NBER WORKING PAPER SERIES

INEQUALITY IN THE JOINT DISTRIBUTION OF CONSUMPTION AND TIME USE

Jeehoon Han
Bruce D. Meyer
James X. Sullivan

Working Paper 25199
http://www.nber.org/papers/w25199

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 2018

Earlier versions of the paper were titled “Economic Well-Being and Time Use.” We would like to thank Grace Finley, Lorenz Kueng and Daniel Reck for helpful comments, Erik Hurst and Justin Wolfers for helpful discussions on an earlier version of this paper, and Janna Johnson, Nikolas Mittag, and Kevin Rinz for excellent research assistance. We also thank the Russell Sage, Alfred P. Sloan, and Charles Koch Foundations for their support, and seminar participants at George Washington University, the University of Notre Dame, and the Society of Labor Economists Annual Meeting for their comments. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

Inequality in the Joint Distribution of Consumption and Time Use
Jeehoon Han, Bruce D. Meyer, and James X. Sullivan
NBER Working Paper No. 25199
October 2018
JEL No. D63,I3,J22

ABSTRACT

This paper examines inequality in both leisure and consumption over the past four decades using time use surveys stretching from 1975 to 2016. We show that individual and family characteristics, especially when including work hours, explain most of the long run variation in leisure. We then use these characteristics to predict the distribution of leisure in the Consumer Expenditure Survey, a survey that also provides detailed information on consumption. The advantage of this approach is that it gives us measures of consumption and leisure at the family level within a single data source. We find that leisure time is highest for families at the bottom of the consumption distribution, and typically declines monotonically as consumption rises. However, the consumption-leisure gradient is small. We find noticeable differences across family types, with the gradient being largest for single parent families and single individuals and smallest for families with a head age 65 or older. Overall, these results indicate that including both leisure and consumption, as opposed to just consumption, in a measure of economic well-being will result in less inequality. However, because the consumption-leisure gradient is not very steep, the dampening effect of leisure on overall inequality is small.

Jeehoon Han
University of Chicago
1155 E 60th Street
Chicago, Illi 60637
United States
jeehoon@uchicago.edu

James X. Sullivan
Department of Economics
3108 Jenkins Nanovic Halls
University of Notre Dame
Notre Dame, IN 46556
James.X.Sullivan.197@nd.edu

Bruce D. Meyer
Harris School of Public Policy
University of Chicago
1155 E. 60th Street
Chicago, IL 60637
and NBER
bdmeyer@uchicago.edu

I. Introduction

There is a growing national debate in the U.S. on trends in the distribution of economic well-being. This debate and most analyses of economic well-being rely almost exclusively on wage or income data. The official measure of poverty in the U.S. is based on pre-tax money income, and much of the discussion of economic inequality in the U.S. concentrates on income inequality. Income is an important indicator of economic well-being as it reflects the resources available for consumption. Though measures of income are readily available from many data sources, recent studies have emphasized that consumption is a better measure of well-being than income, and a growing number of studies have examined trends in economic well-being using consumption.[1]

Economic well-being, however, depends on the consumption of not just goods and services, but also the consumption of time. Time spent in leisure activities has risen in recent decades as has leisure inequality (Robinson and Godbey, 1999; Aguiar and Hurst, 2007; Ramey, 2007). Leisure has increased more for low-educated individuals than for the high educated, particularly between 1965 and 1975, suggesting that changes in leisure might counterbalance other changes economic inequality (Aguiar and Hurst, 2007). However, it is not clear if the amount of leisure, or its growth over time, is greatest for families with low consumption (in which case inequality of consumption would overstate the dispersion of economic well-being) or families with high consumption (in which case inequality of consumption would understate overall dispersion in economic well-being).

Understanding the joint distribution of consumption and leisure is particularly important when analyzing trends in well-being over time given major policy initiatives that are explicitly designed, in part, to reduce leisure time, such as welfare reform (Moffitt 2006) or, more recently, efforts to expand work requirements for other federal programs such as SNAP and Medicaid.[2]

---

[1] See Cutler and Katz 1991; Slesnick 2001; Krueger and Perri 2006; Attanasio, Battistin and Ichimura 2006; Fisher et al. (2015); Aguiar and Bils (2015); Meyer and Sullivan (2003, 2008, 2011, 2017).

[2] There is also a view that leisure is not necessarily a good thing from a social perspective and that able-bodied non-aged adults should be encouraged to work. See Haskins (2006), https://www.heritage.org/press/heritage-expert-urges-broader-work-requirements-welfare-system, and Council of Economic Advisers (2018).

This paper provides a more comprehensive picture of inequality in economic well-being in the U.S. and how this inequality has changed over time by combining information on consumption and leisure for the same families. The primary impediment to conducting this more comprehensive analysis is that measures of leisure and consumption are not typically available in the same data source. We overcome this impediment by imputing leisure time in the Consumer Expenditure Survey (CE). Using time diaries spanning four decades, we estimate the relationship between leisure and other observable characteristics that are also available in the CE, including individual level characteristics such as the work hours, age, education, and marital status, and family level characteristics including family size and composition. We then use these estimates to predict the distribution of leisure for each adult in the CE. We show that these characteristics, especially when including work hours, explain most of the long run variation in leisure.

An important aspect of estimating the leisure distribution is that time use diaries capture leisure time for a single day, while we would like to have an accurate prediction of leisure over a long period. Ideally, the time interval for leisure would be the same as the time interval for consumption. Because the reference period for our consumption measures is a quarter, we use data on daily leisure to predict leisure over a longer period. Specifically, we model leisure as having permanent and transitory components, where the permanent component is average leisure over a long period while the transitory component reflects day-to-day variation around this long-run average. This approach is comparable to the way researchers have frequently modeled income (e.g. Friedman 1957). We find that our prediction equations capture the vast majority of the long-term differences in leisure across individuals.

Using this approach, we predict leisure for all adults in the CE for years when information from time use surveys is available between 1972-1973 and 2016. Having a measure of leisure for all adults in the CE has the added advantage that we can aggregate leisure up to the family level. Time use surveys typically only provide leisure time information for a single individual in the family. Thus, past work on time use has examined individuals, even though 84 percent of people live in families. [3] Individuals in

[3] Based on author's calculations for our main CE sample of adults in 2016.

families typically share resources including time, but often do not consume the same amount of leisure. It is often optimal to specialize instead of share equally, and complicated forms of compensation can and do occur within the family. In such a situation, looking at inequality in individual leisure provides an inaccurate view of the distribution of well-being.

We find modest increases in family level leisure between 1975 and 2016, with much of the rise occurring between 1985 and 2003. The rise in real consumption is much more pronounced than the rise in leisure. Between 1972-1973 and 2016, average family consumption grew by 75 percent, while leisure grew by 2 percent. Looking at the univariate distributions of leisure and consumption, we show that at the family level, consumption is considerably more dispersed than leisure. In 2016 a family at the 90^{th} percentile of the consumption distribution consumed 3.4 times more than a family at the 10^{th} percentile, while a family at the 90^{th} percentile of leisure spent about a third more time on leisure than a family at the 10^{th} percentile.

Our results also show only a modest rise in consumption and leisure inequality over the past four decades. The 90/10 ratio for consumption rose by only 2 percent between 1972-1973 and 2016, although it rose (by 7 percent) between 1972-1973 and 2003, but then fell between 2003 and 2016. The 90/10 ratio for leisure rose by only 3 percent over the past four decades, but leisure inequality fell between 1972-1973 and 1985, and then rose between 1985 and 2016. We see a greater rise in inequality for narrower measures of leisure.

Looking at leisure and consumption together for the same families, we find a weak negative relationship that differs across family types and over time. Leisure time is highest for families at the bottom of the consumption distribution, and typically declines monotonically as consumption rises. However, the consumption-leisure gradient is small—in 2016, families in the bottom consumption decile spent only 1 more hour (about 1 percent) per adult per week in leisure than families in the ninth decile, and leisure in the top consumption decile was about the same as that for the bottom decile. We also find that non-market time is negatively correlated with consumption, and the magnitude of this negative relationship is much larger in absolute value than that between leisure and consumption.

We find noticeable differences in the leisure-consumption gradient across family types, with the gradient typically being largest for single parent families and single individuals and smallest for families with a head age 65 or older. Overall, these results suggest that accounting for both leisure and consumption, as opposed to just consumption, in a measure of economic well-being will result in less measured inequality. However, because the consumption-leisure gradient is not very steep, the dampening effect of leisure on overall inequality is likely to be small. The bivariate relationship between consumption and leisure has changed somewhat over time. The negative relationship peaked in the period around the Great Recession, but then fell so that the leisure-consumption gradient was flatter in 2016 than in 1972-1973. In the period surrounding welfare reform, the bivariate relationship weakened for single parent families, while it moved in the opposite direction for all other family types. This pattern is consistent with welfare reform's emphasis on market work by those with the fewest resources.

II. Data

Time Use Surveys

Our analyses rely on time use data from nationally representative surveys spanning 41 years: the 1975-1976 Time Use in Economics and Social Accounts; the 1985 Americans' Use of Time; and the 2003-2016 American Time Use Surveys (ATUS).[4] All are diary surveys that collect detailed information on how individuals allocate their time for a single day.[5] The 1975-1976 survey includes limited information on the time use of the spouse for married individuals, but we do not include these spouses in our sample.[6]

[4] For time use surveys prior to 2003, we use the American Heritage Time Use Study, a harmonized version of these data (Fisher and Gershuny, 2015). For 2003-2016, we access ATUS data though IPUMS (https://www.ipums.org/timeuse.shtml). Time use data are also available from the 1965–1966 America's Use of Time and the 1992-1994 National Time Use Survey. However, the years we employ are more comparable over time and to the CE. For example, the CE was not administered in the mid-1960s and the 1992-1994 National Time Use Survey does not include information on marital status, which is important for predicting leisure.

[5] Many more activity categories are available in the ATUS than in the earlier time use surveys. We follow the aggregate categories defined by the American Heritage Time Use Study (AHTUS), which are constructed to be consistent across years (Fisher and Gershuny, 2015).

[6] This survey also interviews individuals repeatedly, but due to high attrition rates we restrict our sample to first interviews for each individual.

Each of the time use samples is nationally representative of individuals 18 and over with some minor exceptions.[7] All analyses reported below are weighted using survey weights. These weights are adjusted so that each day of the week and each survey year is represented equally. We also adjust these weights to hold the demographic composition of the sample constant. Specifically, we first combine the surveys in 1975, 1985, 2003, and 2016, and divide the sample into 27 demographic cells defined by three variables: age (18-39, 40-64, 65 or above), education (H.S. dropout, H.S. degree or some college, College degree or above), and family type (elderly person, non-elderly married person with/without child, non-elderly unmarried person with/without child). We define these cells broadly enough to ensure that there are no empty cells in any of the survey years. We then use the percent of population in each of the 27 demographic cells as our fixed demographic weights when calculating results.

