Status (ATUS 2003-2012, Mothers 18 and over and living with at least one child under 13)

	Married			Cohabiting			Single		
	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time
Coresident Female Adult	25.03***	-57.84***	40.15**	71.04	241.66***	-206.84	-28.66***	-68.09***	56.78***
	(9.36)	(21.57)	(16.35)	(111.23)	(89.54)	(135.41)	(5.13)	(13.88)	(11.93)
Coresident Male Adult	-22.74***	-39.03***	13.55*	-42.66***	-67.45*	22.66	-40.87***	-83.18***	60.71***
	(4.01)	(9.48)	(7.20)	(14.26)	(39.41)	(32.48)	(5.23)	(15.25)	(12.94)
Employed Coresident Female Adult	-39.27***	-102.50***	100.60***	-31.17	9.93	17.54	-50.67***	-96.47***	60.42***
	(10.03)	(23.43)	(24.73)	(22.06)	(48.54)	(46.61)	(5.76)	(16.81)	(15.89)
Employed Coresident Male Adult	-32.27***	-114.37***	55.45***	-32.76	-112.91*	-34.6	-53.40***	-179.47***	116.66***
	(8.73)	(20.46)	(14.99)	(25.53)	(58.72)	(42.55)	(4.99)	(12.81)	(12.14)
N	18,708	18,708	18,708	1,021	1,021	1,021	8,167	8,167	8,167

Note: Standard errors are presented in parentheses.
p<0.05, ** p<0.01, *** p<0.001

CHAPTER 2

MEASURING THE "SANDWICH": CARE FOR CHILDREN AND ADULTS IN THE AMERICAN TIME USE SURVEY 2003-2012

Introduction

As age at first birth has increased, along with life expectancy, the probability that adults will face responsibilities for care of both young children and elderly parents has increased. So-called "sandwich" caregivers tend to care for both young and old family members in need of assistance. The term can also be applied to those caring both for children and for adults who are suffering from illness or disability, regardless of age. Time-use surveys such as the American Time Use Survey (ATUS) have considerable potential to help measure the economic burden of sandwich care. Unfortunately, this potential has been limited by conceptual inconsistencies, which have led to serious measurement problems. As a result, it is difficult to accurately assess the amount of time devoted to sandwich care on a given day or to calibrate estimates of daily care demands with estimates of the frequency of assistance provided over a longer time period.

This essay explores these measurement problems, showing that they reflect failure to clearly conceptualize the temporal burden of care and to distinguish types of care that involve personal interaction from those that do not. Next, it develops a strategy for working around these problems, offering upper- and lower-bound estimates of average time devoted to sandwich care in the U.S. based on the ATUS. These alternative estimates have important implications for assessing the relative burden of care for children and adults and the relative contributions of women and men. Many of the

insights that emerge from this empirical exercise are relevant to surveys regarding assistance of adults with Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). The construction of a simple cross-walk between time-use and other types of surveys offers a promising strategy for improved measurement. The essay concludes with an emphasis on the need for improved survey design.

The Temporal Burden of Care

Care for family members in need of assistance is time-consuming and potentially costly, often leading to rearrangement of employment schedules, unpaid leaves, or even exit from the labor force (Bianchi et al., 2006; Wolf and Soldo, 1994). Women take on disproportionate responsibility for child care and adult care regardless of their employment status (Moen et al., 1994; Bianchi, 2000). One study shows that approximately 66 percent of family caregivers are women (National Alliance for Caregiving in collaboration with AARP, 2009). Another study focusing on the characteristics of elder caregivers by Stone et al. (1987), based on the 1982 National Long-Term Care Survey (NLTCS), shows that a majority (71.5 percent) is female. Mothers are far more likely than fathers to withdraw from the labor force or reduce their hours of work to provide care to a family member (Craig, 2006; Reynolds and Aletraris, 2007).

The relative number of individuals who are both raising children and caring for parents has grown as baby boomers advance toward the threshold of old age. The fertility rate for baby boomers is about or less than 2 children, compared with rates of between 2.4 and 3.6 children for their parents' cohorts (Spillman and Pezzin, 2000). Additionally,

as life expectancy increases, more middle-aged people have parents who are still alive. The size of the sandwich generation depends on how one defines it. Henretta et al. (2001) defines the sandwich generation as women ages 55 to 63 (born between 1931 and 1941) living with both children and her parents. Between 32 and 37 percent of women between the ages of this group have both living children and at least one living parent, with highly educated women (more than 12 years of education) more likely than women with less education (less than 12 years of education) to meet this criterion (Henretta et al., 2001).

Care demands are shaped by the age of care recipients. The temporal demands of child care are relatively predictable, and typically decline as children age. The temporal demands of adult care are less predictable.[10] The aging process affects individuals quite differently, often leading to episodic health problems, but also involving chronic conditions that tend to worsen over time. But age is not the only factor determining care needs. About half the adults in the U.S. needing assistance who are living outside institutions in the U.S. are non-elderly (Kaye et al., 2010).

While many time-use researchers have sought to measure the temporal demands of care for children and adults needing assistance due to aging or disability, all acknowledge serious measurement problems (Bianchi et al., 2006; Folbre et al., 2005; Folbre and Wolf, 2012). Like many other time-use surveys, the ATUS fails to distinguish between time spent caring for elderly adults and those with non-age-related disabilities (Budlender, 2008:6).[11] Further, time-use surveys typically sample only one day in the

[10] I use the term "adult" rather than "elderly person" or "frail elderly" because the ATUS does not distinguish between care for different types of adults.

[11] One exception is the special module on elder care (2011 Elder Care Module in ATUS). The module asks more detailed questions about elder care recipients including the age of elder care recipient, the relationship to caregiver, the type of residence (household vs. non-household), and duration of care for the elderly.

year, yet the demands of adult care are often distributed very unevenly throughout an even longer time period. As a result, individuals currently providing care to adults are almost certainly under-sampled relative to adults currently providing care for children.

More serious measurement problems derive from conceptual ambiguities. Much of the time-use literature focusing on care emphasizes the distinctions among interactive care activities involving personal and often emotional contact, supervisory care or "on-call" responsibilities, and support care activities such as housework that develop and maintain an environment for interactive care (Albelda et al., 2009; Allard et al., 2007; Bianchi et al., 2006; Folbre, 2012). Even though supervisory and supporting care tasks may be performed outside the immediate presence of a care recipient, they are often customized to that recipient's special needs. In many ways the distinction between interactive care and support care echoes the distinction between two categories used in surveying episodes of care. The category of "Assistance with Activities of Daily Living" (ADLs) entails help with essentially personal activities such as eating, using the bathroom, and getting dressed. The category of "Assistance with Instrumental Activities of Daily Living" (IADLs) entails less personal activities such as shopping and paying bills. Table 2.1 lists a standard designation of activities.

Lack of attention to these conceptual nuances often leads to operational differences in the definition of time devoted to care. Most empirical research focuses on interactive care activities, which are defined fairly consistently for the care of children and adults. Some small anomalies, however, are apparent even in this category. For instance, activities related to education such as homework and home schooling are more relevant to children than adults. Leisure-related activities also differ. "Playing with

children" is considered a form of child care, but there are no categories of "playing" with adults.

The boundary between leisure and adult care is difficult to identify. Engaging in social interaction with adults who would otherwise feel isolated probably represents an important aspect of emotional care, but is not coded as such in the ATUS. Some surveys of elder care in particular, such as the National Health and Nutrition Examination Survey (NHANES), explicitly ask respondents ask about difficulty with attending movies, or sporting events, participating in social activities (visiting friends or going to parties); and doing things to relax at home or for leisure (reading, watching TV, sewing, listening to music).

More serious problems concern the treatment of supervisory and support care, especially in combination with distinctions between care for household and non-household members. Supervisory care, sometimes termed "on call" time, describes a responsibility rather than an activity, but may seriously constrain a caregivers' ability to engage in paid employment or other productive activities (Bianchi, 2006; Budig and Folbre, 2004; Folbre, 2012; See more extensive discussion of supervisory care in Suh, 2013). Researchers now widely acknowledge the significance of supervisory care of children, but often overlook supervisory care of adults, although this can be extremely demanding for family members with severe mental or physical disabilities (Folbre and Yoon, 2007a; Folbre, 2012; Moore et al., 2001).

The ATUS asks respondents to report the amount of time that a child under the age of 13 was "in your care," tabulating this as "secondary child care."[12] There is no

[12] More details of table available at http://www.bls.gov/news.release/atus.t10.htm.

corresponding question for adult care.[13] Yet long-term care researchers focusing on the elderly and individuals with disabilities observe that "supervisory help" is both time-consuming and likely to be under-reported by family members (Levine, 2004). One effort to address this problem is a Caregiver Vigilance Scale that asks caregivers to assess subjective and temporal burdens in addition to ADL assistance and IADL assistance. The Caregiver Vigilance Scale has been widely applied in health-related research, because of its relevance to treatment of those suffering from Alzheimer's disease or related disorders (Carr, 1997; Gitlin et al., 2003; Mahoney, 2003). (For a more detailed description of the "Caregiver Vigilance Scale," see Appendix B, p.102.)

Supervisory care for adults has not, however, received much attention in the social science or time-use literature, and this creates difficulties for calculation of sandwich care demands. In principle, supervisory care for children should be included in a measure of temporal burden. However, lack of a parallel category for supervisory care of adults who are suffering from illness, disability, or simple frailties of old age understates the burden of care for adults relative to care for children when this larger definition is applied.

Support care activities are those that may not involve direct interaction but set the stage, in a sense, for interactive care. Time-use researchers seldom include support care in measures of total time spent on children because there are no questions asking "who for" in time-use surveys. Stylized surveys of care activities, on the other hand, take a more inclusive approach, often ignoring the distinction between interactive and support care. Asked how many times in the previous month or year they provided "care" for an

[13] Among its categories of primary adult care, the ATUS data includes "looking after adults." However, it is recognized as a primary activity, rather than as a "supervisory activity," as described in child care.

elderly parent, most respondents would probably include both types of activities – preparing meals or running errands as well as feeding or bathing.

In a sense, housework and household organization represent public goods that benefit all household members. When an adult lives in a separate household, however, it is easier to identify the specific beneficiary of assistance with these activities. Perhaps for this reason, the ATUS explicitly measures support care for adults living in separate households—such as preparing their meals, doing their laundry, or mowing their lawn. The same activities conducted on behalf of a resident adult, however, are not explicitly measured.

Two coding categories are relevant: Caring for Household Adults (or Non-Household Adults) and Helping Household Adults (or Non-Household Adults). The list of sample activities for helping household adults implies that such adults are dependent, while the list of activities for non-household adults includes a much longer list of activities that includes housework and related activities. In other words, it appears that "support care" such as housework or help with Instrumental Activities of Daily Living (IADLs) is not separately tallied for household adults, but is separately tallied for non-household adults. Surveys of frequency of assistance show that most help with IADLs comes from non-household rather than household caregivers. For instance, non-household caregivers provide more of the help with "getting around outside" travel beyond walking distance, and financial management tasks (Wolf, 2001).

These apparently minor differences in activity code can have significant implications for the measurement of the temporal burden of sandwich care. Men may be likely to provide support care for a non-household adults, such as running errands or

doing yard work. Women may be even more likely to provide support care for household adults that is not distinguished from the larger category of household support work (Folbre, 2012). If 'Helping Non-Household Adults' is included in a measure of adult care, this definitional inconsistency distorts the picture, making it appear that men provide a greater percentage of elder care than would be the case if support care were treated consistently when provided in one's own household as well as in another.

A final measurement issue concerns lack of consistency between the activities and responsibilities coded in the ATUS and those applying list-based measures such as ADLs and IADLs. Many U.S. surveys, including the Health and Retirement Study (HRS), Longitudinal Study of Aging (LSOA), and the National Long-Term Care Survey (NLTCS), ask respondents to report the number of episodes in which they provided help to a family member or other person. These categorical lists are also widely applied in assessments of need for institutional assistance, such as nursing home care. Yet these lists do not include any explicit consideration of the amount of time devoted to specific forms of assistance.

Surveys of elder care in particular focusing on ADLs and IADLs are extremely varied in their wording. For instance, some surveys ask about ADLs or IADLs separately, while others group them together into just one or two global questions. The Health and Retirement Survey (HRS) asks separately about the basic six ADL activities (dressing, walking across a room, bathing or showering, eating, getting in or out of bed, and using the toilet, including getting up and down). On the other hand, the National Health Interview Survey (NHIS) asks a single question about ADLs. The activity-by-activity approach used in the HRS gives caregiver respondents more chances to report their

caregiving burdens, and might therefore generate more reports than the global approach taken by the NHIS. Efforts to cross-walk and calibrate these different measures have had limited success (Wiener et al., 1990; Freedman et al., 2004).

Other forms of variation further complicate the picture. Some surveys ask about difficulty with the performance of activities, others about difficulty with respect to the capacity to perform these activities, others whether respondents receive help or use equipment to carry out such activities. For example, the HRS asks "[b]ecause of a health or memory problem do you have *any difficulty* with _____," whereas the NHIS question asks whether "you need the help of other persons with _____" (Blank should be filled with specific activities by HRS or the sum of the global approach by NHIS). More people are likely to report having "any difficulty" than are likely to report "needing help" (Freedman et al., 2004).

Time-use surveys have the potential to complement surveys of care episodes, and vice versa. While the ADL-IADL measures are sufficient for some caregiving assessments, they do not address the scope and complexity of many caregivers' responsibilities. These include medical tasks, coordination with care recipients, and management tasks, which are activities often overlooked by long-term-care researchers (Levine, 2004). Also, caregivers do not always think of what they do in terms of ADLs and IADLs. Rather, they do whatever needs to be done. As a result, a list-based measure can lead to underestimates of the total work that they perform.

In sum, efforts to measure the temporal burden of care for children and adults needing assistance suffer from a variety of methodological limitations. Definitions of what constitutes unpaid care vary between child care and adult care even within the same

survey; variation across different types of surveys is also problematic. Nonetheless, careful analyses of the ATUS, sensitive to the problems outlined above, offer some insights into the relative burdens of child care and adult care and how these are distributed between men and women.