We impose a few restrictions on the observations included to construct our analysis samples. First, the 1985 survey only includes individuals 18 and older, so we exclude individuals under 18 from the other surveys. We are also primarily interested in the time use of adults, so we would likely make this restriction in any case. Second, we exclude observations that have missing values for some of the key observable characteristics used to predict leisure. As shown in Appendix Table 1, this restriction drops less than 5 percent of the sample in all years except in 1985 where 5.5 percent are dropped. Finally, we drop observations with low-quality diaries, which includes those that have 8 or more missing hours in a day and those that have no or just 1 basic activity (i.e. eating, sleeping, personal care, and travel/sports/exercise), and those that report less than 7 different activities in total.[8] This restriction typically excludes less than 2% of the sample. See Appendix Table 1 for additional information on how these restrictions affect our analysis sample in each year.

[7] The 1975 survey excludes individuals living on military bases. The 1985 sample is representative of adults living in households with at least one telephone. See Appendix Table 1 for more details on the samples.

[8] We apply this definition of low-quality diaries for the ATUS surveys (2003-2016), but for 1975 and 1985, we use the designation of low-quality diaries from Fisher and Gershuny (2015), which is similar.

The Consumer Expenditure Survey

Our consumption data come from the Consumer Expenditure Survey (CE), which is the most comprehensive source of consumption data in the U.S. We use the Interview component of the CE for the years closest to those for which we have time use data: 1972-1973, 1985, and 2003-2016. Expenditure data are reported at the level of the consumer unit, which is defined as either a group of individuals who are related by blood or marriage, a single or financially independent individual, or two or more persons who share resources.[9] After an initial interview that does not provide publicly available data, consumer units are interviewed on a quarterly basis for up to four quarters, but we treat each quarterly survey as a separate observation.[10] We conduct analyses using CE data at both the individual and family level. As in the time use data, we restrict our sample to individuals 18 and older.[11] All analyses reported below are weighted using survey weights.

Comparing Demographic Characteristics across Surveys

In the analyses that follow, we will predict leisure out of sample (in the CE) using the estimated relationship between observable characteristics and leisure in the time use data. The set of characteristics that we use are strongly related to leisure and are defined similarly in both the CE and the time use surveys. Table 1 compares the means of these demographic characteristics for individuals 18 and older in both data sources for four years: 1975 (1972/73 in the CE), 1985, 2003, and 2016. The characteristics of the time use samples are very similar to those of the CE, but there are notable exceptions. The age, gender, education, and marital status distributions in the CE samples match fairly well with those for the time use samples in most years, although there are some differences in age and education across surveys in 1985. Some of the alignment across data sources results from the fact that the sample weights are constructed in both the time use surveys and the CE to match Census data for certain characteristics, although the characteristics

[9] Individuals are considered to be sharing resources if expenses are not independent for at least two of the three major expense categories: housing, food, and other living expenses.
[10] The 1972-1973 CE provides data on annualized expenditures collected from quarterly interviews.
[11] These individual level data are available in the member files of the CE.

that are matched to the Census has changed over time in the time use surveys.[12] One noticeable difference is that the time use samples have more young children beginning with the 2003 survey, while the reverse was true in earlier years. Differences in the sampling frames and response rates may explain these differences. Our 1975-1976 time use survey is for a sample of respondents to in-person interviews, while the 1985 sample includes those who responded to a mail survey, and the 2003-2016 surveys includes those who completed a phone interview. A study of the 2004 ATUS (Abraham, Maitland, and Bianchi, 2006) shows that the response rates for those with a college degree were much higher (above 60 percent) than those with a high school degree or less (below 50 percent), which is consistent with the slightly greater educational attainment we see in the ATUS surveys as compared to the CE.[13]

As we show below, for the purposes of predicted leisure time, time spent working is considerably more important than individual or family demographic characteristics. Both the CE and the time use surveys provide information on usual hours worked in weeks that an individual works.[14] We also construct a measure of weekly hours worked in the CE that is not conditioned on work that in principle has the same expectation as (seven times) the hours of work in the interview day variable that is available in the time use data. To construct a measure of unconditional hours worked per week in the CE we multiply usual hours by reported weeks worked in the 12 months prior to the survey divided by 52.14. In the time use data, weeks worked is not available, but a measure of unconditional hours worked per week can be constructed by multiplying hours worked in the interview day by 7.

Measures of usual hours worked in weeks that the individual works match up well across data sources both in level and in trend, although average hours in the CE typically

[12] For the 1975 time use survey, the weights adjust the sample to match the Census estimates for age, sex, education, and urbanicity. For 1985, the weights adjust the sample to match the Census estimates for the proportion of full-time working males and females. The ATUS weight (2003-2016) adjusts the sample to match the CPS estimates for age (5-year groups), gender, race-ethnicity (Hispanic or Non-Hispanic), household composition (with children or without children), and education (high school or less or more than high school).

[13] The ATUS sample weights are constructed to match the Census estimates for two education groups (high school or less or more than high school), so when you collapse our ATUS education estimates in Table 1 into these two groups, the means align more closely with the CE.

[14] Hours worked information in the CE and time use samples is reported for a typical week when working, except in the 1985 time use survey where hours are reported for the previous week, regardless of work status.

exceed those in the time use surveys by between 1 and 2.5 hours per week. The mean for unconditional hours worked in the time use sample (which is based on reported hours worked in the interview day) is greater than that for the CE samples (which is based on usual hours and weeks worked).

III. Theoretical Framework and the Measurement of Leisure and Consumption

Measuring Well-Being

There is a surprising dearth of work on how to incorporate measures of time use and consumption into a measure of well-being. Nordhaus (2009) is perhaps the most useful source. He begins by arguing that much of economic welfare depends on nonmarket activity and that time is plausibly the most important nonmarket input and perhaps the most important nonmarket output. He models individual utility for person i at time t as a function of market and nonmarket consumption, and time spent in market work, non-market work and leisure, or

$$(1)\ W_{it} = U\left(C_{it}^{m}, C_{it}^{nm}, B_{it}^{m}h_{it}^{m}, B_{it}^{nm}h_{it}^{nm}, B_{it}^{l}h_{it}^{l}\right),$$

where C denotes consumption, B the state of technology, h hours, while m denotes market time, n nonmarket time, and l leisure time. He notes that this formulation deviates from the usual one in the time use literature because it allows a process value or intrinsic value of time. Nordhaus models individuals as maximizing (1) subject to an income constraint, a nonmarket production function and a time constraint. He takes income and nonmarket production to be proportional to hours in their respective activities. Even after simplifying the constraints in this way and linearizing U, he concludes that any attempt at measurement "is doomed to fail for lack of critical data." In particular, we do not observe nonmarket consumption and do not have estimates of the marginal rates of substitution between time and market consumption, which are needed to determine prices to value the different inputs to utility. Furthermore, Nordhaus addresses an even simpler

case than the present one--that of estimating mean well-being whereas we would seek to estimate the distribution of well-being.

Having indicated the impossibility of an entirely satisfactory approach, we should emphasize that the usual approach in the inequality literature is to entirely ignore leisure despite its importance. This past approach typically models utility as a function of a single argument, either income or consumption. Often in other settings such as labor supply estimation a second argument of utility is included and called leisure, but it is in fact nonmarket time. We do not presume to estimate a version of (1), but rather provide an initial exploration of the first-order characteristics of the consumption and time use distributions. Specifically, we will consider the univariate and bivariate distributions of C_{it}^{m} and h_{it}^{l} as well as several alternative measures that incorporate h_{it}^{m} and h_{it}^{nm}.

An alternative approach to measuring well-being focuses on the market wage—this is the so called full income approach. If one considers the leisure/work first order condition, then the last hour of work must have an after-tax payoff equal to the leisure given up (though in the Nordhaus framework it is the net value which only pins down the difference in value between market time and leisure). Unfortunately, individual wages are not a close approximation to family well-being. Only half of adults have a wage, and taxes and private and government transfers make well-being very different from the wage even for those for whom a wage is observed. The process from wages to family material well-being depends on many processes including family formation, fertility, labor supply, and disability. In addition, we need to account for intertemporal behavior by a family through saving and borrowing, and flows of resources from outside, in particular transfers from family, friends, and the government. These processes will differ across families and over time. If we ignore these features we miss that wages are endogenously dependent on them and that changes in wages may be counteracted by them. In other words, the distribution of wages is very far from the distribution of well-being.

Defining Leisure

While a growing literature examines leisure in the U.S., there is little consensus on exactly how to define leisure (for example see Biddle and Hamermesh 1990; Aguiar and Hurst 2007, 2009, 2013; and Ramey 2007). Ambiguity arises because some

activities, such as gardening, can be viewed as either time in nonmarket production or leisure. In addition, other activities such as sleeping provide utility while at the same time serving as intermediate inputs that may increase productivity. Furthermore, for our analyses that combine both consumption and leisure, issues of double counting arise because some expenditures are made in order to increase leisure time such as spending on domestic service and babysitting. Our main measure of consumption, well-measured consumption (defined below), does not include these spending categories that are potentially intermediate products.

One way to think of leisure is as those activities where time and expenditures are complements (or at least not substitutes). For example, one spends money to play sports, and although a walk in the park may be free, one would not pay someone else to take that walk for them.

For the analyses presented below, our base definition of leisure includes activities where time and expenditures are complements such as "entertainment/social activities/relaxing" and "active recreation," as well as time spent sleeping, eating, and on personal care that can be thought of as intermediate inputs but also provide direct utility. Finally, we include some activities that may be categorized as both leisure and home production such as gardening.

A second standard that also points to our base leisure definition is based on hedonic psychology or emotions research. The measure of leisure includes activities that survey respondents have reported as relatively enjoyable. To demonstrate this, in Table 2 we report the time use categories from Robinson and Godbey (1999), ranking them by how enjoyable survey respondents reported each activity to be.[15] For comparison, we also construct rankings of affect measures of happiness and meaning using data from the ATUS Well-Being Module from 2010, 2012, and 2013, aligning the ATUS activities so they are comparable to those reported from Robinson and Godbey (1999).[16] Specifically,

[15] Robinson and Godbey (1999) use data from the 1985 Time Use Survey.

[16] We construct our affect measures of happiness and meaning using response from two questions in the ATUS Well-Being Module asked in reference to specific activities: 1) "From 0 to 6, where a 0 means you were not happy at all and a 6 means you were very happy, how happy did you feel during this time?" and 2) "From 0 to 6, how meaningful did you consider what you were doing? 0 means it was not meaningful at all to you and a 6 means it was very meaningful to you." For each respondent, these questions were asked in reference to three randomly chosen activities.

using the ATUS data we regress the reported affect measure on activity indicators and individual fixed effects for individuals age 18 and older, and then use the coefficients on the activity indicators to rank the activities.

In general, there is a fair amount of consistency across these rankings. The top rated activities as reported in Robinson and Godbey (1999) typically also rank high according to both of the affect measures. Two exceptions are time spent at bars or lounges and time spent watching movies, which are not ranked as high based on how meaningful the activity is. Our measure of leisure includes all activities ranked higher than market work in the enjoyment index constructed by Robinson and Godbey (1999) with a few minor exceptions. For example, work breaks and lunch breaks are ranked higher than market work, but we include these activities in market work rather than leisure. Also, we exclude civic and religious activities from leisure to be consistent with the previous literature.

Our measure of leisure is also similar to "Leisure Measure 2" defined in Aguiar and Hurst (2007), although we do not include pet care in our measure and we do include certain components of childcare such as playing with kids, reading/talking with kids, and supervise/help with homework.[17] We examine the extent to which our main findings are sensitive to how leisure is defined, considering both narrower and wider definitions. We consider a narrower definitions that excludes time spent eating, sleeping, and in personal care. We also consider two broader measures: one that adds time spent in childcare[18] and non-market time, which includes all activities except market work.

Definitions of Consumption

The CE collects information on expenditures for a large number of spending categories. To convert reported expenditures in the CE into a measure of consumption, we make a number of adjustments. First, we convert vehicle spending to a service flow

[17] Other differences arise because we split some categories that Aguiar and Hurst (2007) classify as leisure into leisure and non-leisure. For example, Aguiar and Hurst (2007) include all time spent on telephone calls as leisure, while we include only calls from friends and neighbors as leisure. Relative to overall leisure these differences are quite small.

[18] Ramey (2007) argues that childcare should not be included in leisure. Others have noted that childcare has a large and positive income elasticity, which is in stark contrast to both leisure and home production that have negative income elasticities (Guryan, Hurst, and Kearney, 2008).

equivalent. Instead of including the full purchase price of a vehicle, we calculate a flow that reflects the value that a consumer receives from owning a car during the period that is a function of a depreciation rate and the current market value of the vehicle. To determine the current market value of each car owned, we use detailed information on vehicles (including make, model, year, age, and other characteristics). This approach accounts for features and quality improvements through what purchasers are willing to pay. See the Data Appendix for more details on how we calculate vehicle service flows.

Second, to convert housing expenditures to housing consumption for homeowners, we substitute the reported rental equivalent of the home for the sum of mortgage interest payments, property tax payments, spending on insurance, and maintenance and repairs. Finally, to arrive at our measure of total consumption, we exclude spending that is better interpreted as an investment such as spending on education and health care, and outlays for retirement including pensions and social security.[19] We exclude out of pocket medical expenses because high out of pocket expenses may reflect substantial need or lack of good insurance rather than greater well-being (more details on our measures of consumption are in the Data Appendix).

Recent research has shown that some components of consumption reported in the CE compare quite favorably to national accounts, both in levels and in changes over time, while other components do not compare well and are deteriorating in quality (Meyer and Sullivan, 2017; Bee, Meyer, and Sullivan, 2015). Incorporating this information, we construct a measure of consumption that is based on its well-measured components including food at home, rent plus utilities, gasoline and motor oil, the rental value of owner-occupied housing, and the rental value of owned vehicles. As shown in Bee, Meyer, and Sullivan (2015), the first four of these components have reporting ratios (CE total compared to National Income and Product Account total) that are high and constant or that decline slowly over time. Although there is not a direct comparison to national accounts for the rental value of owned vehicles, there is evidence that vehicle ownership is reported well in the CE from direct comparisons for new purchases and comparisons of vehicle counts to registrations (Bee, Meyer, and Sullivan 2015).

[19] We also exclude spending on charitable contributions and spending on cash gifts to non-family members. This category is very small relative to total consumption.

There are two key requirements for well-measured consumption to serve as an accurate proxy for total consumption: the well-measured components should have a total consumption elasticity of one and their prices should not change over time relative to those of all items consumed. Meyer and Sullivan (2017) present evidence in support of these requirements. They show that well-measured consumption is close to a constant share of total consumption and has aggregate price changes similar to those of the total consumption bundle. For our main analyses, we rely on "well-measured consumption". However, our results are qualitatively unchanged when we use a measure of total consumption.

Family Level Measures of Leisure and Consumption

The time use surveys provide information on time spent in leisure at the individual level. This allows us to predict leisure at the individual level in the CE as explained in the following section. For our analysis of leisure and consumption, we focus on these measures at the family level for two reasons. First, the leisure time of individuals is not likely to be independent of the leisure time of other individuals in the same family. There may be complementarities across family members or specialization. For example, one family member may engage in market work while another does only non-market work, and compensation across family members can occur in ways that are difficult to observe. Second, we will examine leisure and consumption for the same observation, and our consumption data are only available at the family level. We calculate family level leisure or non-market time as the sum of all leisure or non-market time for adults in the family divided by the number of adults in the family. We express leisure (and non-market time) on a per adult basis because, unlike consumption, there are not likely to be economies of scale in leisure. We base family level leisure off of the leisure time of only the adults in the family because there is limited time use information on children. Focusing on adults also makes sense because children are engaged mostly in schooling and leisure.[20] Our measures of consumption are equivalence scale adjusted using a scale that follows NAS recommendations (Citro and Michael 1995): $(A + 0.7K)^{0.7}$, where A is the number of adults in the family and K is the number of children.

[20] There is some information on the time use patterns of children in the 1993 time use survey and in recent ATUS surveys.

This adjustment allows for economies of scale in consumption, and for differences in consumption for children and adults.

IV. Combining Consumption and Time Use Data

In order to obtain a more comprehensive measure of economic well-being we combine consumption data with information on leisure or non-market time. We closely approximate leisure by estimating the relationship in the time use data between leisure and other observable characteristics that are also available in the CE. We then use these estimates to predict leisure for each family in the CE based on these observable characteristics.

The key methodological issue we face in combining consumption and time use data is determining the best way to predict time use. We observe leisure for one day but we would like to have an accurate prediction of leisure over a long period of time that corresponds to the time interval for consumption, such as a quarter or a year. Therefore, we model leisure as having permanent and transitory components, where the permanent component is average leisure over a long period while the transitory component reflects day-to-day variation around this long-run average. This approach is comparable to the way that researchers have frequently modeled income. To understand this approach, consider the equation

$$(2)\ L_i^* = \beta H_i^* + \gamma' Z_i + \varepsilon_i,$$

where L_i^* is average weekly leisure over a calendar quarter, H_i^* is average weekly hours worked over the same period and Z_i is a vector of covariates such as age and education. What we observe in the time use data, however, is leisure in a single day, L_i , which has both a permanent component, L_i^*, and a transitory component u_i, so $L_i = L_i^* + u_i$, where u_i reflects day-to-day variation around the long-run average as well as measurement error. Substituting for L_i^* in (2) gives us

$$(3)\ L_i = \beta H_i^* + \gamma' Z_i + \varepsilon_i + u_i\ .$$

OLS estimation of (3) will provide consistent estimates of β and γ if the conditional mean of u_i and ε_i are zero given H_i^* and Z_i. The univariate distribution of leisure in a day incorporating the variation in the residuals would overstate the dispersion of average leisure over a long period as long as the variance in u_i is nonzero (and u_i and ε_i are not strongly negatively correlated). However, we are primarily interested in how leisure co-varies with consumption. Thus, we want to estimate

$$(4)\ E[L_i^*|C_i, H_i^*, Z_i] = \beta H_i^* + \gamma' Z_i + E[\varepsilon_i|C_i],$$

which is consistently estimated as $\hat{\beta} H_i^* + \hat{\gamma}' Z_i$ using the parameter estimates from (3) if $\mathrm{E}[\varepsilon_i|C_i] = 0$. This conditional mean zero assumption is just the typical assumption that what is left out of our leisure prediction equation does not vary systematically with consumption.

Alternatively, we might assume that leisure for person *i* is the same each day, which amounts to assuming that $u_i \equiv 0$. In this case, predicted leisure will capture the co-variation of leisure with consumption if $\mathrm{E}[\varepsilon_i|C_i] = 0$. In this case, one can also estimate the full univariate distribution of long-run leisure conditional on H_i^*, Z_i using quantile regressions. However, as we show below, evidence from panel data on time use suggests that most of the variation in reported leisure in a single day is day-to-day variation.

Our mean prediction approach will allow us to estimate the distribution of long run leisure as long as most of the dispersion in a day's measured leisure (L_i) is measurement error or variation within the quarter (u_i). On the other hand, if there is little measurement error, and most of the variation in daily leisure across individuals reflects long-term differences across individuals (L_i^*), then the mean prediction would significantly understate dispersion. We can examine the relative magnitude of within person variation and across person variation using a panel that has multiple days with time use data for an individual. Although most of the time use surveys we use are for a single cross-section, the 1975-1976 time use survey interviews individuals for up to four

waves. The panel structure of the 1975-76 survey can be represented by the following slight modification of equation (3):

$$(3')\ L_i\ = \beta H_i^* + \gamma' Z_i\ + \varepsilon_i + u_{it}\ ,$$

where t ranges from 1 to 4, since we have up to four responses for the same individual—these responses are at least three months apart.

We decompose the variation in reported leisure in a Table 3 by estimating a random effects version of (3'). The top panel reports the results for all those observations available in the first two periods, while the bottom panel reports the results for those individuals who responded in all four periods. The results for three different leisure definitions are given. We start in column (1) with the variance in seven times reported leisure in a single day (to approximate weekly leisure). We then decompose this variance into the part explained by our prediction equation (column (2)) and the two parts of the error variance, the permanent part captured by ε_i (column (3)) and the transitory part captured by u_{it} (column (4)). For completeness we report the total error variance in column (5).