Data and Methods

My analysis of the temporal burden of sandwich caregiving based on the ATUS asks four questions: 1) What are the implications of different definitions of care for the assessment of the relative share of adults engaged in sandwich care on a given day? 2) Given the definitional ambiguities, what are reasonable lower-and upper-bound estimates of the relative share of adults engaged in sandwich care and the average amount of time they devote to such care? 3) What are the implications of these estimates for consideration of the relative burden imposed by child care and adult care, and the relative burden on women and men caregivers? 4) How do these estimates of the amount of time devoted to care compare with estimates based on stylized surveys inquiring about episodes of assistance with ADLs and IADLs?

The American Time Use Survey 2003-2012 (ATUS) is a nationally representative survey that collects information on how non-institutional individuals in the United State aged 15 and over spend their time during a representative day (the day of survey). The information on how individuals use their time is collected in phone interviews during which respondents sequentially describe each of their main activities, along with the duration of activity, and start and end times. Each of these activities is subsequently

coded into one of over 400 detailed activity categories. Interviews were conducted every day except for few major holidays like Thanksgiving Day and Christmas Day.

This essay focuses on sandwich caregivers, individuals aged 18 and over who spend some time on child care and adult care during survey day. The estimates are reported across gender and age groups (18-24, 25-44, 45-64, 65 and over). Analysis samples include 3,669 female caregivers and 1,819 male caregivers in data pooled over the 2003-2012 period. As emphasized above, definitions of both child care and adult care vary, both within the ATUS and between the ATUS and stylized surveys of care episodes. Hence, a range of estimates based on different definitions, including a lower-bound and an upper-bound, provides a more reliable picture than a single estimate. I use the ATUS sample weights throughout the analysis. Weighting is necessary to correct for the stratification of the sample and for differential response rates across groups.[14]

This analysis classifies child care into two categories: interactive child care and supervisory child care. Interactive child care includes four different types of activities: physical care (feeding, bathing, etc.), developmental care (talking to or reading aloud to children), managerial care, and traveling associated with interactive child care activities (including waiting for children at the doctors' office). I categorize the amount of time reported in response to the question, "whether your child was in your care?" as supervisory care, distinguishing it from interactive child care activities. I only consider supervisory care that is not overlapped with interactive child care to avoid double counting. A detailed list of ATUS categories in child care and adult care is provided in Appendix Table B1.

[14] The American Time Use Survey User's Guide by Bureau of Labor Statistics (2014) provides more details on sampling and weighting procedures (2014).

Interactive care for adults consists of three activities: those activities coded as caring, helping, and traveling related to caring and helping. As discussed previously, "helping" activities for adults are treated differently for household adults and non-household adults, unlike interactive activities for children, which list the same activities for both household children and non-household children. While activities listed under "helping" for household adults include organizing or planning for adults, "helping" for non-household adults includes housework, cleaning, cooking, and so on, similar to support care. As discussed earlier, ATUS does not, unfortunately collect data on supervisory care for adults needing assistance.

I include consideration of support care, such as housework that helps create and maintain an environment for interactive care, along with other types of care, for individuals who engage in interactive or support care. In the absence of a question asking "for whom" an activity was conducted, there is no way of identifying the specific beneficiary. Indeed, people living alone devote substantial time to "support care" for themselves. In estimating support care I assume that this has substantial public good characteristics, divide the total by the number of household members to arrive at a per capita measure, and subtract this per capital measure from the total to exclude support care that could be construed as personally benefiting the caregiver.

In order to provide comparability with stylized surveys based on ADLs and IADLs I break out detailed activity descriptions from the ATUS that resemble these. As aforementioned, the distinction between ADLs and IADLs resembles the distinction between interactive care and support care that is often made in the time-use literature.

However, ADLs and IADLs have traditionally been applied only to adult care, not child care.

While the match between ADLs and IADLs and ATUS categories is an approximate one, it provides at least some comparability across different types of surveys. (For details of the cross walk, see Appendix Table B2). The exercise reveals that family caregiving involves complex activities embedded in but not conventionally captured by ADL/IADL measures. For instance, the time devoted to travel as an IADL category is accurately measured in ATUS, whereas other categories of IADLs are only loosely matched with ATUS activities. Beyond ADL/IADL measures, caregivers engage in monitoring and supervising the care recipient's behaviors; managing and organizing paid care services; managing medical equipment and providing skilled nursing care; and so on. Especially for child care, care time devoted to children's education for development, which is omitted in interactive adult care activities, is included.

Results

The analysis begins by examining measures of participation in unpaid care for children and adults generated by pooling data from 2003 – 2012 ATUS. Table 2.2 shows the percentage engaging in caregiving by gender and age group for seven different definitions of caregiving (from non-sandwich caregivers to the most expansive definition of the sandwich caregivers). Panel 1 focuses on interactive child care, revealing gender and age differences similar to those reported elsewhere. Women ages 25-44 years make up the prime child care age group, and 62.6 percent of those engaged in interactive child care activities, whereas only 7 percent of women aged 65 and over engaged in interactive

child care. For men, those in the prime age for child care (25-44) engaged in child care the most (40.5 percent), while men aged 65 and over engaged in the least (5.2 percent). In every age category, women are more likely to provide child care than men.

Panel 2 shows that participation in any interactive adult care (broadly defined to include helping a non-household adult) follows a very different pattern. Women in every age group except 65 and over are more likely to engage in child care than adult care. But men in two age groups – the 18-24 category as well as the 65 and over category – are more likely to provide adult than child care. Further, the gender differences in adult care are much smaller than those in child care. In both the youngest and the oldest age group men are more likely than women to provide care for an adult. Further, men in the 25-44 and 45-64 age groups are almost as likely as women to provide adult care.

Panel 3 shows the percentage of women and men who engaged EITHER in child care or adult care on the diary day. Note that these percentages do not equal the sum of the percentage engaging in any child care and any adult care, because of overlaps. That is, a number of women and men engaged in both types of care activity on the diary day. These results are interesting primarily because they show that a relatively high percentage of men as well as women are providing at least one form of care on a given day, ranging from a low of 17.3 percent for men 65 and over to a high of 67 percent for women ages 25-44.

Panel 4 offers a definition of sandwich caregivers based only on interactive care, tallying the percentage of individuals who engaged in both child care *and* adult care on a diary day. By this definition, the overall share of sandwich caregivers appears relatively small, ranging from a high of 7.8 percent among women aged 25-44 to lows of 1 percent

for both women and men 65 and over. Among men aged 25-55 almost 5 percent (4.8 percent) could be characterized as sandwich caregivers on a given day. However, as Panel 5 demonstrates, the percentages are much lower when "helping a non-household adult" is excluded from the definition. A noticeable reduction is apparent for every gender/age group.

Panels 1-5 all ignored supervisory care for children under the age of 13. Inclusion of this form of supervisory care has a huge impact on the percentage engaged in either child or adult care, as can be seen from a comparison of Panel 6 with Panel 3. The percentage of women providing some form of care (when supervisory care is included) exceeds 50 percent for two age groups, and is remarkably high (at 77.2 percent) for women aged 25-44. The percentage of men aged 25-44 providing at least one form of care is also very high, at 62.5 percent.

Panel 7 shows the implications of including supervisory care for children in a definition of sandwich care. The percentages caring for both a child and an adult on the diary day are greater for every gender/age category, compared to Panel 4. They are highest for women aged 25-44, at 8.9 percent; second highest for women aged 18-24, at 7.2 percent, and third highest for men aged 25-44, at 6.5 percent.

An assessment of the relative temporal burden of sandwich care requires an analysis of differences in the average amount of time devoted to care for both children and adults. Table 2.3 shows differences in means among those who provided at least some kinds of care on a diary day, and those who provided sandwich care. Regardless of how sandwich care is defined, it involves greater temporal burdens than simply providing at least one form of care. Panel 2 compares sandwich caregivers, defined only in terms of

interactive child care and adult care, with those who provided at least some care. Not surprisingly, women ages 45-64 devote more time on average to this form of sandwich care—3.3 hours. Yet there is less variation across gender and age in Panel 2 than in Panel 1, suggesting that when "dual responsibilities" are incurred, their temporal demands are great regardless of the caregivers' demographic characteristics.

Panel 3 shows the consequences of excluding the activity category "helping a non-household adult" compared to Panel 2. Interestingly, this exclusion, which had a noticeable impact on the percentage engaged (see Table 2.2) has only small implications for the mean amount of time devoted to sandwich care. While the difference for men 65 and over amounts to 0.6 hours, the difference for other age/gender categories is never greater than 0.2 hours. Panels 4 and 5 extend the comparison to include supervisory care for children, comparing those who provided care for both. As with the comparison between panel 2 and 1, it is apparent that sandwich caregivers devote far more time to care. For women in the age category 25-44, the average time reaches 10.9 hours per day, compared to 9.7 hours for those who engaged in one or the other. By this definition, sandwich caregivers truly shoulder a significant burden. Even the sandwich caregiver group with the lowest mean, men aged 65 and over, spent 4.9 hours per day, on average, in care provision. It is important to note, as aforementioned, that this estimate does not include supervisory care for adults, which could represent a significant responsibility for both women and men in this age group engaged in spousal care.

Assessment of the relative burden of child care and adult care for sandwich caregivers requires disaggregation by the age of care recipient. Table 2.4 shows the relative burden of child care and adult care across differently defined sandwich

caregivers, following the same sequence as Table 2.3 (note that Panels 1 and 4 include overlaps between child care and adult care, so the percentage engaged in both is not equal to the sum of the percentage engaged in either). Panel 2 in Table 2.4 represents what might be termed a "conventional" definition of sandwich caregiving: those who engaged in both interactive child care and adult care. For both women and men, both the frequency of engaging in child care and the average amount of time devoted to child care exceed the corresponding estimates for adult care. This is true even for men and women aged 65 and over, perhaps attesting to the important role of grandparental responsibilities.

Also noteworthy are the gender differences among sandwich caregivers as defined in Panel 2. Conditional on fitting these sandwich criteria, men and women are more similar in both probability and level of engagement. Consistent with earlier discussion, men who are sandwich caregivers are more likely than women to be providing adult care, and mean levels of care provided are quite similar. As Panel 3 indicates, exclusion of the category "helping a non-household adult" tilts both the percentages and levels more toward child care, and away from adult care. In other words, this exclusion has very important implications for the assessment of the relative burden of children and adults on sandwich caregivers. Since doing household chores or helping with instrumental activities of daily living for children (i.e., support care for children) is generally not considered child care, this exclusion improves consistency of comparison between care for the two age groups.

Panel 4 and 5 demonstrate the effect of including supervisory child care on the relative burden of children and adults among sandwich caregivers defined in these terms. An inclusion of supervisory care further tilts the distribution of care among sandwich

caregivers toward children. More than 50 percent of those in most of age/gender category engage in supervisory care. A noticeable difference between Panel 4 and 5 is that men and women double their time on adult care even though fewer are engaged in adult care activities.

In order to summarize the challenges posed by definitional differences, Table 2.5 provides lower-, middle-, and upper-bound estimates of participation in child care and adult care and the relative burden imposed by child care and adult care. The lower bound is defined by participation in interactive child care and interactive adult care excluding "helping a non-household adult" activities. The middle bound drops this exclusion. As can be seen from Table 2.5, this has a large effect on the percentage of both women and men (in every age group) who are defined as sandwich caregivers, but has only a small effect on the means. The upper bound includes supervisory care as a criterion for participation, and adds both supervisory care and an estimate of support care within the household to the estimates of mean hours. Participation rates are uniformly higher for all age and gender groups. Most striking, however, is the increase in mean hours per day, which reaches 10.9 for women aged 25-44 and 8.2 for men aged 25-44.

In sum, if "care" is defined narrowly as engagement in interactive child care and adult care, relatively few adults—less than 3.5 percent, even for those in the prime caregiver group of women aged 25-44—are providing care and they are devoting between 2.1 and 3.3 hours to these activities on a diary day. If "care" is defined broadly to include supervisory responsibilities and support care (if provided by those engaged in interactive or supervisory child care and interactive adult care), both participation rates and means are far higher. The percentage of those aged 25-44 who could be described as

sandwich caregivers on the diary day rises to 8.9 percent for women and 6.5 percent for men. The mean hours for every group except for those 65 and over amount to more than 6 hours per day. This implies a weekly average of more than 40 hours a week, that is, more than a full-time job, as conventionally defined.

Ideally, estimates of the average daily burden of sandwich care would be combined with estimates of the distribution of care episodes over time. As aforementioned, adult care in particular is likely to be distributed less evenly throughout the year than child care. In order to increase comparability between time-diary estimates and estimates based on surveys of assistance with ADLs and IADLs, I use the crosswalk between these two approaches described earlier to estimate time in specific IADLs (ADLs cannot be disaggregated from ATUS codes) in Table 2.6.

For activities like housework, including doing laundry and meal preparation as IADL categories, there are no questions asking "who for" in the ATUS. In order to adjust for this weakness and estimate the amount of IADL work that can be attributed to children or adults needing assistance, I divide the average time devoted to housework, meal preparation, and shopping by the number of total household members (per capita hours). I then multiply those by number of children in the household and by number of household adults (except for oneself) in the household. Both women and men spend more time devoted to ADLs and IADLs for children than for adults. In general, men make larger relative contributions to IADL time than to ADL time. Overall, the results in Table 2.6 suggest that IADLs are far more time-consuming than ADLs, though this may partly reflect lack of disaggregation in the activity codes. It is worth noting, again, that the supervisory demands of adult care are not explicitly included in either measure.

Finally, I use this method of assigning average time use to compare time devoted to ADLs and IADLs as measured by the ATUS with those provided by stylized surveys (see Table 2.7). Weekly hours devoted to ADLs and IADLs are calculated by daily hours of ADLs and IADLs multiplied by 7. The 1994 Health and Retirement Survey (HRS) indicates that among active caregivers (those who provide at least some hours of elderly care) the average number of care hours per week is 19.4 (Amirkhanyan and Wolf, 2003). The 1996 Survey of Income and Program Participation (SIPP) reports that those who provide unpaid care or assistance to someone with long-term illness or disability during the past month spend on average 24.2 hours per week (Alecxih et al., 2001). The 1997/1999 National Longitudinal Survey of Young Women (NLSYW) reports that the female-sandwiched generation between the ages of 45 and 54 who at least spend some time to care for children and parents devote 49.2 hours per week to unpaid care. One reason for this comparatively high estimate by NLSYW may be that the caregivers are limited to females in prime sandwich caregiving ages.