The key summary statistic, the fraction of the variance in long-term leisure explained by our prediction equation is reported in column (6). For our base leisure measure 82 percent of the variance is explained by our prediction equation. For the narrower definition that excludes eating, sleeping and personal care, the share is lower but at least 62 percent in the two samples. The broader definition has a slightly higher explained share, 86 percent for the shorter (but larger) panel and 83 percent for the longer panel. Thus, our prediction equation explains the vast majority of the variation in leisure across individuals, especially when broader measures of leisure are considered. This decomposition table also shows why our prediction equation performs so well despite the predictions showing much less dispersion than reported leisure in day (as we will see below). Note that the share of the total variance in reported leisure that is transitory (or measurement error) reported in column (7) is always at least 60 percent. Thus, most of the variation in leisure reported in a day is effectively noise.

A variant of our mean prediction approach would be to use hours worked in the day rather than usual hours worked in a week as the key predictor. If we used hours worked in the day, then equation (3) could be written as

$$(5)\ L_i = \beta H_i + \gamma' Z_i + \varepsilon_i + u_i - \beta v_i$$

where $H_i = H_i^* + v_i$ is hours worked in the survey day and v_i is its deviation from usual hours. Note that v_i and u_i will have a strong negative correlation—if you work more than usual in a given day you will enjoy less leisure in that day. The correlation between H_i and $-\beta v_i$ will be positive (because beta is negative), biasing the estimate of β toward zero, but the correlation between H_i and u_i will be the reverse. Thus, an estimate of β from (5) will not necessarily be attenuated. Given this unknown bias, we use usual hours worked rather than hours worked in the day in our specifications we report below.

Our estimates in the time use data build on equation (3), adding a time dimension indicated by the subscript t, while we indicate the time use data with the superscript T. We allow the coefficients on all of the variables to vary with the survey year. Thus, we estimate the parameters of the equation

$$(6)\ L_{it}^T = \beta_t H_{it}^{*T} + \gamma_t' Z_{it}^T + \varepsilon_{it}^T + u_{it}^T .$$

Taking the estimates from (6) we predict leisure in the CE as

$$(7)\ \hat{L}_{it}^C = \hat{\beta}_t H_{it}^{*C} + \hat{\gamma}_t' Z_{it}^C ,$$

where superscript *C* denotes that the variable is measured in the consumption data.

The demographic characteristics included in our specifications are those that are likely to be correlated with leisure and that are defined similarly in both the time use and consumption data. The individual characteristics (Z) include indicator variables for gender, marital status and age and education categories. The most important predictor is *H**, a measure of the hours an individual spends working per week—either a measure of

hours worked in a week when the individual works, or an unconditional measure of hours worked. These measures are the hours worked variables presented in Table 1. The family characteristics in Z include the number of children under 18 in the family, the number of adults in the family, and the number of children under 5. All specifications also include controls for the interview day of the week and interview month.

Estimates from the Time Use Samples

Table 4 reports the coefficient estimates from two different specifications: a simplified version of equation (6) where no hours measure is included (i.e. $\beta = 0$, columns 1-4) and estimates of equation (6) that controls for usual hours worked (columns 5-8). The R^2 for the specification without an hours worked variable is 0.23. The R^2 rises to 0.35 when one controls for usual hours worked per week. When separate regressions are estimated for each year, the resulting R^2s are very similar across years.[21] These R^2s are the fraction of the total variation in reported daily leisure that is explained by our prediction equation. The dependent variable in these specifications, leisure hours per week, is constructed from reported leisure in a specific day. As discussed above, the concept of leisure that we hope to closely approximate for a family is leisure averaged over a long time period, say a quarter or a year. One day's reported leisure will have more variation than that over a longer time period because of measurement error and because of daily variation. Without panel data for all surveys, we cannot calculate the fraction of the long-term variation in leisure that we can explain for all years. However, the evidence in Table 3 discussed above indicates that for the 1975-76 survey 82 percent of the variation across individuals in long-term leisure is explained by our equation.

We report the coefficients for the interaction terms of each of the year dummies with observable individual and family characteristics. Although not reported, each regression also includes interview month dummies and interactions of year with interview day of week. The estimates are qualitatively similar year by year with those 45-54 typically having the least leisure, those 65+ having the most, men having substantially

[21] We also estimated a version of equation (5) where work is measured as hours in the day rather than usual hours. For this specification the R^2 is much higher (0.57), because reported hours in a day can explain a substantial fraction of the variation in reported daily leisure. As we discussed above, however, coefficient estimates from this specification are likely to be biased.

more leisure (conditional on work) and college grads having quite a bit less leisure than the base group of high school graduates. The more children under 18 and the more children under 5 living in the family, the less leisure adults in the family consume. The magnitudes of the coefficients on the hours an individual works (columns 5-8) are similar across years. These estimates suggest that leisure falls by about 0.48-0.54 hours for each additional hour worked. These estimates are only slightly larger than estimates from Aguiar, Hurst, and Karabarbounis (2013) that indicate that about half of the foregone market work hours during the Great Recession were shifted into leisure.

Before predicting leisure in the CE, we compare the distributions of the actual reported value of leisure in a day to the predicted value of leisure in a day using our main approach (using the estimates from columns 5-8 in Table 4). The means for actual and predicted leisure for individuals in the time use data are the same by definition, but as shown in Table 5, the dispersion in predicted leisure is considerably lower than the dispersion in reported daily leisure. In 2016, for example, the 90/10 ratio for actual leisure in a day is 1.91, while this ratio is 1.44 for predicted leisure. This tighter distribution is consistent with the idea that we are aiming to predict the distribution of average leisure over a longer period rather than the distribution of daily leisure.

Predicting Leisure in the CE

Using the estimates from equation (6) (those reported in columns 5-8 of Table 4) we estimate predicted leisure for all adults in the CE. For the years from 1972-1973 to 2016, we report in Figure 1 and Table 5 the means for actual leisure for individuals in the time use data as well as the means for predicted leisure for individuals in the CE. For Figure 1, we interpolate to fill in the pattern between years when the time use data are available. These results show that the pattern for mean predicted leisure in the CE follows very closely the pattern for the time use data, although the mean for predicted leisure in the CE is slightly lower ranging from 0.3 hours lower in the early 1970s to 1 hour lower in 2016. This difference in mean predicted leisure across surveys is consistent with the differences in usual hours worked. For example, in 2016 average usual hours worked in the CE was 1.2 hours more than in the ATUS (Table 1). Multiplying this by the coefficient on usual hours in Table 4 (-0.54), we get a difference in predicted leisure of

0.65, which is 68 percent of the difference in predicted leisure in 2016 reported in Figure 1 and the first row of Table 5.

Table 5 also shows that the full distribution of predicted leisure in the CE aligns fairly closely with the full distribution of predicted leisure in the time use data, although leisure is somewhat less dispersed in the CE than in the time use data. In 2016, for example, the 90/10 ratio for predicted leisure in the time use data is 1.47, while for individual-level leisure in the CE, the ratio is 1.39.

V. Consumption and Leisure Trends in the CE

From the measures of predicted leisure at the individual level in the CE, we can calculate a family level measure of leisure as described above. The remainder of the paper examines these family level measures of leisure and consumption within the CE samples, using our measures of leisure and consumption. Family level leisure is expressed per adult in the family while consumption is equivalence scale adjusted using the NAS recommended equivalence scale as explained in Section III.

Figure 1 reports mean family level predicted leisure in the CE from 1972-1973 to 2016. The patterns for family leisure mirror those for individual leisure, although there are small differences. The reason for this difference is that the family level measure is weighted by family size, rather than number of adults.

Figure 2 reports changes in mean predicted leisure and consumption at the family level since the early 1970s. We report three measures of leisure, nonmarket time, and well-measured consumption in real terms, using a bias-corrected CPI-U-RS deflator, as explained in the Data Appendix. These family level observations are person weighted and we hold the demographic composition of the sample fixed as explained in Section II. As before, we interpolate between years when leisure data are not available. Family level leisure rose modestly over the past four decades. Between 1972-1973 and 2016, average family leisure increased by 2.0 hours (1.8 percent) per adult per week, with much of the rise occurring between 1985 and 2012. Between 1972-1973 and 1985, family leisure time remained flat. Average time spent in leisure grew by 1.7 hours (1.5 percent) between 1985 and 2016. The patterns between the early 1970s and 2003 are consistent with earlier

studies of changes in leisure (Robinson and Godbey, 1999; Aguiar and Hurst, 2007; Ramey, 2007), and the modest increase in leisure between 2003 and 2010 is similar to findings from Aguiar, Hurst and Karabarbounis (2013). The results in Figure 2 extend these earlier studies by reporting leisure at the family level and showing that there is little evidence that leisure continues to rise after 2012. In fact, average leisure declines by 1.8 hours (1.6 percent) between 2012 and 2016.

The pattern is quite similar when childcare is added to leisure, but we see a more noticeable rise in leisure over time when eating, sleeping, and personal care are excluded. Between 1972-1973 and 2016, this narrower definition of leisure rose by 8.5 percent. Unlike leisure, non-market time, which includes both leisure and home production, declined over the past 4 decades, except for a brief period around the Great Recession when it rose. In analyses not reported here, we find that this decline was driven by a decline in non-market time for women. For men, non-market time rose between 1985 and 2016.

The rise in real consumption was much more pronounced than the rise in leisure. Between 1972-1973 and 2016 average consumption grew by 75 percent. The rise was less pronounced after 2003. Consumption fell sharply during the Great Recession and then bounced back a bit, but average real consumption in 2016 was less than 1 percent higher in 2016 than it was at its previous peak in 2008.

Although there are noticeable differences in time spent in leisure across demographic groups, the trends in leisure are quite similar. In Figure 3a we report average predicted leisure at the family level by educational attainment of the head. These results show a clear negative relationship between educational attainment and leisure. In 2016, for example, those without a high school degree consumed about 8.3 hours (7.5 percent) more leisure per adult per week than those with a college degree. All education groups saw a modest increase in leisure since 1985. These differences are similar to those reported in earlier studies focusing on individuals (Aguiar and Hurst, 2007; Ramey, 2007; Aguiar, Hurst and Karabarbounis, 2013). Consumption also increased noticeably for all groups (Figure 3b), but the rise was much more pronounced for those with a college degree than for other educational groups.

We also see different levels but similar trends in leisure across family types. In Figure 4a we present average predicted leisure at the family level for five mutually exclusive and exhaustive groups defined by the age and marital status of the head and the presence of children. Family heads age 65 and over consume more leisure than any other group. In 2016, this group consumed, on average, 13 hours (11 percent) more leisure per adult per week than the next highest group, single individuals. That leisure was flat between 1972-1973 and 1985 for the full sample masks differences by family type, with leisure falling for families with a head over 65 and rising for other family types. Between 1985 and 2016, leisure rose more for families with a head over 65 and for single individuals than for other family types. All family types experienced a significant rise in consumption over the past 4 decades, but the rise differs across these groups (Figure 4b). For example, between 1972-1973 and 2016, average consumption rose by 91 percent for families with a head age 65 and over, while it rose by 61 percent for single individuals.