The 2002 HRS (Johnson and Schaner, 2005) exhibits the lowest estimate of average caregiving hours to grandchildren and parents/spouse (11.2 hours per week) because caregivers report the number of hours they had spent on caregiving over a two-year period rather than to estimate the hours spent in a "typical" or "usual" week.[15] The 2009 NAC/AARP, on the other hand, estimates typical hours spent on caregiving for those who are aged 18 and over and spend some time on care for any child (<18) and relative or friend (18+) in the last 12 months.

[15] SIPP and NAC/AARP studies estimate the hours spent in a "typical" or "average" week.

For comparison with these surveys, I generate estimates of time devoted to care from the ATUS that are as consistent as possible with these sources. Differences in the time period covered also limit comparability. In some cases, notably comparisons with the 1994 Health and Retirement Study and the 2009 National Alliance for Caregiving survey, the estimates from these very disparate sources are quite similar. In other cases, such as the 2002 Health and Retirement Survey and the 1996 Survey of Income and Program Participation, they vary by more than 100 percent. Clearly, further efforts to improve consistency of estimates across these surveys are required.

Conclusion

The need for accurate measures of sandwich care responsibilities grows out of practical concerns as well as research priorities. Consistent measures could help assess the consequences of sandwich care, which may well include a significant reduction in market income, especially for women.

The dual burden of care for young children and adults needing assistance is difficult to assess using existing data sources. My analysis offers three important contributions. First, it highlights measurement problems related to differences in the definition of care activities. Second, it shows that, despite these problems, analysis of the American Time Use Survey provides useful comparisons of the temporal burden of combined child care and adult care and the distribution of this burden between women and men. Third, it shows how data from the ATUS can be used to both compare and calibrate results from stylized surveys based on questions regarding assistance with

Activities of Daily Living or Instrumental Activities of Daily Living. All these contributions have important implications for the design of future surveys.

Table 2.1 List of Activities in Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs)

ADLs	IADLs
	Light housework, heavy housework, or work around the
Bathing or showering	house or yard
Dressing	Doing laundry
Eating	Preparing meals
Getting in and out of bed	Shopping for groceries or personal items
Using the toilet	Making phone calls or using telephone
Getting around inside or walking across a	
room or walking	Taking or managing medication
	Managing money
	Get around outside/go places outside of walking
	distance

Note: Measures of ADLs and IADLs vary by surveys. However, I take the common ADL and IADL activities in following surveys: Health and Retirement Study (HRS), National Health Interview Survey (NHIS), National Long-Term Care Survey (NLTCS), and Survey of Income and Program Participation (SIPP).

Table 2.2 Participation on Interactive Child Care and Adult Care, by Gender and Age of Unpaid Caregivers (ATUS 2003-2012)

	Interactive Child Care		Interactive Adult Care		Total Interactive Care (for Children and Adults)	
	Women	Men	Women	Men	Women	Men
	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day
Panel 1: Individuals 18 and over who engaged in any interactive child care						
Age of Caregivers						
18 – 24	35.7%	11.8%				
25 – 44	62.6%	40.5%				
45 – 64	23.5%	17.3%				
65 and over	7.0%	5.2%				
Panel 2: Individuals 18 and over who engaged in any interactive adult care						
Age of Caregivers						
18 – 24			16.2%	18.5%		
25 – 44			12.2%	11.6%		
45 – 64			15.2%	12.3%		
65 and over			11.6%	13.2%		
Panel 3: Individuals 18 and over who engaged in any interactive child care or interactive adult care						
Age of Caregivers						
18 – 24					46.2%	27.8%
25 – 44					67.0%	47.2%
45 – 64					34.9%	27.0%
65 and over					17.6%	17.3%

(continued)

Table 2.2 (Continued)

	Interactive Child Care		Interactive Adult Care		Total Interactive Care (for Children and Adults)	
	Women	Men	Women	Men	Women	Men
	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day	Engaged in Activity on Diary Day
Panel 4: Individuals 18 and over who engaged in any interactive child care and interactive adult care						
Age of Caregivers						
18 - 24					5.7%	2.5%
25 - 44					7.8%	4.8%
45 - 64					3.8%	2.6%
65 and over					1.0%	1.0%
Panel 5: Individuals 18 and over who engaged in any interactive child care and interactive adult care except for "helping a non-household adult"						
Age of Caregivers						
18 - 24					2.1%	0.8%
25 - 44					3.3%	2.2%
45 - 64					1.5%	1.3%
65 and over					0.3%	0.4%
Panel 6: Individuals 18 and over who engaged in any child care (interactive or supervisory) or interactive adult care						
Age of Caregivers						
18 - 24					54.7%	35.9%
25 - 44					77.2%	62.5%
45 - 64					40.9%	34.6%
65 and over					19.7%	19.5%
Panel 7: Individuals 18 and over who engaged in any child care (interactive or supervisory) and interactive adult care						
Age of Caregivers						
18 - 24					7.2%	3.8%
25 - 44					8.9%	6.5%
45 - 64					4.7%	3.6%
65 and over					1.3%	1.3%

Table 2.3 Mean Daily Hours Devoted to Interactive Child Care (and Supervisory Care) and Adult Care, by Gender and Age of Sandwich Caregivers (ATUS 2003-2012, Hours per day)

	Women	Men
	Mean Hours per Day Provided by Those Engaged in Activity	Mean Hours per Day Provided by Those Engaged in Activity
Panel 1: Individuals 18 and over who engaged in any interactive child care or interactive adult care		
Age of Caregivers		
18 - 24	2.1	1.5
25 - 44	2.6	1.9
45 - 64	1.9	1.7
65 and over	1.7	1.8
Panel 2: Individuals 18 and over who engaged in any interactive child care and interactive adult care		
Age of Caregivers		
18 - 24	3.2	2.5
25 - 44	3.3	2.7
45 - 64	2.8	2.8
65 and over	2.9	2.7
Panel 3: Individuals 18 and over who engaged in any interactive child care and interactive adult care except for "helping a non-household adult"		
Age of Caregivers		
18 - 24	3.3	2.3
25 - 44	3.2	2.6
45 - 64	2.6	2.6
65 and over	2.8	2.1
Panel 4: Individuals 18 and over who engaged in any child care (interactive or supervisory) or interactive adult care		
Age of Caregivers		
18 - 24	7.1	3.7
25 - 44	9.7	6.7
45 - 64	5.4	4.7
65 and over	3.5	3.0
Panel 5: Individuals 18 and over who engaged in any child care (interactive or supervisory) and interactive adult care		
Age of Caregivers		
18 - 24	8.8	6.5
25 - 44	10.9	8.2
45 - 64	7.1	6.7
65 and over	5.7	4.9

Table 2.4 Disaggregation of Total Unpaid Care into Child Care and Adult Care by Gender and Age of Unpaid Caregivers (ATUS 2003-2012, Hours per day)

	Interactive Child Care				Interactive Adult Care				Supervisory Care			
	Women		Men		Women		Men		Women		Men	
	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity
Panel 1: Individuals 18 and over who engaged in any interactive child care or interactive adult care												
Age of Caregivers												
18 - 24	69.1%	1.6	37.7%	0.7	43.1%	0.5	70.3%	0.8				
25 - 44	91.8%	2.3	81.3%	1.5	20.1%	0.2	29.0%	0.4				
45 - 64	61.7%	1.2	58.8%	1.0	49.4%	0.7	49.9%	0.8				
65 and over	37.8%	0.7	31.4%	0.6	68.4%	1.0	74.7%	1.2				
Panel 2: Individuals 18 and over who engaged in any interactive child care and interactive adult care												
Age of Caregivers												
18 - 24	64.0%	2.0	60.5%	1.5	36.0%	1.1	39.5%	1.0				
25 - 44	68.7%	2.3	59.4%	1.6	31.3%	1.0	40.6%	1.1				
45 - 64	61.9%	1.7	56.6%	1.6	38.1%	1.1	43.4%	1.2				
65 and over	59.5%	1.7	56.3%	1.5	40.5%	1.2	43.7%	1.2				
Panel 3: Individuals 18 and over who engaged in any interactive child care and interactive adult care except for "helping a non-household adult"												
Age of Caregivers												
18 - 24	72.0%	2.4	62.2%	1.4	28.0%	0.9	37.8%	0.9				
25 - 44	76.2%	2.4	67.3%	1.7	23.8%	0.8	32.7%	0.8				
45 - 64	63.6%	1.7	64.5%	1.7	36.3%	0.9	35.5%	0.9				
65 and over	57.7%	1.6	60.5%	1.3	42.3%	1.2	39.5%	0.8				

(continued)

Table 2.4 (Continued)

	Interactive Child Care				Interactive Adult Care				Supervisory Care			
	Women		Men		Women		Men		Women		Men	
	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity
Panel 4: Individuals 18 and over who engaged in any child care (interactive or supervisory) or interactive adult care												
Age of Caregivers												
18 - 24	21.1%	1.4	15.2%	0.5	6.1%	0.4	18.1%	0.6	72.8%	4.8	66.7%	2.3
25 - 44	23.0%	2.0	17.6%	1.1	2.3%	0.2	5.0%	0.3	74.7%	6.7	77.4%	5.0
45 - 64	21.6%	1.0	17.1%	0.8	13.3%	0.6	14.1%	0.6	65.1%	3.1	68.8%	3.1
65 and over	22.4%	0.7	19.3%	0.5	29.6%	0.9	37.0%	1.0	48.0%	1.4	43.8%	1.2
Panel 5: Individuals 18 and over who engaged in any child care (interactive or supervisory) and interactive adult care												
Age of Caregivers												
18 - 24	19.2%	1.6	15.8%	1.0	13.6%	1.1	16.8%	1.0	67.2%	5.6	67.4%	4.2
25 - 44	20.3%	2.1	15.7%	1.2	10.6%	1.1	16.3%	1.3	69.0%	7.0	68.1%	5.4
45 - 64	21.8%	1.4	18.0%	1.2	18.4%	1.2	21.2%	1.4	59.8%	3.8	60.8%	3.9
65 and over	26.6%	1.4	27.1%	1.2	22.2%	1.2	26.9%	1.2	51.3%	2.7	46.0%	2.1

Table 2.5 Lower Bound, Middle Bound, and Upper Bound of Sandwich Caregivers' Responsibilities, by Gender and Age of Sandwich Caregivers (ATUS 2003-2012, Hours per day)

	Women		Men	
	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity	Engaged in Activity on Diary Day	Mean Hours per Day Provided by Those Engaged in Activity
Lower Bound (Individuals 18 and over who engaged in any interactive child care and interactive adult care excluding for "helping a non-household adult")[1]				
Age of Caregivers				
18 - 24	2.1%	3.3	0.8%	2.3
25 - 44	3.3%	3.2	2.2%	2.6
45 - 64	1.5%	2.6	1.3%	2.6
65 and over	0.3%	2.8	0.4%	2.1
Middle Bound (Individuals 18 and over who engaged in any interactive child care and interactive adult care)[2]				
Age of Caregivers				
18 - 24	5.7%	3.2	2.5%	2.5
25 - 44	7.8%	3.3	4.8%	2.7
45 - 64	3.8%	2.8	2.6%	2.8
65 and over	1.0%	2.9	1.0%	2.7
Upper Bound (Individuals 18 and over who engaged in any child care (interactive and supervisory) and interactive adult care)[3]				
Age of Caregivers				
18 - 24	7.2%	8.8	3.8%	6.5
25 - 44	8.9%	10.9	6.5%	8.2
45 - 64	4.7%	7.1	3.6%	6.7
65 and over	1.3%	5.7	1.3%	4.9

Note: 1. Lower bound is calculated by total hours spent on interactive child care and interactive adult care subtracting the time spent for helping a non-household adult. Housework hours are calculated by total housework hours subtracting an approximation of housework done for "self" (subtracting per capita housework hours).
2. Middle bound is calculated by total hours spent on interactive child care and interactive adult care.
3. Upper bound is calculated by total hours spent on any child care including interactive child care and supervisory child care and interactive adult care and support care for others.

Table 2.6 Daily Time Devoted to ADLs and IADLs by Gender of Caregiver and the Type of Care Recipient (ATUS 2003-2012, Minutes per day, For those who provided some ADLs and IADLs for children and adults)

	Children		Adults	
	Women	Men	Women	Men
Lower Bound (Iindividuals 18 and over who engaged in any interactive child care and interactive adult care excluding for "helping a non-househod adult")				
ADLs	49	25	11	4
IADLs	143	105	103	83
Housework/Laundry[1)]	25	8	24	11
Meal Preparation[2)]	24	12	23	10
Shopping[3)]	13	11	13	11
Travel	21	22	21	26
Management[4)]	11	11	11	16
Getting Around Outside	5	5	3	4
Taking Medication[5)]	3	2	8	7
Developmental Care (for Children)[6)]	41	34	n.a.	n.a.
Total of ADLs and IADLs	192	130	114	87
Middle Bound (Individuals 18 and over who engaged in any interactive child care and interactive adult care)				
ADLs	44	23	6	2
IADLs	140	99	93	71
Housework/Laundry[1)]	23	7	19	8
Meal Preparation[2)]	21	10	18	8
Shopping[3)]	16	10	15	9
Travel	20	20	27	30
Management[4)]	11	10	8	10
Getting Around Outside	7	6	2	3
Taking Medication[5)]	3	2	5	4
Developmental Care (for Children)[6)]	39	34	n.a.	n.a.
Total of ADLs and IADLs	184	122	99	74
Upper Bound (Individuals 18 and over who engaged in any child care (interactive and supervisory) and interactive adult care)				
ADLs	38	17	7	2
IADLs	125	80	96	74
Housework/Laundry[1)]	21	6	19	7
Meal Preparation[2)]	19	9	18	7
Shopping[3)]	15	10	16	10
Travel	17	15	28	32
Management[4)]	9	7	9	11
Getting Around Outside	7	5	2	3
Taking Medication[5)]	3	2	5	3
Developmental Care (for Children)[6)]	33	26	n.a.	n.a.
Total of ADLs and IADLs	163	97	103	76

Note: 1), 2), and 3) activities in IADLs are calculated by those activities done for adults and children separately (calculated per capita and multiplied by the number of household adults (except for self) for IADLs for adults and calculated per capita and multiplied by the number of household children for IADLs for children). 4) Management for adults is specific to financial management, while management for children includes activities like managing events for children.
5) Taking medication for children are calculated by care activities related to children's health.
6) Developmental care is specific to children.