In Table 6 we report several different measures of inequality including the 90/10, 50/10, 90/50 ratios and other measures of dispersion for consumption, our three different measures of leisure, and non-market time for the CE samples. There are some noticeable differences in the dispersion of these measures. In particular, leisure inequality is small in comparison to consumption inequality. A family at the 90^{th} percentile of the consumption distribution in 2016 consumes 3.4 times that of a family at the 10^{th} percentile. In the case of predicted leisure, a family at the 90^{th} percentile consumes only about 1.3 times the leisure of a family at the 10^{th} percentile. While dispersion is larger for narrower definitions of leisure, even when time spent eating, sleeping, and personal care are excluded from leisure, the 90/10 ratio (1.93 in 2016) is much lower than that for consumption.

We have seen a very modest increase in leisure and consumption inequality over the past 40 years. Between 1972-1973 and 2016, the 90/10 ratio for consumption rose by about 2 percent, with the increase concentrated in the top part of the distribution. The 90/10 ratio for leisure grew by only 3 percent over roughly this same period, and this rise is evident in both the top and bottom halves of the leisure distribution. The pattern for inequality in nonmarket time is quite similar to that of leisure. However, we see a more noticeable rise in inequality for narrower measures of leisure. The 90/10 ratio for leisure

excluding eating, sleeping, and personal care rose by 17 percent between 1972-1973 and 2016, and the rise is evident in both the top and bottom halves of the distribution.

VI. Bivariate Analyses of Consumption and Leisure

The key advantage of having measures of both leisure and consumption in the same data source is that we can examine changes in these important components of well-being for the same families. We are interested in knowing first what the association between consumption and leisure is at each point in time, and second how that association has changed over time. At a point in time, it is not clear if the amount of leisure is greatest for families with low consumption (in which case inequality of consumption would overstate the dispersion of economic well-being) or families with high consumption (in which case inequality of consumption would understate overall dispersion in economic well-being). There has also been a substantial increase in consumption and a modest increase in leisure over the past four decades, though it is not clear if the growth in leisure over time has been greatest for families with low consumption (in which case the modest rise in consumption inequality that we document in Table 6 would overstate the increase in the dispersion of economic well-being) or families with high consumption (in which case the rise in inequality of consumption would understate the change in the overall dispersion in economic well-being).

The Bivariate Relationship at a Point in Time

To examine the joint distribution of consumption and leisure we estimate average family leisure time by decile of the consumption distribution (Table 7). We also estimate the correlation between consumption and leisure and calculate the slope from a bivariate regression of leisure (or nonmarket time) on the percentile of the consumption distribution for families in the CE (Table 8). Finally, we report the locally-weighted, regression smoothed (LOWESS) bivariate relationship between mean leisure and the percentile of the consumption distribution (Figure 5). Most of these results show a clear gradient between consumption and leisure with low consumption families consuming more leisure time than high consumption families. In Table 7, we see that leisure declines

monotonically with consumption except at the very top deciles.[22] Although leisure typically declines with consumption, the differences are small. In 2016, families in the bottom consumption decile spent only 1 more hour (about 1 percent) per adult per week in leisure than families in the ninth decile, and leisure in the top consumption decile was about the same as that for the bottom decile

The negative relationship is also evident in the correlations between leisure and consumption (Table 8), indicating the substitution between consumption goods and leisure time. The slope coefficients in Panel A of Table 8 are negative and statistically significant for all years except 2016. In 2010, for example, a family 10 percentiles higher in the consumption distribution had on average 0.38 hours per week less leisure. Finally, the negative relationship between leisure and consumption is also evident in Figure 5, where the downward sloping plot indicates that in each year leisure declined almost monotonically as consumption rose, although leisure rose with consumption in the top parts of the distribution in 1972-1973 and 2016. Overall, these results suggest that including both leisure and consumption, as opposed to just consumption, in a measure of economic well-being will result in less measured inequality. However, because the consumption-leisure gradient is not very steep, the dampening effect of leisure on overall inequality is small.

The bivariate relationship between consumption and leisure differs considerably across demographic groups, as is evident in Panels B through F of Table 8. The negative relationship between the two well-being measures is strongest for single parent families and for single individuals, and the relationship is weakest for families with a head age 65 and over.

We also examine the bivariate relationship between consumption and two other measures of leisure. These results, which are reported in Table 9, indicate that the negative relationship between consumption and leisure is less evident, particularly in

[22] We calculate bootstrapped standard errors of mean predicted leisure by consumption decile in Table 7, by drawing with replacement bootstrap samples independently from the Time Use and CE data in each year. The size of each bootstrap sample is equal to the size of the original sample for each survey and year. For each bootstrap sample, we first estimate the relationship between leisure and observable characteristics in the time use sample, then use these estimates to predict leisure per adult for each family in the CE sample, then estimate the consumption decile for each family, and finally calculate the mean predicted leisure by consumption decile. We repeat this procedure for two hundred bootstrap samples to obtain the standard errors. The standard errors of the coefficients in Tables 8-11 are calculated in a similar way.

more recent years, when eating, sleeping, and personal care are not included in leisure. For this narrower measure, the estimate of the slope is negative and significant in 1972-1973, 1985 and 2010, but is small and insignificant in 2003 and then turns positive by 2016. For broader measures of leisure, the negative relationship between leisure and consumption is much stronger. For example, when childcare is included in leisure the slope coefficients are negative and significant for all years, indicating considerable substitution between consumption and time spent in childcare.

The negative relationship is even stronger for broader measures of time use. In Table 8 we also consider the bivariate relationship between consumption and non-market time, which includes both leisure and home production. This measure of time is observed directly in the CE, so we do not need to predict it using data from the time use survey. Non-market time is negatively correlated with consumption in all years, and the magnitude of this negative relationship is much larger in absolute value than that between leisure and consumption and is statistically significant. The slope coefficient indicates that in 2016, a family 10 percentiles higher in the consumption distribution had on average 0.82 hours per week less non-market time.

Changes in the Bivariate Relationship Over Time

We are also interested in how the bivariate relationship between consumption and leisure has changed over time. In Tables 7 through 10, we examine the bivariate relationship between consumption and leisure for various years over the past four decades. As shown in Table 7, between 1972-1973 and 2016 average leisure time increased for all consumption deciles, but the rise was more noticeable for families at the top of the consumption distribution than for those at the bottom. During this period, leisure time grew by 1.2 percent for those in the bottom consumption decile, while it grew by 1.9 percent for those in the top consumption decile. The flattening of this bivariate relationship over time is also evident in the correlation and slope estimates reported in Table 8. For the full sample, the estimate of the magnitude of the gradient is between -2.1 and -2.9 for the years from 1972-1973 through 2003. By 2016, however, this gradient had become small and not statistically significant.

Although leisure time increased for all consumption deciles over the entire period, the patterns differ for some subperiods (Table 7). Average leisure rose through 2010 for all consumption deciles, but this rise was more noticeable at the bottom than at the top so the negative relationship between leisure and consumption appears to be greatest at a time when annual unemployment had reached its peak. Leisure then fell between 2010 and 2016 for nearly all consumption deciles. Consequently, the estimates of the slope coefficients (Table 8) are largest in 2010 and the smallest in 2016. The rise in leisure we see in 2010, is likely due, in large part, to a decline in work; both reduced employment and reduced hours among those working. For our sample of adults in the CE, employment rates fell by 6 percent between 2007 and 2010, while hours conditional on working fell by 3 percent. Rising leisure that results from involuntary unemployment is likely to have different implications for economic well-being than when leisure rises for other reasons.

Changes over time for a measure of leisure that includes childcare are similar to those for overall leisure (Table 9). We again see that the estimates of the slope coefficients are largest in 2010 and smallest in 2016. For the narrower measure of leisure that excludes eating, sleeping, and childcare, we also see a more pronounced negative relationship between leisure and consumption in earlier years than in 2016, when this relationship is positive. The bivariate relationship between consumption and non-market time follows a similar pattern as that between consumption and leisure. For the full sample, the estimate of the slope declined in absolute value from -10.6 in 1972-1973 to -8.2 in 2016 (Table 8).

We see sharp differences across family types in the changes over time in the bivariate relationship between consumption and leisure (Panels B through F of Table 8). For families with a head age 65 and over and single mother families, the slope estimates fell in absolute value between 1972-1973 and 2016, while for the other groups, the slope rose in absolute value. In all groups except the elderly we again see that the negative relationship was strongest in 2010. That the bivariate relationship was not stronger for the elderly in 2010 is consistent with the fact that the elderly have less attachment to the labor market. Between 1985 and 2003, the period that surrounds welfare reform, the bivariate relationship weakened both in terms of correlation and slope for single parent

families. For other family types, the bivariate relationship moved in the opposite direction. This pattern is consistent with welfare reform's emphasis on market work by those with the fewest resources.

We also explore whether the bivariate relationship between consumption and leisure differs across two age subgroups defined to evenly split the sample: families with a head age 48 and younger and families with a head older than 48 (Table 10). While consumption is negatively related to leisure in all years for both age groups, the patterns of the negative relationship are somewhat different between them. In particular, for the younger families, the negative relationship between consumption and leisure was stronger in 2016 than it was in 1972-1973, but the reverse is true for older families. For both groups, the negative relationship is strongest in 2010, the period immediately following the Great Recession. However, this peak in 2010 is more noticeable for the families with younger heads, indicating that the recession had a larger impact on this bivariate relationship for this group. As was the case for the full sample, the negative relationship between nonmarket time and consumption is stronger than that for leisure and consumption.

Overall, these changes indicate that while a measure of inequality that incorporates both consumption and leisure may be less pronounced than inequality based on consumption alone, the distribution of leisure had somewhat more of an equalizing effect in the past than it does now.

Robustness

Through a series of alternative specifications, we examine how sensitive our results are to changes in how we predict leisure and measure consumption. One potential concern with our approach to constructing measures of leisure at the family level by predicting leisure for each adult in the family separately is that the leisure time of individuals is not likely to be independent of the leisure time of other individuals in the same family. There may be complementarities across family members or specialization. For example, one family member may engage in market work while another does only non-market work, and compensation across family members can occur in ways that are difficult to observe. Consequently, adults within a family do not consume the same

amount of leisure. This concern is particularly relevant for married couples. Ideally, when predicting leisure for an individual we would control for the characteristics of the other members of the family, including their work hours, but this information is not available for all adults in the family. For the ATUS surveys from 2003-2016, however, we do observe information about the characteristics of the spouse for respondents who are married. For these years, we re-estimated equation (6), including in Z_i, the characteristics of the spouse such as age, education, and usual hours worked. We find that including these spouse characteristics has very little effect on our main findings (results not reported). In fact they have little effect on our measures of predicted leisure even for subgoups such as married parents or those who are married but do not have children.