Table 2.7 Cross-Walk of Weekly Hours of Unpaid Care

Data Sources	Definition of Caregivers	Average Caregiving Hours
1994 Health and Retirement Study (Amirkhanyan and Wolf, 2003)	Among those who spent 100 or more hours in the past 12 months helping parent(s) (or stepparents) with basic personal needs like dressing, eating, and bathing excluding time spent on transport, shopping, cooking, and paying bills.	19.4
2003-2012 American Time Use Survey[1]	Among those who are 18 and over and spend at least 1.2 hours on a diary day engaging in any interactive adult care excluding the time on transport, shopping, cooking, and paying bills[1]	21.4
2002 Health and Retirement Study (Johnson and Schaner, 2005)	Among those 54-64 who provided at least 100 hours of care for grandchildren and parent/spouse care in the previous two years	11.2
2003-2012 American Time Use Survey	Among those 54-65 who provide at least some care for children and adults on a survey day	27.6
1996 Survey of Income and Program Participation (Alexcxih et al., 2001)	Among those who provide unpaid care or assistance to someone with a long-term illness or disability during the past month	24.2
2003-2012 American Time Use Survey	Among those 18 and over who provide some adult care	14.0
1997/1999 National Longitudinal Survey of Young Women (Pierret, 2006)	Among women age 45 and 54 who provide some time for children and parents	49.2
2003-2012 American Time Use Survey	Among women age 45 and 54 who provide some time for children and adults	37.0
2009 National Alliance for Caregiving/AARP	Among those 18 and over who provide unpaid care to a relative or friend (18+) or any child (<18) in the last 12 months	18.8
2003-2012 American Time Use Survey	Among those 18 and over who provide unpaid care to non-household adults or any child (<18) on a survey day	21.8
2003-2012 American Time Use Survey Lower Bound	Among individuals 18 and over who engaged in any interactive child care and interactive adult care excluding for "helping a non-household adult")	20.0
2003-2012 American Time Use Survey Middle Bound	Among individuals 18 and over who engaged in any interactive child care and interactive adult care)	20.9
2003-2012 American Time Use Survey Upper Bound	Among individuals 18 and over who engaged in any child care (interactive and supervisory) and interactive adult care)	60.0

Note: 1. Estimates provided by 2003-2012 American Time Use Survey data are weekly average hours converted by multiplying daily hours by 7.

CHAPTER 3

VALUING UNPAID CHILD CARE IN THE U.S.: A PROTOTYPE SATELLITE ACCOUNT USING THE AMERICAN TIME USE SURVEY

Introduction

Increasing attention to the value of non-market work is motivating the construction of new satellite national income accounts in many countries (Stiglitz et al., 2010). In order to add estimates of the value of non-market household work to Gross Domestic Product in the United States, two recent studies employ time-use data to impute its market value (Landefeld et al., 2009; Bridgman et al., 2012). In this paper, we adopt a similar approach to the valuation of unpaid child care, an important component of all non-market household work. However, we argue that previous satellite accounting efforts have underestimated the amount and value of time devoted to child care for three reasons: omission of supervisory child care time, failure to consider the number of children cared for relative to adults present, and lack of adjustment for the care provider's educational attainment. The measurement and valuation of time devoted to child care deserves special attention because it holds important implications for current living standards and the well-being of future generations. Furthermore, child care time represents a significant portion of all time devoted to non-market household production.

Building on the method used in earlier estimates of the value of all non-market household work, we use pooled 2003-2012 data from the American Time Use Survey (ATUS) to develop a prototype satellite account assigning a market value to unpaid child care in the U.S. We begin with a brief review of previous research on the implications of

valuing unpaid household work, methods of estimating the amount of time devoted to it, and imputation of its monetary value. Next, we make a case for including supervisory child care, for adjusting time spent in active child care for its intensity (measured by the ratio of children to adults present), and for applying education-adjusted specialist wages to different types of unpaid child care. In order to demonstrate the implications of this approach, we first replicate and then revise previous estimates of the total value of time spent in non-market household production in the U.S. We offer a separate stand-alone account of the value of unpaid time devoted to the care of children under 18 over the 2003-2012 period. Finally, we demonstrate the implications of this approach for estimates of the value of all non-market household work.

The Valuation of Non-Market Household Work

The limitations of measures of Gross Domestic Product that omit consideration of the value of non-market work in the household have been long been acknowledged (Hawrylyshyn, 1976; Kendrick, 1979; Murphy, 1978). For many years, the lack of adequate data for estimating the market value of this work has impeded efforts to develop expanded measures using satellite accounts. With the advent of nationally representative time-use surveys, including the American Time Use Survey, researchers have begun to develop detailed imputations based on either a replacement or opportunity cost valuation of labor inputs. Still, the implications of these efforts remain underappreciated, and a number of issues regarding both measurement and valuation remain unresolved. The value of unpaid child care has received little explicit consideration, despite its relevance to both family living standards and human capital accounting.

Implications

In conventional measures of Gross Domestic Product, all non-market work activities (including production of goods and services in the household for its own use, volunteer work, and time spent in education) are implicitly valued at zero. Yet this work contributes to current and future living standards and is, to some extent, substitutable with income from market production. Its quantitative dimensions are significant. Indeed, in every year the American Time Use Survey has been conducted and tallied to date (2003-2012) the daily average of time that individuals 15 and older devoted to activities that can be construed as non-market work averaged more than the daily average of time devoted to paid working and work-related activities.[16]

Household production accounts for the bulk of all non-market work, and labor time devoted to it is augmented by investment in both household and government capital. Failure to include estimates of the value of household production in Gross Domestic Product (GDP) leads to understatement of total output and probably to overstatement of the rate of economic growth.[17] As women have entered paid employment, they have reduced the amount of time devoted to housework and family care. While women's increased wages are reflected in conventional GDP measures, their decreased home production is not. Thus, the long-term trend in output as measured by conventional GDP

[16] See Table A-1 for each year at http://www.bls.gov/tus/tables.htm. Our estimates of total non-market work include the following ATUS categories: housework, purchasing, caring for household and non-household members, engaging in organizational, civic, and religious activities, and education.

[17] If the rate of productivity growth in non-market work exceeds that in market work, the rate of growth of average productivity would be under-stated.

fails to provide an accurate picture of true growth in national output (Landefeld and McCulla, 2000).

Previous research has powerfully demonstrated the implications of using time-use data to impute a value to non-market household work in a separate satellite account that can be added to conventional measures of Gross Domestic Product. Landefeld et al. (2009) show that the average annual growth rate for nominal GDP in the U.S. over the period 1985-2004 was 5.5% but declined to 5.2% when the imputed value of household production was included. Examining a longer time period, between 1965 and 2010, Bridgman et al. (2012) present adjustments that lower the average annual rate of nominal GDP growth from 6.9% to 6.7%.

Secular declines in the amount of time devoted to housework seem to countervail cyclical increases in household production that might be expected to increase with unemployment. Focusing on analysis of the effects of the Great Recession, Aguiar et al. (2011) exploit differences in the intensity of the downturn across states to control for secular trends, showing that household production is actually somewhat countercyclical.

Non-market household work also has important implications for household living standards, providing implicit income through in-kind consumption. Consider, for instance, two households of identical composition (two parents and two young children) with identical after-tax market income. In the first household one parent is employed full-time and another specializes in non-market household work; in the second, both parents are employed full-time. The first household enjoys the benefits of non-market household work that allow it to minimize purchases of expensive services such as child care.

By conventional measures, these households are equally well-off. By measures of "extended income" that include the value of non-market household work, the first household is considerably better off than the second (Folbre et al., 2013). Accurate estimation of extended income is especially relevant to a comparison of the living standards of families with different levels of participation in market work and those with and without children.

Measurement and valuation of time devoted to child care also bear directly on cost-based estimates of the value of human capital. Many aspects of household production (not just those directly devoted to child care) are inputs into the production of young adults capable of developing their cognitive skills through education and work experience. Although most current estimates of the value of human capital tally the net present value of future income (Fraumeni, 2011), cost-based measures are also relevant, as first argued by John Kendrick (1976). Unpaid time is clearly an important component of the overall cost of children (Folbre, 2008).

While the overall amount of time that Americans devote to housework has declined substantially since 1965, the amount of time that parents devote to children has increased (Bianchi et al., 2006). Child care is less susceptible to technological change (at least so far) than housework, and standards of childrearing seem to ratchet up along with income. Utilization of purchased child care does not reduce parental time as much as might be anticipated, as parents often compensate for reduced weekday time by spending more time with children on evenings and weekends (Bittman et al., 2004).

In sum, the value of unpaid child care matters not only because it represents a growing component of all non-market household production, but also because it affects

household living standards and influences the historical cost of investment in children's human capital.

Measurement of time devoted to non-market household work

Most time-use surveys ask respondents about their primary activities with questions such as "What were you doing?" Slight differences in wording and categorization of activities often create some incompatibilities in measurement across time. Both Landefeld et al. (2009) and Bridgman et al. (2012) present estimates of the amount of time devoted to child care that combine data from relatively small time-use surveys conducted before 2003 included in the Multinational Time Use Survey (MTUS) archive with some results from the American Time Use Survey, which was implemented on a national basis beginning in 2003.

Both studies disaggregate household production into seven basic categories: cooking, housework, odd jobs, gardening, shopping, child care, and travel. The Bridgman et al. estimates (2012) show that child care represented about 11% of all household production time in 1965 and 13.5% in 2010. However, both studies defined child care only as care of household children, excluding care of non-household children (which includes care by non-custodial parents) and assigning it to the odd jobs category.[18] This

[18] Personal communication, Steven Landefeld and Benjamin Bridgman (Based on analysis of ATUS coding used in their analyses).

reduces their estimates of total child care time (the sum of care of household and non-household children) by about 5.5% in 2003 and 7.7% in 2010.[19]

Another coding issue concerns the treatment of travel. Many time-use scholars group travel time with the activity with which it is associated. For instance, travel time involved in taking a child to daycare, school, or to recreational activities is typically treated as a component of child care. The decision to treat travel as a separate category rather than assigning a portion of it to child care (again, likely the result of efforts to maximize compatibility with the earlier surveys) underestimates total time devoted to child care activities by about 18%.[20]

A more serious measurement issue arises from concerns about multitasking or joint production—vacuuming the living room while waiting for the washing machine to finish its cycle, or cooking meals while keeping an eye on the children. Because it is not uncommon for people to multi-task while working at home, some time-use surveys inquire about "secondary" activities by asking "Were you doing anything else at the same time?"

Joint production clearly complicates measurement of all household activities. Analysis of Australian time-use surveys, which include questions regarding secondary activities, shows that child care activities are the most likely to be combined with other tasks (Ironmonger, 2004). Therefore, it seems likely that surveys that do not tally secondary activities understate the amount of time devoted to child care activities.

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[19] The coding decision is described in the technical background appendices. These estimates of their implications are based on estimates from the published ATUS Tables A1, http://www.bls.gov/tus/#tables, accessed June 26, 2013.

[20] Authors' calculations.

The ATUS does not ask respondents to report secondary activities but does ask respondents to report any time that children under the age of 13 were "in your care." The Statistics Canada General Social Survey poses a similar question, asking if individuals were "looking after children" (Folbre and Yoon, 2007a). Responses to both the U.S. and Canadian questions are reported as "secondary" child care activity (Fedick et al., 2005; ATUS published tables). This terminology is somewhat misleading. While some supervision of children is active—that is, requires the caregiver to pay close attention and scrutinize children's behavior, much supervision takes the form of passive, or "on-call" availability. That is, it represents a responsibility that constrains time allocation to other tasks (Budig and Folbre, 2004). The ATUS survey question was initially designed to capture responsibility for children that did not necessarily take the form of an "activity" (Horrigan and Herz, 2004).

Responses to the "in your care" question clearly demonstrate that the temporal demands that young children impose far exceed explicit child care activities. In previous research, Suh (2013) shows that supervisory time in the ATUS is significantly affected by hours of paid employment, and the demographic, and racial/ethnic characteristics of parents. Other empirical studies of child care time confirm the temporal demands of supervisory care. For instance, a detailed analysis of the 1997 Panel Study of Income Dynamics - Child Development Supplement (PSID-CDS) shows that children under 13 received about 59 hours per week of active care (including care from non-household adults such as teachers) and about 22 hours per week in activities when adults were "available," not counting sleep time (Folbre et al., 2005). Time that children spent sleeping amounted to 79 hours per week, on average (about one-half of all hours in the

week). The study notes that exclusion of time that children are sleeping from estimates of care time leads to the misleading inference that infants require less time than older children simply because they are less likely to be awake at any given time.

Another approach to assessing supervisory care for children utilizes survey questions regarding who respondents were with, or "who else was there" while they were engaged in activity. But the mere presence of a child is conceptually distinct from having a child "in your care." A child can be in an adult's care while watching television in another room or playing in the backyard. Indeed, such spatial separation is a common feature of supervisory care. On the other hand, the "with whom" variable could overstate child care responsibilities by extending their definition to include social activities in which many adults are present, sharing responsibility for a small child. Many activities reported as leisure fall into this category (Mattingly and Bianchi, 2003; Bittman and Wajcman, 2004).

Analysis of Canadian data that measured both physical proximity and "looking after" children shows that these are related but distinct measures of child care (Folbre and Yoon, 2007a). Similarly, Suh's detailed analysis of the impact of economic, demographic, and cultural variables on different measures of child care in the ATUS reveals significant differences between "in your care" time and "time with children" (Suh, 2013). At least one published study has utilized the "in your care" question in the ATUS to expand estimates of the amount and market value of time devoted to children (Folbre and Yoon, 2007b).

Another aspect of time-use measurement is intensity of work. Some tasks are intrinsically more demanding than others in terms of physical and mental effort, level of

stress, and responsibility. Multitasking generally requires additional effort, and analysis of Australian time use data from 1992 shows that women engage in multitasking significantly more than men (Floro, 1995; Floro and Miles, 2003).

Standard adult-centric measures of child care treat one hour of care provision the same whether one or more adults report caring for one child, or whether one adult is caring for one child or for more at the same time. But the ratio of children to adults deserves consideration. Detailed analysis of Australian time use data shows that the addition of a second or third child to a household is associated with only a small increase in time devoted to child care, a result consistent with increased intensity of effort within the same time frame (Craig and Bittman, 2008).

A higher ratio of children to adults is probably also associated with a decline in the quality of the care provided to an individual child. Children get more individualized attention from a parent, nanny, or a babysitter than from a child care provider or teacher. Research suggests that birth order, birth timing, and number of siblings have significant impacts on child outcomes—children benefit from more individual attention from parents (Conley, 2004; Price, 2008). However, it seems unlikely that the decline in quality per child is the only result; in general, child care is more demanding the greater the number of children per adult, even if children are able to play with one another and entertain themselves to some extent.

The aforementioned analysis of child-centric data from the 1997 PSID-CDS showed that about a third of the active care that children under the age of thirteen receive, on average, involves overlaps of either additional adults or children (Folbre et al., 2005).

A recent analysis of time use data from the United Kingdom also utilized "who with" data to estimate the intensity of child care (Mullan, 2007).

Imputing market value

Estimation of the quantity of time devoted to household production allows input-based replacement-cost valuation based on the market value of labor and, where feasible, the market value of capital and other inputs. Ideally, input valuation should be combined with or at least compared to, valuation of outputs (Abraham and Mackie, 2005; Fitzgerald and Wicks, 1990). However, practical concerns often dictate reliance on valuation of labor time alone. Both Landefeld et al. (2009) and Bridgman et al (2012) offer replacement-cost estimates of the value of non-market household production as recommended by Abraham and Mackie (2005) for national income accounting purposes.

The replacement-cost approach estimates what the market wages for labor of similar quality would be, multiplying these hourly wage rates times the number of hours. The simplest approach applies a generalist wage (such as a housekeeper's wage). Alternatively a vector of specialist wage rates (such as wages for a cook, a gardener, or a preschool teacher) can be applied. Landefeld et al. (2009) apply both approaches. In their application of specialist wages, they assume that the "productivity of an average individual is less than the productivity of a specialist for the cooking, cleaning, odd jobs, and gardening categories, but equal to that of a specialist for the shopping, child care, and travel categories" (Landefeld et al., 2009: 218). In some activities in which they consider it likely that productivity of an unpaid provider is lower, specialist wages are reduced to 75% of their market value (Landefeld et al., 2009: 218). Bridgman et al. (2012) use the

wages of general-purpose housekeepers, arguing that this represents a reasonable lower-bound estimate.

We agree with Landefeld et al. (2009) that a specialist wage rate is appropriate for child care. Parents and other family members acquire child-specific information and skills that can increase their efficacy in child care. Further, the continuity of care that parents provide is crucial to the development of children's emotional and social well-being. However, we believe that child care activities themselves should be disaggregated and assigned different specialist wage rates. Parents engage in a variety of tasks, including physical care, travel, and developmental care such as reading aloud or helping with homework.

The ATUS provides information that makes it possible to assign different specialist wage rates to different types of child care, a procedure that facilitates inclusion of supervisory care, which should clearly be valued at a lower rate than active care. One study used 2003 ATUS data to disaggregate child care into seven categories of supervisory, active care, and overlapped activities, applying a vector of wage rates ranging from the minimum wage of $5.15 for supervisory care to $25 an hour for developmental activities (Folbre and Yoon, 2007b). A report on the care sector of the state of Massachusetts also adopted this approach, applying different wage rates for interactive and supervisory care (Albelda et al., 2009).

The value of supervisory time has been explicitly estimated in a number of studies using output-based approaches. Holloway and Tamplin (2001) estimate the quantity of output of child care provided by households in the United Kingdom by subtracting from 24 hours time spent in school and in the formal market care sector and asking what a

market-based replacement for all parental time would cost. Mullan's subsequent analysis of UK data included estimates of supervisory time based on how much time children spent with parents, including measures of child care intensity, yielding significant higher estimates than would be expected based on simple measures of active child care alone (Mullan, 2010).

Expanding and Refining Valuation of Child Care

In order to develop a separate satellite account for child care that exploits available data to the fullest extent, we advocate measures that take supervisory care, intensity of care activities, and education of care provider into account. We also advocate several specific replacement cost valuation strategies, including use of a relatively low wage rate for supervisory child care, attention to overlapping categories (such as the combination of supervisory child care with housework), and a specialist wage approach that applies different wage rates for different types of child care activity with attention to different levels of child care provider education.

Supervisory time clearly imposes constraints on parents that affect their ability to work outside the home, especially during night shifts or on weekends. Leaving a child younger than age 9 without adult supervision, even when that child is asleep, can be legally construed as neglect. Many paid jobs also involve on-call responsibilities, and these are clearly recognized by labor law.[21] Discussions of the application of the Fair

[21] According to the U.S. Department of Labor,
"An employee who is required to remain on his or her employer's premises or so close thereto that he or she cannot use the time effectively for his or her own purposes is working while on-call. Whether hours spent on-call is hours worked is a question of fact to be decided on a case-by-case basis. All on-call time is not hours worked. On-call situations vary. Some employees are

Labor Standards Act to household employment emphasize that covered employment includes all time that the employee is required to be at the employer's home and all time that the employee is required to be "on call" in the course of his/her duties. For instance, one website providing information regarding nanny taxes includes "all hours on duty, including meal time if the employee is required to remain at the premises during meals, nap time, and time when children are in school IF nanny is required to be 'on call' for any emergencies such as early dismissal, child sick at school, etc."[22]

Respondents in the ATUS are instructed not to report supervisory responsibilities while they are sleeping, and in its published tables the Bureau of Labor Statistics automatically excludes such care. This is a questionable exclusion. Baby sitters and nannies are typically paid for staying overnight with children, including long periods of time when both caregivers and children are asleep. Rates of pay are typically less than for daytime hours, but still significant. For instance, parents in the San Francisco area recently reported paying between $25 and $100 per night for overnight nannies.[23] In his analysis of UK time use data Mullan (2010) estimates the value of overnight care, although he keeps it separate from the imputed value of other care. For all these reasons,

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required to remain on the employer's premises or at a location controlled by the employer. One example is a hospital employee who must stay at the hospital in an on-call room. While on-call, the employee is able to sleep, eat, watch television, read a book, etc. but is not allowed to leave the hospital. Other employees are able to leave their employer's premises, but are required to stay within so many minutes or so many miles of the facility and be accessible by telephone or by pager. An example of this type of employee is an apartment maintenance worker who has to carry a pager while on call and must remain within a specified number of miles of the apartment complex."See U.S. Department of Labor website at http://www.dol.gov/elaws/esa/flsa/hoursworked/screenER80.asp, accessed June 20, 2013.

[22] See the 4 Nanny Taxes site at http://www.4nannytaxes.com/index.cfm/faq/nannyhousekeeper-faq-list/nanny-minimum-wage/, accessed June 24, 2013.

[23] See, for instance, the website of the Golden Gate Mothers Group at http://www.ggmg.org/recommends/NannyPay.html, accessed June 25, 2013.

it is seems likely that the ATUS estimates of supervisory "in your care" time represent a conservative, lower-bound estimate of temporal constraints.

An alternative way to expand the definition of child care is to rely on questions regarding "who else was present" while adults were engaged in other activities, sometimes termed "social time" with children. Previous research on the ATUS shows that supervisory care and social time with children overlap considerably but are not exactly the same, since adults can report supervisory care of children who are in another room of the house, or playing outside (Suh, 2013). In our view, the ATUS data on "who else was present" provide important insights into supervisory care, but are not a substitute for the "in your care" measure.

More importantly, the "who else was present" question provides a means of measuring the intensity of both active and supervisory childcare. The rationale for considering intensity is similar to the rationale for considering supervisory care—it influences the cost of comparable market services. Babysitters and nannies charge rates partly based on number, as well as age of children. For instance, one national company recruiting child care providers specifies a minimum recommended wage rate of $11 an hour for one child, with an additional $2 per additional child.[24] Similarly, a national babysitting guide stipulates, "if you have more than one child, expect to pay $2 to $5 more an hour for each additional child."[25] Valued in terms of a substitute service provided outside the home, such as a child care center, the effect of number of children is

[24] See the A+ Childcare site at http://apchildcare.com/rates/, accessed June 25, 2013.
[25] See http://www.care.com/child-care-babysitting-cost-p1145-q22781.html, accessed June 26, 2013

even more pronounced: that is, it usually costs approximately twice as much to send two young children to a child care center as to send one.

The additional effort required to care for more than one child probably depends on their difference in ages. Older children can help supervise younger ones; children of similar ages may play together and entertain themselves. These complementarities probably help explain why the per-child increments described above are small. In the absence of much information about how these complementarities come into play, it seems plausible to simply assume that, on average, more children require more effort, but the increase in effort is far less than proportional.

The age of children tends to affect the type of child care activity directly—that is, babies require more physical care; young children who go to preschool or kindergarten require more travel time. Young children also require more supervision. Using different wage rates for replacement cost estimates of different child care activities, therefore, captures much of the direct effect of child age.

Education of caregiver is especially likely to affect the value of time devoted to developmental care, such as reading aloud or helping with homework. However, education of caregiver may have more diffuse positive effects in other activities, as children are exposed to a larger vocabulary or to valuable problem-solving skills. Assigning a higher value to the child care time of more highly educated individuals is consistent with the principle that replacement cost estimates should be adjusted for quality. In our view, even a reasonable guess at such an adjustment is better than no adjustment at all.

Data and Methods

We utilize data from the 2003-2012 American Time Use Surveys conducted by the U.S. Bureau of Labor Statistics, a stratified random sample drawn from households that have completed their participation in the Current Population Survey (CPS), representative of the U.S. civilian non-institutional population ages 15 and over.[26] Since 2003, ATUS has collected time diaries from one individual from each participating household. ATUS respondents were asked to sequentially report their primary activities during the 24-hour period from 4:00 AM the day before the interview to 4:00 AM the day of the interview. Respondents describe their activity episodes, including start and stop times and other information, such as who they were with and where they were. In addition, ATUS interviewers collect demographic data on household members and labor force information for the respondent and their spouse/cohabiting partner.

In developing a satellite account for child care, we follow the precedent set by previous research employing ATUS data for satellite accounting of household production in general (Landefeld et al., 2009; Bridgman et al., 2012). However, we divide non-market household labor activities captured in ATUS 2003-2012 into slightly different categories, as well as adding a category of supervisory childcare: 1) active child care, 2) supervisory child care, 3) adult care, 4) cooking and cleaning, 5) housework, 6) home repairs and maintenance, 7) gardening and pet care, 8) shopping, 9) organizing and managing, 10) travel related to housework and child and adult care, and 11) other household chores. A complete mapping between the ATUS and these eleven household production categories is presented in Appendix Table C1.

[26] For more information about ATUS, see http://www.bls.gov/tus.

We use these measures to construct an estimate of total time devoted to non-market household production using the methodology applied by previous studies and compare these to the estimate of total time including the value of supervisory or on-call time that is not overlapped with any other form of non-market household work. Inclusion of supervisory time in the revised total increases the estimate of total non-market household production time in each year by over 36% and the average for the period by 38.7 % (See Table 3.1).

In order to refine estimates of the imputed value of child care time, we disaggregate child care activities, including both supervisory time overlapped with other forms of non-market household work (excluding active child care) and non-overlapped supervisory time (See Table 3.2). We also include a vector of replacement cost wage rates for these different child care activities for each year, largely based on the Occupational Employment Survey. We opt for conservative lower-bound choices, because we adjust them (in the next column) both for number of children and for the education of the caregiver (for detailed information on replacement cost choices, see Appendix Table C2).[27]

We define the intensity of child care as the ratio of adults (18 and over) to young children (aged 0-12) participating in a child care activity, per unit of time, measured by responses to the question "who else was present?" while an activity was performed. Estimates of the weighted average of the density of all episodes of childcare are provided in Appendix Table C4. Following the example described earlier of wage rates for babysitters based on number of children, we increase the value of child care for episodes

[27] We use occupation-based data rather than industry-based data for wages because this allows finer differentiation.

in which the intensity exceeded 2 but was lower than 3 by 18%. We increase the value of child care for episodes in which the intensity exceeded 3 by a total of 36%. When care is provided by an individual who has completed at least some college (but not attained a bachelor's degree) we boost the replacement wage level by 10%; for college and beyond, we boost it 20%.

Replicated and Revised Estimates

We estimate the total amount of time devoted to supervisory child care that was not overlapped with any other non-market production for every year between 2003 and 2012, and compare it with our measure of active child care (which includes care of non-household children) (See Table 3.1). Non-overlapping supervisory time is more than four times greater than the amount of time devoted to child care activities. Inclusion of this category of time use increases the total number of hours devoted to non-market household production by more than 50%.

The effect of this addition is somewhat blunted by the application of a relatively low wage—the legal minimum—to the valuation of non-overlapping child care time. We assign the highest wage rates to developmental and managerial childcare. When supervisory child care is combined with other household production activities we assign this combined activity a higher replacement wage than physical or developmental care (See Table 3.2).[28]

[28] Landefeld et al. (2009) and Bridgman et al. (2012) assigned the hourly wage rate of child day care services provided by the North American Industry Classification System in the Current Employment Statistics (CES-NAICS).

In these calculations we use a measure of time devoted to child care that includes travel time and care of non-household children. Multiplying the average hours per person, per week times the number of persons 18+ in the population and the number of weeks per year yields an estimate of the total value of time devoted to childcare of about $1.6 trillion in 2003 and about $2 trillion in 2012.

Adjusting for two measures of intensity (caring for more than one but less than four children at a time, or for four or more) increases the 2003 estimate to about $2 trillion, and adjusting for the education of the primary caregiver increases it further, to about $2.5 trillion. These represent increases of about 25% and 56%, respectively. The impact of these adjustments for 2012 is similar, increasing about 30% and 60%, respectively.[29]

The cumulative effect of these adjustments is to more than double estimates of the value of all non-market household work compared to previous estimates for the same years.[30] Compared to the standard National Income and Product Account (NIPA) estimates, Landefeld et al (2009) offer an estimate of adjusted GDP for 2004 (including some revisions to the treatment of consumer durables and investment to account for capital contributions to household production) that are 26.9% higher (See Table 3.3). Bridgman et al. (2012) offer similar estimates for 2010 that are about 24.5% higher. By contrast, our estimates, including similar revisions to non-labor categories, arrive at much higher estimates, 43% higher for 2004 and 43.9% higher for 2010.