We also verified that our key findings do not change noticeably when we use hours in a day as opposed to usual hours to predict leisure. Finally, we looked at whether our results change noticeably when we use total consumption instead of well-measured consumption. We find that the bivariate relationship between leisure and total consumption, and the change in this relationship over time, is very similar to that for leisure and well-measured consumption, although the negative relationship is somewhat stronger with total consumption.

Finally, we estimate the relationship between predicted leisure and income rather than consumption using 2003-2016 ATUS data. For these years, we have time use data and family income information available from the same survey, so we do not need data from the CE here.[23] For this analysis, we consider the bivariate relationship between predicted individual level leisure and family income, calculating predicted leisure the same as before, as describe in Section IV.

We find that the negative relationship between leisure and income is considerably more pronounced than that between leisure and consumption. This result likely reflects the fact that income, more so than consumption, is directly related to the number of hours worked, resulting in a negative relationship between leisure and income. The magnitude of the negative relationship is largest in 2010, consistent with the pattern in the relationship between leisure and consumption. Looking across demographic groups, we

[23] In the ATUS, the dollar value of family income is not available. Rather, family income is reported for 16 different income ranges. We use the midpoint of the reported range for each family as their income.

again see that the bivariate relationship is largest (in absolute value) for single individuals and smallest for those with a head over 65.

VII. Conclusions

Economic well-being depends on the consumption of not just goods and services, but also the consumption of leisure time. To characterize more accurately changes in the distribution of well-being in the U.S., we examine measures of leisure and consumption for the same families. We present a methodology for predicting the full distribution of leisure from information on observable characteristics. We show that these characteristics, especially when including work hours, explain most of the long run variation in leisure.

In general, we find that the rise in consumption over the past four decades is much more pronounced than the rise in leisure. Between 1972-1973 and 2016 average family consumption grew by 75 percent, while leisure grew by 2 percent. We also find that consumption is considerably more dispersed than leisure. Consumption and leisure inequality have increased very modestly over the past four decades.

Looking at leisure and consumption together for the same families reveals some interesting facts about the bivariate relationship. In particular, we find a clear, negative relationship between consumption and leisure, but the relationship is fairly weak. In 2016, families in the bottom consumption decile spent only 1 more hour (about 1 percent) per adult per week in leisure than families in the ninth decile, and leisure in the top consumption decile was about the same as that for the bottom decile. We find noticeable differences in the leisure-consumption gradient across family types, with the gradient being largest for single parent families and single individuals and smallest for families with a head age 65 or older. The bivariate relationship between consumption and leisure has changed somewhat over time. The negative relationship peaked in the period around the Great Recession, but then fell so that the leisure-consumption gradient was flatter in 2016 than in 1972-1973. Between 1985 and 2003, the period that surrounds welfare reform, the bivariate relationship weakened both in terms of correlation and slope for single parent families. For other family types, the bivariate relationship moved in the

opposite direction. This pattern is consistent with welfare reform's emphasis on market work by those with the fewest resources.

These results contribute to a growing national debate in the U.S. on trends in the distribution of economic well-being. Previous work has documented rising leisure inequality and rising consumption inequality for some periods. That the rise in leisure has been most pronounced for those without a high school degree has suggested that perhaps the dispersion in economic well-being, and its rise over time, is lower than is implied by inequality in consumption alone. Our results indicate that accounting for both leisure and consumption, as opposed to just consumption, when measuring economic well-being implies less inequality. However, because the consumption-leisure gradient is shallow, the dampening effect of leisure on overall inequality is small.

References

Aguiar, Mark and Erik Hurst (2007): "Measuring Trends in Leisure " *Quarterly Journal of Economics* 969-1006.

Aguiar, Mark and Erik Hurst (2008): "Deconstructing Lifecycle Expenditure " Working Paper.

Aguiar, Mark, and Erik Hurst (2009). "The Increase in Leisure Inequality," 1965–2005. Washington, DC: AEI Press.

Aguiar, Mark, Erik Hurst, and Loukas Karabarbounis (2013): "Time Use During the Great Recession," *American Economic Review*, 103(5): 1664–1696.

Attanasio, Battistin and Ichimura. 2007. "What Really happened to Consumption Inequality in the United States?" in *Hard to Measure Goods and Services: Essays in Honor of Zvi Grilichers*.

Autor, David H, Lawrence F. Katz, and Melissa S. Kearney. "Trends in U.S. Wage Inequality: Re-Assessing the Revisionists," *Review of Economics and Statistics* 90(2), May 2008, 300-323.

Biddle, Jeff and Daniel S. Hamermesh. 1990. "Sleep and the Allocation of Time," *Journal of Political Economy*, Vol. 98, No. 5, Part 1 (Oct.), pp. 922-943.

Berndt, Ernst R. 2006. "The Boskin Commission Report After a Decade: After-life or Requiem?" *International Productivity Monitor* 12: 61-73.

Boskin, Michael et al. 1996. "Toward a More Accurate Measure of the Cost of Living" Final Report to the Senate Finance Committee.

Burtless, Gary. 1999. "Squeezed for Time: American Inequality and the Shortage of Leisure" *Brookings Review*, Fall, 18-22.

Citro, Constance F. and Robert T. Michael. 1995. *Measuring Poverty: A New Approach*, eds. Washington, D.C.: National Academy Press.

Council of Economic Advisers. 2018. Expanding Work Requirements in Non-Cash Welfare Programs, July.

Cutler, David M. and Lawrence F. Katz. 1991. "Macroeconomic Performance and the Disadvantaged." *Brookings Papers on Economic Activity* 2: 1-74.

Fisher, Kimberly and Jonathan Gershuny 2015. American Heritage Time Use Study, release 7 (July 2015). Oxford: Centre for Time Use Research.

Friedman, Milton. 1957. A Theory of the Consumption Function. Princeton University Press.

Gordon, Robert J. 2006. "The Boskin Commission Report: A Retrospective One Decade Later," NBER Working Paper No. 12311.

Guryan, Jonathan, Erik Hurst, and Melissa Kearney (2008). "Symposia: Investment in Children: Parental Education and Parental Time with Children." *Journal of Economic Perspectives* 22 (3): 23–46.

Haskins, Ron. 2006. "Work over Welfare: The Inside Story of the 1996 Welfare Reform Law." Brookings Institution.

Johnson, David S., Stephen B. Reed and Kenneth J. Stewart. 2006. "Price Measurement in the United States: a Decade After the Boskin Report" *Monthly Labor Review*: 10-19.

Krueger, Dirk and Fabrizio Perri. 2006. "Does Income Inequality lead to Consumption Inequality? Evidence and Theory" *Review of Economic Studies* 73, pp. 163-193.

Meyer, Bruce D. and James X. Sullivan. 2017. "Consumption and Income Inequality in the U.S. Since the 1960s," Working Paper, December 2009 (revised August 2017). NBER Working Paper No. 23655.

_____. 2012. "Winning the War: Poverty from the Great Society to the Great Recession". Brookings Papers on Economic Activity, Fall 2012, 133-200.

_____. 2011. "Viewpoint: Further Results on Measuring the Well-Being of the Poor Using Income and Consumption." *Canadian Journal of Economics* 44(1): 52-87.

_____. 2009b. "Five Decades of Consumption and Income Poverty." NBER Working Paper # 14827.

_____. 2008. "Changes in Consumption, Income, and Well-Being of Single Mother Headed Families," *American Economic Review*, December.

_____. 2003. "Measuring the Well-Being of the Poor Using Income and Consumption." *Journal of Human Resources*, 38:S, 1180-1220.

Moffitt, Robert. 2006. "Welfare work Requirements with Paternalistic Government Preferences," *Economic Journal*, Royal Economic Society, vol. 116(515), pp. F441-F458, November.

Nordhaus, William. 2009. "Measuring Real Income with Leisure and Household Production." in Measuring the Subjective Well-Being of Nations: National Accounts of Time Use and Well-Being, Allen B. Krueger ed. University of Chicago Press, p. 125-144.

Ramey, Valerie A. 2007. "How Much Has Leisure Really Increased Since 1965?"

Robinson, John, and Geoffrey Godbey, Time for Life (University Park, PA: Pennsylvania State University Press, 1999).

Schor, Juliet, The Overworked American: The Unexpected Decline of Leisure (New York, NY: Basic Books, 1992).

Slesnick, Daniel T. 2001. *Consumption and Social Welfare*. Cambridge: Cambridge University Press.

Stewart, Kenneth J. and Stephen B. Reed. 1999. "Consumer Price Index Research Series Using Current Methods, 1978-98" *Monthly Labor Review*, June, pp. 29-38.

Data Appendix

A. Measuring Consumption and Spending in the CE

As discussed in Section 3, the main measure of consumption presented in this paper is well-measured consumption, but we also consider how our results change when we use a measure of total consumption. In this appendix section, we describe total consumption, provide details on how some of the subcomponents of consumption are calculated, and highlight how some components have changed over time.

Total Consumption: Consumption includes all spending in our measure of total expenditures less spending on out of pocket health care expenses, education, and payments to retirement accounts, pension plans, and social security. In addition, housing and vehicle expenditures are converted to service flows. For homeowners we subtract spending on mortgage interest, property taxes, maintenance, repairs, insurance, and other expenses, and add the reported rental equivalent of the home. For vehicle owners we subtract spending on recent purchases of new and used vehicles as well vehicle finance charges. We then added the service flow value of all vehicles owned by the family, as described below.

A.1. Estimating Vehicle Service Flows

Our measure of consumption replaces the purchase price of vehicles and vehicle maintenance costs with the service flow value from owned vehicles. Our improved measure of vehicle service flows follows the approach we used in Meyer and Sullivan (2012,b). Previous studies have imputed flows based only on recent spending on vehicles and descriptive characteristics of the family (Cutler and Katz 1991), recent spending on vehicles, vehicle age, and descriptive characteristics of the family (Meyer and Sullivan 2003, 2004), or reported purchase prices and vehicle age (Slesnick 1993). Our approach provides two important improvements upon previous work. First, in addition to vehicle age, our approach uses detailed information for each vehicle (such as make, model, year, automatic transmission, and other characteristics) to determine the market price. Second, we estimate depreciation rates by comparing the reported purchase prices for similar vehicles of different ages. We use the detailed expenditure data for owned vehicles from the 1980-2016 CE.