[29] Neither Landefeld et al., 2009 nor Bridgman et al. 2012 provide a disaggregated measure of the value of child care that would allow for comparison with our estimate.
[30] Estimates for intervening years and for 2011 and 2012 are available from the authors on request.

Conclusion

Previous estimates of the value of non-market household production in the U.S. based on the American Time Use Survey have not taken full advantage of the detailed information it provides regarding supervisory time, the intensity of child care, and the educational attainment of child care providers. While opinions differ as to the appropriate definition of child care and the best methods of imputing market value, this paper clearly demonstrates the scope for more detailed and disaggregated empirical attention to this issue. In particular, it shows that supervisory child care, even when valued at a low replacement cost value, represents a major component of all non-market work and makes a significant contribution to the total value of goods and services produced in the U.S.

Table 3.1 Average Hours Per Week Devoted to Household Production, Including Supervisory Care Time (Individuals 18 and over, ATUS 2003-2012)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2003-2012
Cooking and Cleaning	4.2	3.5	3.5	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Housework	4.9	4.9	4.9	4.9	5.6	4.9	4.9	4.9	4.9	4.9	4.9
Home Repairs and Maintenance	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Child Care	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Adult Care	1.4	1.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Gardening and Pet Care	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Shopping	2.8	2.8	2.8	3.5	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Organizing and Managing	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Travel	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Other Household Chores	0.7	0.7	0.7	0.7	0.1	0.7	0.1	0.7	0.7	0.1	0.7
Replicated Total	25.9	25.9	25.2	25.2	25.2	24.5	24.5	24.5	23.8	23.1	24.5
Supervisory Child Care Time ("In-Your-Care") not overlapped with any other non-market household production	14.7	14.0	14.7	14.0	14.0	14.7	13.3	13.3	13.3	12.6	14.0
Percentage Impact of Adding Non-Overlapping Supervisory Child Care	56.8%	54.1%	58.3%	55.6%	55.6%	60.0%	54.3%	54.3%	55.9%	54.5%	57. 1%

Table 3.2 Imputed Annual Value of Disaggregated Child Care Activities, 2003 and 2012 (Individuals 18 and over, ATUS)

	2003								
	Hourly Wage Rate ($)	Total (Unadjusted) Aggregate Value (Thousands)	Intensity 1 Adjusted Wage Rate (>2 but <=3, +18%)	Intensity 2 Adjusted Wage Rate (>3, +36%)	Intensity-Adjusted Average Wage	Total Intensity-Adjusted Aggregate Value (Thousands)	Education 1 Adjusted Wage Rate (some college, +10%)	Education 2 Adjusted Wage Rate (college or above, +20%)	Total Intensity and Education Adjusted Aggregate Value (Thousands)
Physical	9.0	148,803,176	10.62	12.21	10.38	174,000,925	11.42	12.46	197,364,145
Developmental	10.67	165,479,669	12.59	14.48	13.94	376,060,169	15.33	16.72	491,140,712
Managerial	16.59	125,581,996	19.58	22.51	19.35	138,936,563	21.29	23.22	154,085,873
Travel	9.14	75,789,324	10.79	12.40	11.14	100,543,450	12.26	13.37	276,969,865
Supervisory (overlapped with any household production except primary childcare)	11.92	561,524,690	14.07	16.18	13.63	627,563,322	14.99	16.35	684,278,028
Supervisory (not-overlapped)	5.15	556,851,270	6.08	6.99	5.84	589,012,910	6.42	7.00	673,726,407
Total		1,634,030,125				2,006,117,340			2,477,565,029

(continued)

Table 3.2 (Continued)

	2012								
	Hourly Wage Rate ($)	Total (Unadjusted) Aggregate Value (Thousands)	Intensity 1 Adjusted Wage Rate (>2 but <=3, +18%)	Intensity 2 Adjusted Wage Rate (>3, +36%)	Intensity-Adjusted Average Wage	Total Intensity-Adjusted Aggregate Value (Thousands)	Education 1 Adjusted Wage Rate (some college, +10%)	Education 2 Adjusted Wage Rate (college or above, +20%)	Total Intensity and Education Adjusted Aggregate Value (Thousands)
Physical	11.00	163,871,335	12.98	14.93	12.67	191,149,356	13.94	15.21	212,489,215
Developmental	15.89	289,751,078	18.75	21.56	20.79	652,961,512	22.87	24.95	854,318,959
Managerial	21.13	147,882,254	24.93	28.67	24.71	174,133,389	27.18	29.65	185,431,130
Travel	10.97	90,920,158	12.94	14.89	13.37	124,132,075	14.71	16.04	339,178,446
Supervisory (overlapped with any household production except primary childcare)	14.12	566,845,636	16.66	19.16	16.20	645,303,101	17.82	19.44	698,875,548
Supervisory (not-overlapped)	7.25	771,905,355	8.56	9.84	8.26	839,431,125	9.09	9.92	926,865,670
Total		2,031,175,815				2,627,110,558			3,217,158,969

Note:
1. Intensity 1 refers to those whose average intensity is greater than or equal to 2 and less than and equal to 3.
2. Intensity 2 refers to those whose average intensity is greater than 3.
3. Education 1 refers to those who have some college education.
4. Education 2 refers to those who have college and beyond.

Table 3.3 Size of GDP Adjustments Relative to Standard National Income and Product Account (NIPA) Measures, 2003, 2004, 2010, and 2012 (billions of nominal dollars)

	NIPA vs. Adjusted GDP, 2004 (Landefeld et al. 2009)			NIPA vs. Adjusted GDP, 2010 (Bridgman et al. 2012)			NIPA vs. Adjusted GDP, 2004 (Authors' estimates)			NIPA vs. Adjusted GDP, 2010 (Authors' estimates)		
	NIPA GDP	Adjusted GDP	% Difference	NIPA GDP	Adjusted GDP	% Difference	NIPA GDP	Adjusted GDP	% Difference	NIPA GDP	Adjusted GDP	% Difference
Gross Domestic product	11,734.3	14,885.1	26.9%	14,660.4	18,247.7	24.5%	12,277.0	17,558.5	43.0%	14,958.3	21,522.0	43.9%
Nonmarket household services	0	2,219.5		0	2,591.80			4,266.2			5,333.0	
Net adjustments to consumer durables and government spending		931.3			995.0			1,015.3			1,230.7	

APPENDIX A

TABLES FOR CHAPTER 1

Table A1. Complete ATUS Coding for Different Types of Child Care

Categories	Code	ATUS Description
Primary Child care	03-01	Caring For and Helping Household Members: Caring for and helping household children
	03-02	Caring For and Helping Household Members: Activities related to household children's education
	03-03	Caring For and Helping Household Members: Activities related to household children's health
	03-99	Caring For and Helping Household Members: Caring for and helping household members, n.e.c.
	04-01	Caring For and Helping Nonhousehold Members: Caring for and helping nonhousehold children
	04-02	Caring For and Helping Nonhousehold Members: Activities related to nonhousehold children's education
	04-03	Caring For and Helping Nonhousehold Members: Activities related to nonhousehold children's health
	08-01	Professional and Personal Care Services: Childcare services
	16-01-07	Telephone Calls: Telephone calls to/from paid child or adult care providers
	18-03-81	Traveling: Travel related to caring for and helping household children
	18-04-81	Traveling: Travel related to caring for and helping nonhousehold children
Supervisory Care		Yes to questions asking "Were your children under 13 in your care?" TUCC codes under activity file are used for analysis.
Social Time		Yes to questions asking "Were you with a child during an activity?" TERRP codes under "Who with" file are used for analysis.

Note: n.e.c. stands for not elsewhere classified.

Table A2. Robustness Check for Regression Results with Different Treatments for Zero Hourly Wage for Time Devoted to Different Types of Child Care by All Mothers (ATUS 2003-2012, mothers 18 and over and living with at least one child under 13)

	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time
	Adding 10^{-20} to Hourly Wage for Zero Wage			Added 0.001 to Hourly Wage for Zero Wage			Added 1 to Hourly Wage for Zero Wage		
Economic Variables									
Usual Work Hours	-0.88***	-1.46***	3.27***	-0.89***	-1.48***	3.30***	-0.92***	-1.73***	3.59***
	(0.09)	(0.23)	(0.23)	(0.09)	(0.23)	(0.23)	(0.09)	(0.23)	(0.23)
Full-time	-19.24***	-61.97***	90.60***	-19.26***	-62.18***	90.65***	-20.00***	-68.69***	97.53***
	(4.00)	(9.86)	(9.88)	(4.00)	(9.87)	(9.89)	(3.99)	(9.89)	(9.96)
Part-time	-7.08**	-34.72***	33.32***	-7.21**	-35.90***	34.33***	-8.98***	-51.20***	51.23***
	(3.41)	(7.78)	(7.21)	(3.40)	(7.78)	(7.21)	(3.34)	(7.69)	(7.12)
Unemployed	-17.15***	-28.35***	29.77***	-17.17***	-28.50***	29.88***	-17.46***	-31.04***	32.59***
	(4.80)	(10.93)	(8.76)	(4.80)	(10.94)	(8.77)	(4.80)	(11.01)	(8.93)
Log(Household Income)	5.30***	-10.09***	9.93***	5.34***	-9.79***	9.58***	5.58***	-7.88**	7.06***
	(1.32)	(3.13)	(2.62)	(1.32)	(3.13)	(2.62)	(1.33)	(3.14)	(2.63)
Log(Hourly Wage)	-0.13***	-1.06***	1.32***	-0.67***	-5.51***	6.94***	-0.20*	-1.55***	2.28***
	(0.04)	(0.10)	(0.10)	(0.23)	(0.54)	(0.53)	(0.10)	(0.23)	(0.25)
Cultural Variables									
High School Graduate	16.59***	26.75***	-19.73***	16.60***	26.82***	-19.84***	16.53***	26.27***	-19.26***
	(3.38)	(8.14)	(6.87)	(3.38)	(8.14)	(6.87)	(3.38)	(8.19)	(6.94)
Some College	22.55***	20.44**	-11.27	22.59***	20.76**	-11.69	22.66***	21.22**	-12.62*
	(3.39)	(8.49)	(7.26)	(3.39)	(8.50)	(7.27)	(3.39)	(8.55)	(7.33)
College and Beyond	45.53***	21.25**	-19.71***	45.65***	22.25**	-20.79***	46.72***	31.13***	-31.76***
	(3.89)	(8.83)	(7.45)	(3.88)	(8.83)	(7.45)	(3.83)	(8.83)	(7.48)

(Continued)

Table A2. (Continued)

	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time
	Adding 10^{-20} to Hourly Wage for Zero Wage			Added 0.001 to Hourly Wage for Zero Wage			Added 1 to Hourly Wage for Zero Wage		
Black (Non-Hispanic)	-23.14***	-8.09	10.57	-23.14***	-8.1	10.55	-23.24***	-8.95	11.47*
	(2.99)	(7.29)	(6.55)	(2.99)	(7.30)	(6.55)	(2.99)	(7.34)	(6.59)
Hispanic	-18.89***	20.18***	0.46	-18.89***	20.17***	0.46	-18.94***	19.76***	0.91
	(2.62)	(6.21)	(5.56)	(2.63)	(6.21)	(5.57)	(2.63)	(6.24)	(5.60)
Other Race	-6.58	6.34	2.74	-6.57	6.42	2.63	-6.51	6.9	1.86
	(4.17)	(8.60)	(7.50)	(4.17)	(8.60)	(7.50)	(4.16)	(8.62)	(7.49)
Demographic and Household Variables									
Single	-2.99	-57.02***	41.32***	-3.01	-57.17***	41.47***	-3.18	-58.61***	43.13***
	(2.60)	(5.87)	(5.03)	(2.60)	(5.88)	(5.03)	(2.60)	(5.90)	(5.07)
Coresident Female Adult	-25.91***	-51.73***	44.05***	-25.92***	-51.79***	44.11***	-25.98***	-52.35***	44.83***
	(5.21)	(13.72)	(11.23)	(5.21)	(13.73)	(11.24)	(5.20)	(13.81)	(11.38)
Coresident Male Adult	-29.42***	-56.84***	30.41***	-29.44***	-57.05***	30.63***	-29.69***	-59.11***	33.10***
	(3.19)	(7.88)	(6.26)	(3.19)	(7.89)	(6.26)	(3.19)	(7.93)	(6.31)
Employed Coresident Female Adult	-48.47***	-98.68***	67.49***	-48.51***	-98.98***	67.83***	-48.72***	-100.73***	70.04***
	(5.06)	(13.73)	(13.19)	(5.06)	(13.73)	(13.19)	(5.06)	(13.79)	(13.26)
Employed Coresident Male Adult	-51.95***	-158.67***	95.30***	-52.03***	-159.33***	96.06***	-52.57***	-163.74***	101.71***
	(4.31)	(10.77)	(9.35)	(4.30)	(10.77)	(9.35)	(4.30)	(10.77)	(9.39)
Mother's Age	-0.40***	-1.63***	-0.47*	-0.39***	-1.61***	-0.49**	-0.38***	-1.47***	-0.67***
	(0.10)	(0.27)	(0.24)	(0.10)	(0.27)	(0.24)	(0.10)	(0.27)	(0.24)

(Continued)

Table A2. (Continued)

	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time	Primary Care Activities	Supervisory Care	Social Time
	Adding 10^{-20} to Hourly Wage for Zero Wage			Added 0.001 to Hourly Wage for Zero Wage			Added 1 to Hourly Wage for Zero Wage		
Number of Children	7.99***	7.91***	-2.16	7.99***	7.89***	-2.14	7.96***	7.66***	-1.87
	(1.08)	(2.34)	(1.91)	(1.08)	(2.34)	(1.91)	(1.08)	(2.35)	(1.93)
Age of Youngest Child	-9.80***	-4.42***	5.80***	-9.80***	-4.43***	5.81***	-9.81***	-4.49***	5.89***
	(0.26)	(0.62)	(0.58)	(0.26)	(0.62)	(0.58)	(0.26)	(0.62)	(0.59)
Presence of Boy	1.74	-1.59	-2.96	1.74	-1.6	-2.94	1.73	-1.64	-2.88
	(1.96)	(4.50)	(3.90)	(1.96)	(4.50)	(3.90)	(1.96)	(4.52)	(3.93)
Other Variables									
Summer	11.32***	-14.78**	2.67	11.32***	-14.83**	2.72	11.30***	-14.99**	2.92
	(2.44)	(5.81)	(4.77)	(2.44)	(5.82)	(4.78)	(2.44)	(5.84)	(4.80)
Weekend	-38.38***	169.31***	-141.81***	-38.38***	169.32***	-141.83***	-38.38***	169.33***	-141.88***
	(1.69)	(4.03)	(3.38)	(1.69)	(4.03)	(3.39)	(1.69)	(4.04)	(3.40)
Metropolitan	6.64**	-15.38***	-0.37	6.65**	-15.29***	-0.49	6.71**	-14.83**	-1.16
	(2.61)	(5.88)	(5.07)	(2.61)	(5.88)	(5.07)	(2.61)	(5.91)	(5.10)
Constant	150.60***	608.08***	60.35**	151.68***	617.07***	49.49*	153.23***	630.15***	34.11
	(14.14)	(32.91)	(28.03)	(14.11)	(32.90)	(27.97)	(14.10)	(33.08)	(28.08)
N	134,734	134,734	134,734	134,734	134,734	134,734	134,734	134,734	134,734
R-squared	0.222	0.208	0.315	0.222	0.207	0.315	0.222	0.204	0.31

Note: Year dummies were included in the analysis but not reported.
Standard errors are presented in parentheses.
p<0.05, ** p<0.01, *** p<0.001

Table A3. Regression Results with Complete Controls from Table 1.5

	Primary Care Activities			Supervisory Care			Social Time		
	Married	Cohabiting	Single	Married	Cohabiting	Single	Married	Cohabiting	Single
Economic Variables									
Usual Work Hours	-0.96***	-1.57***	3.34***	-1.55***	-4.61***	6.28***	-0.63***	-1.75***	3.44***
	(0.10)	(0.28)	(0.28)	(0.43)	(0.97)	(1.03)	(0.13)	(0.34)	(0.38)
Full-time	-28.68***	-89.44***	114.24***	-1.69	14.55	24.1	-2.92	-45.17***	84.73***
	(4.95)	(12.73)	(12.27)	(17.47)	(43.14)	(46.69)	(6.03)	(15.42)	(17.29)
Part-time	-12.54***	-53.86***	54.26***	7.72	-86.26**	45.24	-2.01	-58.13***	51.37***
	(4.02)	(9.43)	(7.77)	(21.13)	(35.40)	(37.81)	(5.73)	(13.98)	(14.99)
Unemployed	-26.45***	-41.81***	44.53***	-5.34	-37.85	14.33	-6.16	-15.35	18.77
	(6.56)	(15.37)	(10.43)	(22.41)	(36.41)	(23.82)	(6.97)	(15.59)	(13.26)
Log(Household Income)	10.36***	-0.25	-0.81	4.15	-0.42	-3.71	-0.61	-6.84	6.28
	(1.80)	(3.97)	(2.96)	(6.61)	(11.18)	(10.61)	(1.96)	(4.89)	(4.40)
Log(Hourly Wage)	-0.27**	-1.42***	2.09***	0.42	-0.09	1.36	-0.23	-1.67***	2.78***
	(0.12)	(0.27)	(0.29)	(0.59)	(1.49)	(1.70)	(0.21)	(0.55)	(0.60)
Cultural Variables									
High School Graduate	14.10***	14.88	-4.69	7.35	24.7	-5.97	18.31***	35.41***	-34.99***
	(4.79)	(11.23)	(7.77)	(15.23)	(26.16)	(23.75)	(4.65)	(11.90)	(11.22)
Some College	22.27***	16.27	-7.37	15.47	20.79	-8.89	19.37***	20.94	-14.49
	(4.84)	(11.58)	(8.48)	(15.58)	(28.49)	(24.96)	(4.65)	(12.81)	(11.76)
College and Beyond	46.96***	23.13**	-21.34**	37.64	14.48	-50.81	31.86***	44.80***	-46.07***
	(5.11)	(11.71)	(8.46)	(32.80)	(37.65)	(36.46)	(6.76)	(15.32)	(14.03)
Black (Non-Hispanic)	-23.94***	-15.21	21.49**	-53.65***	-65.84**	78.70**	-23.51***	-0.83	3.91
	(4.49)	(11.53)	(9.89)	(16.35)	(31.26)	(31.26)	(4.03)	(9.83)	(9.11)

(continued)

Table A3. (Continued)

	Primary Care Activities			Supervisory Care			Social Time		
	Married	Cohabiting	Single	Married	Cohabiting	Single	Married	Cohabiting	Single
Hispanic	-23.05***	14.64*	3.46	-27.88**	32.78	31.68	-13.68***	21.70*	-2.27
	(3.37)	(7.73)	(6.41)	(13.15)	(23.54)	(22.58)	(4.24)	(11.12)	(10.53)
Other Race	-5.27	8.06	-1.12	-28.83	-25.3	10.66	-12.18	10.12	0.75
	(4.80)	(9.77)	(7.95)	(28.74)	(53.22)	(37.21)	(7.79)	(19.15)	(18.18)
Demographic and Household Variables									
Female Ext Member	25.03***	-57.84***	40.15**	71.04	241.66***	-206.84	-28.66***	-68.09***	56.78***
	(9.36)	(21.57)	(16.35)	(111.23)	(89.54)	(135.41)	(5.13)	(13.88)	(11.93)
Male Ext Member	-22.74***	-39.03***	13.55*	-42.66***	-67.45*	22.66	-40.87***	-83.18***	60.71***
	(4.01)	(9.48)	(7.20)	(14.26)	(39.41)	(32.48)	(5.23)	(15.25)	(12.94)
Employed Female Ext Member	-39.27***	-102.50***	100.60***	-31.17	9.93	17.54	-50.67***	-96.47***	60.42***
	(10.03)	(23.43)	(24.73)	(22.06)	(48.54)	(46.61)	(5.76)	(16.81)	(15.89)
Employed Male Ext Member	-32.27***	-114.37***	55.45***	-32.76	-112.91*	-34.6	-53.40***	-179.47***	116.66***
	(8.73)	(20.46)	(14.99)	(25.53)	(58.72)	(42.55)	(4.99)	(12.81)	(12.14)
Mother's Age	-0.47***	-3.13***	0.57*	0.14	1.43	1.52	-0.32**	-0.52	-1.30***
	(0.17)	(0.42)	(0.32)	(0.73)	(1.45)	(1.28)	(0.13)	(0.37)	(0.33)
Number of Children	9.11***	9.92***	-3.26	6.2	13.42	1.38	5.48***	5.12	-1.25
	(1.32)	(2.90)	(2.09)	(4.95)	(8.85)	(8.81)	(1.77)	(4.26)	(3.74)
Youngest Age of Child	-10.10***	-0.92	3.51***	-11.46***	-11.02***	0.2	-9.01***	-9.22***	8.43***
	(0.35)	(0.84)	(0.66)	(1.40)	(3.27)	(2.94)	(0.42)	(1.09)	(1.10)
Presence of Boy	3.04	-2.44	-4.45	17.11	-6.94	-7.82	-0.67	-4.08	0.75
	(2.42)	(5.36)	(4.45)	(10.59)	(20.55)	(18.39)	(3.24)	(8.57)	(7.80)

(continued)

Table A3. (Continued)

	Primary Care Activities			Supervisory Care			Social Time		
	Married	Cohabiting	Single	Married	Cohabiting	Single	Married	Cohabiting	Single
Other Variables									
Summer	13.00***	-19.14***	8.03	10.84	-91.63***	32.76	8.14**	-11.69	-1.14
	(3.03)	(6.21)	(5.16)	(9.99)	(22.18)	(20.68)	(4.08)	(12.41)	(10.13)
Metropolitan	6.39**	-21.05***	6.74	30.43*	9.01	-34.59*	4.73	-10.16	-11.09
	(3.14)	(7.14)	(5.87)	(16.80)	(26.82)	(20.74)	(4.52)	(10.82)	(9.82)
Year 2004	-4.15	-14.39	2.13	-6.44	-14.15	47.26	-10.33	-9.75	39.94**
	(4.88)	(10.49)	(8.29)	(26.98)	(39.69)	(34.23)	(6.78)	(16.99)	(16.81)
Year 2005	-14.57***	26.08**	-7.05	-32.02	3.99	91.12**	-8.78	-5.02	21.76
	(5.08)	(11.40)	(9.20)	(21.49)	(45.62)	(40.45)	(7.25)	(16.83)	(15.88)
Year 2006	-12.13**	14.39	0.18	-37.54*	2.91	30.36	-11.81	9.67	12.43
	(5.15)	(11.28)	(9.36)	(22.06)	(45.72)	(36.02)	(7.52)	(18.35)	(16.09)
Year 2007	-10.84**	19.12	-5.99	-35.07	-41.89	34.88	-12.39*	-31.37*	42.88***
	(5.32)	(11.80)	(9.38)	(21.60)	(39.35)	(35.58)	(7.41)	(18.34)	(16.38)
Year 2008	-12.53**	23.63**	-1.34	-0.29	-33.22	38.29	-10.25	37.86*	15.08
	(5.25)	(11.39)	(9.68)	(23.07)	(43.67)	(39.17)	(7.04)	(22.59)	(17.27)
Year 2009	-6.59	1.89	6.72	-27.66	-27.51	37.63	-9.54	-27.05	42.28**
	(5.68)	(11.36)	(9.46)	(22.15)	(39.52)	(36.68)	(7.76)	(17.79)	(16.86)
Year 2010	-11.55**	8.21	-26.23***	-39.66	-44.54	39.16	-17.28**	2.85	-3.29
	(5.03)	(11.11)	(9.44)	(24.60)	(46.02)	(38.95)	(7.31)	(17.79)	(16.12)
Year 2011	-12.44**	7.99	-17.98*	-32.84	-48.11	21	-22.33***	-13.77	7.52
	(5.25)	(11.08)	(9.33)	(23.85)	(37.89)	(35.15)	(7.07)	(17.40)	(16.42)
Year 2012	-14.82***	-21.48*	-17.94*	-28.7	-44.77	43.1	-11.84*	-30.88*	31.80*
	(5.46)	(12.44)	(10.27)	(23.31)	(43.92)	(37.88)	(7.18)	(17.78)	(17.32)
Constant	94.29***	646.69***	43.87	145.62**	560.23***	11.4	192.12***	608.46***	46.12
	(18.87)	(42.29)	(32.36)	(65.04)	(111.37)	(105.07)	(19.41)	(48.28)	(43.45)
R-squared	0.207	0.107	0.256	0.187	0.204	0.316	0.151	0.125	0.211

Note: Standard errors are presented in parentheses. p<0.05, ** p<0.01, *** p<0.001

APPENDIX B

TABLES FOR CHAPTER 2 AND CARE VIGILANCE SCALE

Table B1. The List of ATUS Categories in Child Care and Adult Care

	Household Member	Non-Household Member
Interactive Child Care		
Physical Care	030101 Physical Care for Household Children	040101 Physical Care for non-household children
	0303 Activities Related to Household Children's health	0403 Activities related to non-household children's health
Developmental Care	030102 Reading to/with household children	040102 Reading to/with non-household children
	030103 Playing with household children, not sports	040103 Playing with non-household children, not sports
	030104 Arts and crafts with household children	040104 Arts and crafts with non-household children
	030105 Playing sports with household children	040105 Playing sports with non-household children
	030186 Talking with/listening to household children	040186 Talking with/listening to non-household children
	03299 Activities related to household children's education, n.e.c*	04299 Activities related to non-household children's education, n.e.c*
	030201 Homework (household children)	040201 Homework (non-household children)
	030202 Meeting and school conferences (household children)	040202 Meeting and school conferences (non-household children)
	030203 Home schooling of household children	040203 Home schooling of non-household children
	030299 Activities related to household child's education, n.e.c.	040299 Activities related to household child's education, n.e.c.
Managerial Care	030108 Organization & planning for household child	040108 Organization & planning for non-household child
	030110 Attending household children's events	040110 Attending non-household children's events
	030111 Waiting for/with household children	040111 Waiting for/with non-household children
	080101 Using paid childcare services	
	080102 Waiting associated w/ purchasing childcare services	
	080199 Using paid childcare services, n.e.c*	

(continued)

Table B1. (Continued)

	Household Member	Non-Household Member
Travel	030112 Picking up/dropping off household children	040112 Picking up/dropping off non-household children
	030204 Waiting associated with household children's education	040204 Waiting associated with non-household children's education
	030303 Waiting associated with household children's health	040303 Waiting associated with non-household children's health
	180381 Care-related travel for household child	180481 Care-related travel for non-household child
Other	030109 Looking after household children	040109 Looking after non-household child (as a primary activity)
	030199 Caring for and helping household children	040199 Caring for and helping non-household children
Supervisory Child Care		
	Was your child < 13 in your care?	
Interactive Adult Care		
Caring	0304 Caring for household adults	0404 Caring for non-household adults
Helping	0305 Helping for household adults	0405 Helping for non-household adults
Travel	180382 Travel related to caring for and helping household adults	180482 Travel related to caring for and helping non-household adults

Note: n.e.c. refers to not elsewhere collected.