We determine a current market price for each of the 1.6 million vehicles in the data from 1980-2016 in one of three ways. First, for vehicles that were purchased within twelve months of the interview and that have a reported purchase price (the estimation sample), we take the current market price to be the reported purchase price. This estimation sample accounts for about 14 percent of all vehicles in the 1980-2016 surveys. Second, for vehicles that were purchased more than twelve months prior to the interview and that have a reported purchase price (about 15 percent of all vehicles), we specify the current market price as a function of the reported purchase price and an estimated depreciation rate as explained below.

For the remaining 71 percent of vehicles, we impute a current market price because the purchase price is not reported. Using the estimation sample, we regress the log real purchase price on a cubic in vehicle age, vehicle characteristics, family characteristics, and make-model-year fixed effects.[24] The vehicle characteristics include indicators for whether the vehicle has automatic transmission, power brakes, power steering, air conditioning, a diesel engine, a sunroof, four-wheel drive, or is turbo charged. Family characteristics include log real expenditures (excluding vehicles and health), family size, region, and the age and education of the family head. Coefficient estimates from this regression are then used to calculate a predicted log real purchase price for the i^{th} vehicle ($x_i\hat{\beta}$). The predicted current market value for each vehicle without a reported purchase price is then equal to $\hat{\alpha} * \exp(x_i\hat{\beta})$, where $\hat{\alpha}$ is the coefficient on $\exp(x_i\hat{\beta})$ in a regression of y_i on $\exp(x_i\hat{\beta})$ without a constant term.[25]

To estimate a depreciation rate for vehicles, we compare prices across vehicles of different age, but with the same make, model, and year. In particular, from the estimation sample we construct a subsample of vehicles that are in a make-model-year cell with at least two vehicles that are not the same age. Using this sample, we regress the log real purchase price of the vehicle on vehicle age and make-model-year fixed effects.[26] From the coefficient on vehicle age (β), we calculate the depreciation rate (δ): $\delta = 1 - EXP(\beta)$. The service flow is then the product of this depreciation rate and the current market price. If the vehicle has a reported purchase price but was not purchased within 12 months of the interview we calculate the service flow as: (real reported purchase price)$*\delta(1-\delta)^t$, where t is the number of years since the car was purchased.

Although the 1972-1973 CE data files include an inventory of vehicles owned, we do not use these data to calculate service flows from vehicles for several reasons. First, we do not observe the year the car was manufactured, only whether it was manufactured before or after 1967. Second, we do not observe the model for vehicles manufactured during or before 1967, and for those manufactured after 1967 we only observe a broadly defined model group: subcompact domestic, compact domestic, etc. Thus, rather than using the vehicle inventory data, we impute service flows for owned automobiles using data on reported spending on new and used automobile purchases during the survey year and the reported number of automobiles owned during the year. Specifically, for a sample with

[24] 76 percent of the vehicles without a reported purchase price can be matched to at least one vehicle in the estimation sample with the same make, model, and year, and 69 percent of the remaining 24 percent do not have a match because they are not a car, truck, or van so make and model are not observed. Starting in 2006, vehicles can be matched on make, but not model, because the CE stopped providing information on vehicle model after 2005. For those vehicles without a reported purchase price that do not have the same make, model, and year as at least one vehicle in the estimation sample, but do have the same make and year as a vehicle in the estimation sample, a separate regression is estimated that includes make-year fixed effects instead of make-model-year fixed effects.

[25] This adjustment is made because $\exp(x_i\hat{\beta})$ will tend to underestimate y_i.

[26] The distribution of service flows does not differ noticeably when alternative specifications for depreciation are estimated. For example, specifications that allow the depreciation rate to vary by age of the vehicle (by including a cubic in vehicle age in the regression) yield similar results.

positive spending on automobiles, we regress annual spending for new and used automobiles on a quadratic in total (non-automobile) spending and observable characteristics of the family including family income, family size, and the age, sex, and education of the family head. Parameter estimates from these regressions are used to predict spending on new and used car purchases for all families that own automobiles. We calculate the service flow from automobiles as the product of predicted automobile spending, the number of owned automobiles and a depreciation rate. This approach will understate total automobile flows for some families because the number of automobiles is topcoded at 2. This approach will overstate vehicle flows for families that dispose of an automobile during the survey year if this automobile is included in the total count of automobiles owned. This approach will also overstate vehicle flows for families that have owned their vehicles for an extended time, because we are predicting the value based on recent automobile purchases. Note that unlike our approach for 1985 and 2003-2016, we calculate service flows only for automobiles, not for other vehicles such as trucks, motorcycles, campers, etc., because we do not have reliable information on the total number of each of these types of vehicles owned.

We validate our procedure for predicting the current market value of vehicles for those observations where we do not have a purchase price by comparing the predicted values to published values in National Automobile Dealers Association (NADA) guides. For a given year of the CE we take a random sample of 100 vehicles for which a purchase price was not observed. We then find the average retail price of the vehicle reported in the NADA Official Used Car Guide, using observable vehicle characteristics including make, model, year, number of cylinders, and number of doors. In cases where a unique match is not found in the NADA guide (for example, there might be multiple sub-models listed in the NADA guide), we use the midpoint of the range of prices for the vehicles that match the description of the vehicle from the CE. For the sample of vehicles randomly drawn from the 2000 CE, the correlation between our imputed price and the 2000 NADA price was 0.88. Similarly, for a sample of 100 cars with a reported purchase price, the correlation between the reported price and the NADA price was 0.91.

A.2. Estimating a Rental Equivalent for Families Living in Government or Subsidized Housing

We impute a rental equivalent for families in the CE living in government or subsidized housing using reported information on their living unit including the number of rooms, bedrooms and bathrooms, and the presence of appliances such as a microwave, disposal, refrigerator, washer, and dryer. Specifically, for renters who are not in public or subsidized housing we estimate quantile regressions for log rent using the CE housing characteristics mentioned above as well as a number of geographic identifiers including state, region, urbanicity, and SMSA status, as well as interactions of a nonlinear time trend with appliances (to account for changes over time in their price and quality). We then use the estimated coefficients to predict the 40th percentile of rent for the sample of families that do not report full rent because they reside in public or subsidized housing. We use the 40th percentile because public housing tends to be of lower quality than private housing in dimensions we do not directly observe. Evidence from the PSID indicates that the average reported rental equivalent of public or subsidized housing is

just under the predicted 40th percentile for these units using parameters estimated from those outside public or subsidized housing.

A.3. Comparability over Time

We make two minor adjustments to the measure of total expenditures provided in the CE to maintain a comparable definition of expenditures across our sample period. First, we add in insurance payments and retirement contributions for the 1972-1973 surveys because these categories were not treated as expenditures in these years. This adjustment does not affect consumption measures because these categories are excluded from consumption. Second, the wording for the question regarding spending on food at home in surveys conducted between 1982 and 1987 differed from other years. Several studies have noted that this wording change resulted in a decrease in reported spending on food at home (Battistin 2003; Browning et al. 2003). To correct for the effect of this change in the questionnaire, for the year 1985 we multiply spending on food at home by an adjustment factor which is equal to the ratio of average spending on food at home from 1988 through 1990 to average spending on food at home from 1984 through 1987. These adjustment factors, which we estimate separately for different family types, range from 1.12 to 1.30. Starting with the second quarter of 2007, the question on food away from home changed from a query about usual monthly spending to usual weekly spending. This change resulted in a noticeable increase in reported food away spending. We estimate the effect of the question change by regressing food away spending on a new question indicator, controlling for interview month and reference month (respondents report spending for the previous three months) for survey years 2005 through 2007. Based on these estimates we adjust spending on food away down by 55 percent for the most recent years. This adjustment does not affect our well-measured consumption measure because this measure excludes food away. Reported food away spending is a small fraction of total spending, accounting for about 5 percent of total spending for all consumer units in 2015.[27]

The values for certain spending components are top coded in the public use files, and the threshold values for the top code changes over time. For example, the top code threshold for the monthly rental equivalent value of an owned home increased from $1,000 in 1988 to $1,500 in 1989. Over longer periods the real values of the top code thresholds have typically risen. For example, the value of the rental equivalent threshold in 2014 ($3,200) is 17% greater in real terms than the value of this threshold in 1980 ($1,000).

A.4. Imputing missing values in the 1972-1973 CE

For the 1972-1973 CE, we impute values for some of the key variables in our analysis in cases where these values are missing or there is incomplete information. In the 1972-1973 survey, we do not observe a continuous measure of hours worked for each adult. Rather, we observe whether the adult works and whether he or she works full-time or part-time. From this information, we impute a continuous measure of usual hours worked for adults that work. Using data from the 1980 CE, we regress usual hours

[27] https://www.bls.gov/cex/tables.htm#avgexp.

worked per week on an indicator for whether the person works full-time and controls for age and education for a sample of adults who work. We then use the estimates from this regression to predict usual hours worked for adult workers in the 1972-1973 survey using their reported information on full-time status, age, and education.

Education and marital status are also missing for adults who are neither the head of the family nor the spouse of the head in the 1972-1973 CE (about 15 percent of adults for these years). For these adults with missing education and marital status we assign the mean value of these variables from the 1980 CE. Specifically, we calculate mean education and marital status for individuals that are neither a head or spouse in the 1980 CE by relationship to the head and by education of the head. We then assign the appropriate mean to adults in the 1972-1973 CE who have missing values for these variables.

B. A Bias-Corrected CPI

Bias in the most frequently used price index, the CPI-U, is well-documented (Boskin et al. 1996; Berndt 2006; Gordon 2006; Johnson, Reed, and Stewart 2006). This bias can be very substantial for changes over long time periods. The BLS has implemented several methodological improvements in calculating the CPI-U over the past 25 years. Although the BLS does not update the CPI-U retroactively, it does provide a consistent research series (CPI-U-RS) that incorporates many of the changes.[28] However, a consensus view among economists is that the CPI-U-RS does not make sufficient adjustment for the biases in the CPI-U. Between 1972 and 2005 the CPI-U grew on average between 0.4 and 0.5 percentage points per year faster than the CPI-U-RS, with essentially all of this difference occurring before 1998. A reasonable estimate of the bias in the CPI-U over this period is much larger–about 1.3 percentage points per year between 1978 and 1995.