Table B2. Mapping ADL and IADL Activities onto ATUS Activities

	Child Care	Adult Care
ADL Tasks		
Eating, Getting in/out of Bed, Indoor Mobility, Dressing, Bathing and Toileting	030101 Physical Care	030401 Physical care
	040101 Physical care	040401 Physical Care
IADL Tasks		
Housework/Laundry[2)]	0201 Housework	0201 Housework
Meal Preparation[3)]	0202 Food and Drinks Prep., Presentation, and Clean-up	0202 Food and Drinks Prep., Presentation, and Clean-up
Shopping	07 Consumer Purchases	07 Consumer Purchases
		040501 Housework, cooking & shopping assistance for nonhousehold adults[4)]
Travel	180381 Travel related to caring for and helping hh children	030405 Waiting associated with caring for hh adults
	180401 Travel related to caring for and helping nonhh children	040405 Waiting associated with caring for nonhh adults
	030112 Picking up/dropping off hh children	180382 Travel related to caring for hh adults
	040112 Dropping off/picking up nonhh children	180482 Travel related to caring for nonhh adults
	030204 Waiting associated with household children's education	180399 Travel related to helping hh adults, n.e.c.
	040204 Waiting associated with non-household children's education	180499 Travel related to helping nonhh adults, n.e.c
	030303 Waiting associated with household children's health	
	040303 Waiting associated with non-household children's health	
Get Around Outside	030112 Dropping off/Picking up household child	30503 Picking up/Dropping off
	040112 Dropping off/Picking up nonhh child	40503 Picking up/Dropping off
Management[4)]	030108 Organization & planning for household child	020901 Household Financial Management
	040108 Organization & planning for non-household child	020902 Household Organization and Planning
	030110 Attending household children's events	030502 Organizing and Planning
	040110 Attending non-household children's events	040505 Financial management
	030111 Waiting for/with household children	160107 Telephone calls from/to paid child or adult care providers
	040111 Waiting for/with non-household children	1602 Waiting Associated with telephone calls
	160103 Telephone calls from/to education service providers	
	160107 Telephone calls from/to paid child or adult care providers	

(continued)

Table B2. (Continued)

	Child Care	Adult Care
	1602 Waiting Associated with telephone calls	
	080101 Using paid childcare services	
	080102 Waiting associated w/ purchasing childcare svcs	
	080199 Using paid childcare services, n.e.c*	
Taking Medication	0303 Activities Related to hh children's health	030403 Providing medical care
	0403 Activities related to nonhh children's health	030404 Obtaining medical and care services
Development for Children[6)]	030102 Reading to/with household children	
	040102 Reading to/with non-household children	
	030103 Playing with household children, not sports	
	040103 Playing with non-household children, not sports	
	030104 Arts and crafts with household children	
	040104 Arts and crafts with non-household children	
	030105 Playing sports with household children	
	040105 Playing sports with non-household children	
	030186 Talking with/listening to household children	
	040186 Talking with/listening to non-household children	
	03299 Activities related to household children's education, n.e.c*	
	04299 Activities related to non-household children's education, n.e.c*	
	030201 Homework (household children)	
	040201 Homework (non-household children)	
	030202 Meeting and school conferences (household children)	
	040202 Meeting and school conferences (non-household children)	
	030203 Home schooling of household children	
	040203 Home schooling of non-household children	

(continued)

Table B2. (Continued)

	Child Care	Adult Care
	030299 Activities related to household child's education, n.e.c. 040299 Activities related to household child's education, n.e.c.	

Note:
1) Nonhh stands for Non-household and hh stands for household.
2) Household work for children (both hh and nonhh) and hh adult is not disaggregated. Thus, in the empirical section, the time devoted to this category will be provided by total housework divided by square root of number of household members.
3) Meal preparation is the same as housework. See the note 2).
4) ATUS code 040501 includes housework, cooking, and shopping for nonhh adults. No further disaggregation is feasible.
5) There is no separate financial management for children. Instead I include activities for managing children's events or meeting in management for children as a category of IADLs.
6) Activities related to development for children are included and added in IADLs for Children.

Caregiver Vigilance Scale

The term "vigilance" originates with Carr (1997), who defined it as the close protective involvement of family members with hospitalized relatives. Later Mahoney (1998) further developed the concept in a "Caregiver Vigilance Scale." Her conceptualization grew out of her qualitative research on families caring for relatives with Alzheimer's disease.

The "Caregiver Vigilance Scale" helps qualify supervisory effort. Vigilant caregivers see themselves as responsible for the care recipient even when they are not engaged in specific caregiving tasks. The concept of vigilance includes five categories, from intensive to mild supervision: watchful supervision, protective intervening, anticipating, on duty, and being there (Mahoney, 2003). Among those, for a caregiver, "being there" is an embracing concept across all the stages of caregiving. Therefore, it covers a much wider spectrum of caregiving activities.

For instance, "being there" activities in the early and middle stages include guiding, preserving the care recipient's functioning, and avoiding situations that highlight mental decline and embarrass or frustrate the care recipient. In the last stage, "being there" means that caregivers believed their presence was important even when the person no longer recognized them and continued even after hospitalization or institutional placement. "Being there" includes the watchful supervision of care recipient activities to ensure safety.

The questions used to construct the scale utilize simple, easily understood, literal words and examples that are designed to be familiar to multicultural caregivers and directly translatable. A similar response format (Yes/No) is carried throughout in asking

whether the caregiver believes the care recipient could be left alone in a room before requesting the time estimate. The box below presents the four vigilance questions taken from the study by Mahoney (1998).

Example Questions from Caregiver Vigilance Questionnaire

1. In the case of a family emergency, are you able to leave (name person) home alone, that is, with no one else there?
   Response: No/Yes
   1a. If yes, then ask: How long can you leave (name person) alone?
   Response: in __ hour(s): __minutes.

2. Can (Name person) be left alone in a room as long as someone is in the house?
   Response: No/Yes
   2a. If yes, then ask: How long can you leave (name person) alone in a room?
   Response: in __hour(s): __minutes.

3. Some people have told us that they feel their caregiving is a time-consuming job. They say that even when they aren't actually doing something special for or with their relative, they feel "on duty" or the need to "be there" for him/her. About how many hours a day do you feel the need to "be there" or "on duty: to care for (name person)?
   Response in __hour(s)

4. About how many hours a day do you estimate that you are actually doing things for (name person)?
   Response in __hour(s)

APPENDIX C

TABLES FOR CHAPTER 3

Table C1. Household Production Categories Based on ATUS data

	Code	ATUS Description
Cooking and Cleaning	020201	Household Activities: Food and drink preparation
	020202	Household Activities: Food presentation
	020203	Household Activities: Kitchen and food clean-up
	020299	Household Activities: Food and drink prep, presentation, and clean-up, n.e.c.
Housework	020101	Household Activities: Interior cleaning
	020102	Household Activities: Laundry
	020103	Household Activities: Sewing, repairing, and maintaining textiles
	020301	Household Activities: Interior arrangement, decoration, and repairs
	020399	Household Activities: Interior maintenance, repair, and decoration, n.e.c
	020401	Household Activities: Exterior cleaning
	020104	Household Activities: Storing interior household items, including food
	020199	Household Activities: Housework, n.e.c.
Active Child care	0301	Caring For and Helping Household Members: Caring for and helping household children
	0302	Caring For and Helping Household Members: Activities related to household children's education
	0303	Caring For and Helping Household Members: Activities related to household children's health
	0399	Caring For and Helping Household Members: Caring for and helping household members, n.e.c.
	0401	Caring For and Helping Nonhousehold Members: Caring for and helping nonhousehold children
	0402	Caring For and Helping Nonhousehold Members: Activities related to nonhousehold children's education
	0403	Caring For and Helping Nonhousehold Members: Activities related to nonhousehold children's health
	0801	Professional and Personal Care Services: Childcare services
	160107	Telephone Calls: Telephone calls to/from paid child or adult care providers
Adult Care	0304	Caring For and Helping Household Members: Caring for household adults
	0305	Caring For and Helping Household Members: Helping household adults
	0404	Caring For and Helping Nonhousehold Members: Caring for nonhousehold adults
	0405	Caring For and Helping Nonhousehold Members: Helping nonhousehold adults
	0499	Caring For and Helping Nonhousehold Members: Caring for and helping nonhousehold members, n.e.c.

(continued)

Table C1. (Continued)

	Code	ATUS Description
Home Repairs and Maintenance	020302	Household Activities: Building and repairing furniture
	020303	Household Activities: Heating and cooling
	020402	Household Activities: Exterior repair, improvements, and decoration
	020499	Household Activities: Exterior maintenance, repair, and decoration, n.e.c.
	020502	Household Activities: Ponds, pools, and hot tubs
	020801	Household Activities: Appliance and tool set-up, repair, and maintenance (by self)
	020899	Household Activities: Appliance and tools, n.e.c.
Organizing and Managing	020901	Household Activities: Financial management
	020902	Household Activities: Household and personal organization and planning
	020909	Household Activities: Household management, n.e.c.
Gardening	020501	Household Activities: Lawn, garden, and houseplants
	020599	Household Activities: Lawn and garden, n.e.c.
	0206	Household Activities: Animals and pets
Shopping	070101	Consumer Purchases: Grocery shopping
	070102	Consumer Purchases: Purchasing gas
	070103	Consumer Purchases: Purchasing food (not groceries)
	070104	Consumer Purchases: Shopping, except groceries, food, and gas
	070105	Consumer Purchases: Waiting associated with shopping
	070199	Consumer Purchases: Shopping, n.e.c.
	0702	Consumer Purchases: Researching purchases
	0703	Consumer Purchases: Security procedures related to consumer purchases
	0799	Consumer Purchases: Consumer purchases, n.e.c.
	0802	Professional and Personal Care Services: Financial services and banking
	0901	Household Services: Household services (not done by self)
	0902	Household Services: Home maintenance, repair, decoration, and construction (not done by self)
	0903	Household Services: Pet services (not done by self, not vet)
	0904	Household Services: Lawn and garden services (not done by self)
	0905	Household Services: Vehicle maintenance and repair services (not done by self)
	0999	Household Services: Household services, n.e.c.
	1001	Government Services and Civic Obligations: Using government services
	100301	Government Services and Civic Obligations: Waiting associated with using police/fire services
	100302	Government Services and Civic Obligations: Waiting associated with obtaining licenses
	100399	Government Services and Civic Obligations: Waiting associated with government services or civic obligations, n.e.c.
	1004	Government Services and Civic Obligations: Security procedures related to government services/civic obligations
	1099	Government Services and Civic Obligations: Government services, n.e.c.
	160104	Telephone Calls: Telephone calls to/from salespeople
	160106	Telephone Calls: Telephone calls to/from household services providers
	160108	Telephone Calls: Telephone calls to/from government officials

(continued)

Table C1. (Continued)

	Code	ATUS Description
Travel	1702	Traveling: Travel related to household activities
	1703	Traveling: Travel related to caring for and helping household members
	1704	Traveling: Travel related to caring for and helping nonhousehold members
	1707	Traveling: Travel related to consumer purchases
	1708	Traveling: Travel related to using professional and personal care services
	1709	Traveling: Travel related to using household services
	1710	Traveling: Travel related to using government services and civic obligations
Other Household Chores	020701	Household Activities: Vehicle repair and maintenance (by self)
	020799	Household Activities: Vehicles, n.e.c.
	020905	Household Activities: Home security
	029999	Household Activities: Household activities, n.e.c.
Supervisory (overlapped with any form of non-market household production except primary childcare)		"Where your child under 13 was in your care?" for all children under 13 during non-market household production activities.
Supervisory (Not-overlapped with any other productive activities)		"Where your child under 13 was in your care?" for all children under 13 during activities except for non-market household production and sleeping.

Table C2. Median Hourly Wage for Specialist Child Care Activities, 2003-2012 (in dollars)

Child Care Category	Occupation	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Physical Care	Nanny/Babysitter [a]	9.00	9.25	9.50	9.75	10.00	10.20	10.40	10.60	10.80	11.00
Developmental Care	Preschool and Kindergarten Teachers[b]	10.67	11.51	12.09	12.45	12.40	12.80	13.20	14.04	14.50	15.89
Managerial Care	Education Administrators, Preschool and Childcare Center Programs	16.59	17.18	17.79	18.15	18.55	19.20	19.74	20.65	21.07	21.13
Travel Care	Taxi Driver/Chauffeur	9.14	9.41	9.60	9.78	10.01	10.36	10.56	10.79	10.94	10.97
Supervisory Care (Overlapped with any form of non-market household production except primary child care)	Maid/housekeeper wage plus 50% premium	11.92	12.20	12.33	12.68	13.23	13.70	13.89	13.92	13.98	14.12
Supervisory Care (Not-overlapped with any other productive activities)	Minimum wage	5.15	5.15	5.15	5.15	5.85	6.55	7.25	7.25	7.25	7.25

Note: [a] We utilize estimates of a median nanny/babysitter wage for care of one child based on a variety of web-based sources. These are a closer substitute for parental care than childcare workers' wages, which average about 1.5 dollars per hour less.

[b] We utilize wage rates for preschool and/or kindergarten teachers in part because hourly wage estimates are not available for other teachers (due to their nine-month work schedule). Data are aggregated slightly differently in different years; in 2003, for instance, they are for preschool teachers only. In those years we adjust upwards slightly.

Unless otherwise noted, wages based on Occupational Employment Statistics, available at http://www.bls.gov/oes/current/oes_nat.htm for 2012, and http://www.bls.gov/oes/2003/may/oes_nat.htm for 2003; wage rates for years 2004-2011 are interpolated.

Table C3. Median Hourly Wage for Specialist Nonmarket Activities (other than child care), 2003 and 2012 (CES-NACIS)

	BLS Industry (CES- NACIS)	2003	2012	Assumed Quality Adjustment
Cooking and Cleaning	Food services and drinking places	8.07	10.59	75%
Housework	Janitorial services	9.34	11.34	75%
Home Repairs and Maintenance	Household goods and repair services	14.58	15.75	75%
Child Care[1]				
Adult Care	Services of the elderly and disabled	10.37	12.60	100%
Gardening and Pet Care[2]	Landscaping services	11.99	14.61	75%
	Pet care services	11.92	12.86	
	Average	11.96	13.74	
Shopping	Leisure and Hospitality	9.00	11.62	100%
Organizing and Managing[3]	Professional and business services	17.21	23.28	75%
	Individual and family services	11.84	14.13	
	Average	14.53	18.71	
Travel	Leisure and hospitality	9.00	11.62	100%
Other Household Chores	Individual and family services	11.84	14.13	100%

Note:

1. Wages for child care are taken from other source, which is discussed in the paper (See Appendix Table 2).

2. Wages for gardening and pet care are calculated by averaging wages for landscaping services and pet care services.

3. Wages for organizing and managing are calculated by averaging wages for professional and business services and individual and family services.

Table C4. Average Intensity in Specific Types of Child Care (Ratio of children under 13 to individuals 18 and over, reported present, ATUS 2003-2012)

	Intensity (all individuals 18 and over)	Intensity (18 and over and living with at least one child)	Single Mothers (18 and over and living with at least one child)	Married Mothers (18 and over and living with at least one child)
Physical	1.28	1.36	1.40	1.41
Developmental	1.16	1.32	1.32	1.35
Managerial	0.91	1.07	1.14	1.10
Travel	0.86	0.99	0.94	1.08
Supervisory (overlapped with any form of non-market household production except primary childcare)	0.70	0.76	0.86	0.80
Supervisory (Not-overlapped with any other productive activities)	0.61	0.70	0.81	0.71

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