Given that the CPI-U-RS does not fully correct for bias in reported price changes, the results for consumption we report are indexed using an adjusted CPI-U-RS that subtracts 0.8 percentage points from the growth in the CPI-U-RS index each year. We base this adjustment on Berndt (2006) and Gordon (2006) who argue that even with recent alterations to the CPI-U methodology that make it and the CPI-U-RS essentially the same for recent years, a bias of 0.8 percentage points per year remains. Because the CPI-U-RS provides a consistent series only back until 1978, we subtract the full 1.1 percentage points from changes in CPI-U inflation for earlier years. See Meyer and Sullivan (2012) for more details.

[28] The CPI-U-RS does not incorporate all of the methodological improvements to the CPI-U. See Stewart and Reed (1999) for more details.

Table 1: Mean Demographic Characteristics, Time Use and Consumer Expenditure Surveys, 1975-2016

	1975		1985		2003		2016	
	Time Use	CE	Time Use	CE	Time Use	CE	Time Use	CE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age 18-24	0.164	0.194	0.179	0.160	0.127	0.127	0.116	0.111
	(0.010)	(0.002)	(0.008)	(0.002)	(0.002)	(0.001)	(0.003)	(0.001)
Age 25-44	0.367	0.357	0.414	0.417	0.390	0.390	0.344	0.345
	(0.013)	(0.002)	(0.010)	(0.002)	(0.004)	(0.002)	(0.005)	(0.002)
Age 45-54	0.145	0.163	0.127	0.129	0.189	0.191	0.172	0.176
	(0.009)	(0.002)	(0.007)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)
Age 55-64	0.140	0.136	0.133	0.131	0.130	0.131	0.170	0.171
	(0.009)	(0.002)	(0.007)	(0.002)	(0.002)	(0.001)	(0.004)	(0.002)
Age 65+	0.184	0.149	0.146	0.162	0.164	0.161	0.198	0.198
	(0.010)	(0.002)	(0.007)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)
Male	0.486	0.471	0.462	0.477	0.475	0.475	0.478	0.476
	(0.013)	(0.003)	(0.010)	(0.003)	(0.004)	(0.002)	(0.005)	(0.002)
Less than HS	0.395	0.386	0.267	0.264	0.152	0.168	0.108	0.124
	(0.013)	(0.002)	(0.009)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
HS Degree	0.364	0.340	0.395	0.328	0.325	0.295	0.292	0.273
	(0.013)	(0.002)	(0.010)	(0.002)	(0.003)	(0.002)	(0.005)	(0.002)
Some College	0.129	0.153	0.178	0.217	0.263	0.293	0.262	0.294
	(0.009)	(0.001)	(0.008)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)
College Grad	0.113	0.121	0.160	0.192	0.259	0.244	0.338	0.308
	(0.008)	(0.001)	(0.007)	(0.002)	(0.003)	(0.002)	(0.005)	(0.002)
Married	0.630	0.692	0.635	0.617	0.583	0.579	0.549	0.552
	(0.013)	(0.002)	(0.010)	(0.002)	(0.004)	(0.002)	(0.005)	(0.002)
Number of children under 18	0.999	1.145	0.643	0.774	0.738	0.740	0.660	0.686
	(0.037)	(0.008)	(0.019)	(0.006)	(0.008)	(0.005)	(0.011)	(0.005)
Number of adults in family	1.958	2.351	2.244	2.289	2.211	2.217	2.224	2.254
	(0.020)	(0.005)	(0.019)	(0.005)	(0.007)	(0.004)	(0.010)	(0.005)
Number of children under 5	0.128	0.193	0.144	0.170	0.204	0.157	0.182	0.137
	(0.011)	(0.002)	(0.009)	(0.002)	(0.004)	(0.001)	(0.005)	(0.002)
Usual hours worked per week when working	23.497	25.077	25.358	27.077	26.490	27.562	25.577	26.780
	(0.576)	(0.099)	(0.427)	(0.102)	(0.160)	(0.083)	(0.224)	(0.095)
Unconditional usual hours worked per week		20.755		23.812		24.916		24.336
		(0.096)		(0.103)		(0.084)		(0.097)
Hours worked on interview day*7	25.482		27.377		26.724		26.205	
	(0.833)		(0.623)		(0.238)		(0.331)	
N	1,469	38,903	2,557	39,241	18,724	59,834	9,604	47,250

Notes: The odd numbered columns report data from the 1975-1976 Time Use in Economics and Social Accounts; the 1985 Americans' Use of Time; and the 2003 and 2016 American Time Use Surveys (ATUS). The even numbered columns report data from the Consumer Expenditure Survey (CE). The unit of observation is an individual and samples include those 18 and older. Results are weighted using survey weights. Weights from the time use survey are adjusted so that each day and each survey year is represented equally. In the 1970s, the time use data are from 1975 while the CE data are from 1972-1973. Standard errors are reported in parentheses.

Table 2: Time Use Activities Ranked by Enjoyment or Affect Measure

	1985	2010, 2012-2013			1985	2010, 2012-2013	
Activities (Robinson and Godbey, 1999)	Enjoyment	Happy	Meaning	Activities (Robinson and Godbey, 1999)	Enjoyment	Happy	Meaning
	(1)	(2)	(3)		(1)	(2)	(3)
Sex	1	N/A	N/A	Working	29	38	28
Playing sports	2	12	9	Second job	32	36	24
Fishing	3	13	8	Cooking	33	21	28
Art, Music	4	1	7	Shopping	33	44	47
Bar, lounges	5	5	17	Working at home[d]	33		
Playing with kids	6	2	1	Child care	36	19	15
Hugging and Kissing[a]	6			Helping adults	36	16	16
Talking/reading to kids	8	3	2	Work commute	38	31	44
Church	9	10	4	Dressing	39	N/A	N/A
Movies	9	8	30	Classes	40	33	3
Sleeping	9	N/A	N/A	Pet care	40	20	18
Walking	12	14	19	Errands	41	35	35
Reading	12	25	32	Housework	42	30	23
Visiting	14	4	14	Grocery shopping	43	29	36
Work break	14	43	26	Home repair[e]	43		
Meals out	14	17	27	Homework	45	46	12
Talking with family	17	18	13	Ironing	46	40	42
Lunch break	18	32	39	Paying bills[f]	46		
TV	19	28	43	Yardwork[g]	47		
Reading paper	19	N/A	N/A	Cleaning house	48	34	31
Meals at home[b]	19			Cleaning dishes	48	37	46
Knitting, sewing	22	11	11	Laundry[h]	50		
Recreational trip	23	22	34	Doctor, dentist	51	39	25
Hobbies	24	6	20	Child health	51	45	37
Baby care	25	9	5	Car repair shop	53	41	38
Civic activities	25	47	45	Job Search	N/A	42	10
Exercising[c]	25			Travel related to child care	N/A	15	22
Gardening	28	24	21	Relaxing, thinking, doing nothing	N/A	26	33
Homework help	29	23	6	Computer	N/A	27	40
Bathing	29	N/A	N/A	Playing games	N/A	7	41

Notes: Rankings in column 1 are based on results in Robinson and Godbey (1999) and use their categories. Rankings in columns 2 and 3 use comparable ATUS categories (with exceptions noted below) and are based on a regression of the affect measure on activity indicators and individual fixed effects using the ATUS Well-Being (WB) Module from 2010, 2012-2013. The sample is restricted to individuals aged 18 or older. Estimates are weighted using Well-Being Module adjusted annual activity weights. [a] included in ATUS category "Visit", [b] included in ATUS category "Meals out", [c] included in ATUS category "Playing sports", [d] included in ATUS category "Work", [e] included in ATUS category "Housework", [f] included in ATUS category "Errands", [g] included in ATUS category "Cleaning house", [h] included in ATUS category "Ironing".

Table 3: Variance Decomposition using Panel Data on Leisure in a Day

Leisure Measure	Variance of Leisure in Day *7	Variance of Predicted Leisure	Variance of ε_i	Variance of u_{it}	Variance of $\varepsilon_i + u_{it}$	Explained Share (2)/[(2)+(3)]	Transitory Share (4)/(1)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Sample includes Individual present in the first two waves							
Leisure less ESP	535.4	104.6	63.9	369.2	433.1	0.62	0.69
Leisure	748.0	247.8	52.8	450.9	503.7	0.82	0.60
Leisure plus Child Care	732.7	233.4	38.8	463.2	502.0	0.86	0.63
Number of Individuals				1,038			
Number of Observations				2,076			
Panel B. Sample includes Individuals present in all four waves							
Leisure less ESP	540.1	103.7	53.2	385.1	438.3	0.66	0.71
Leisure	768.3	244.0	52.6	477.0	529.7	0.82	0.62
Leisure plus Child Care	762.4	235.7	48.9	481.2	530.1	0.83	0.63
Number of Individuals				774			
Number of Observations				3,096			

Notes: Data are from the 1975-1975 Time Use Survey. Estimates are from a random-effects version of equation (2') where we include the demographic characteristics listed in Table 4, usual hours worked, and indicators for day of week and survey wave.

Table 4: OLS Estimates from Regressions of Leisure Hours in a Day*7 on Demographic Characteristics, Time Use Surveys, 1975-2016

Measure of Work Hours	None				Usual hours worked per week			
Interaction with	1975	1985	2003	2016	1975	1985	2003	2016
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age 25-44	-3.122	-4.720	-4.814	-5.604	0.187	0.345	-0.358	-0.776
	(2.485)	(2.179)	(1.183)	(1.904)	(2.413)	(2.109)	(1.078)	(1.849)
Age 45-54	-3.799	-5.458	-4.954	-4.266	-1.435	-0.882	-1.271	-0.072
	(2.739)	(2.747)	(1.230)	(2.071)	(2.633)	(2.635)	(1.119)	(1.966)
Age 55-64	2.810	3.242	1.680	0.816	2.032	1.372	0.346	1.065
	(2.738)	(2.558)	(1.309)	(2.080)	(2.626)	(2.395)	(1.172)	(1.955)
Age 65+	20.309	14.679	16.554	14.401	10.780	6.071	5.602	5.087
	(3.115)	(2.806)	(1.240)	(2.007)	(2.991)	(2.528)	(1.182)	(1.946)
Male	0.218	1.314	1.923	2.663	8.336	6.990	7.032	7.952
	(1.490)	(1.328)	(0.518)	(0.833)	(1.535)	(1.317)	(0.498)	(0.784)
Less than HS	0.634	-0.099	5.801	4.342	-1.093	-2.157	2.362	1.281
	(1.963)	(1.890)	(0.836)	(1.382)	(1.878)	(1.793)	(0.751)	(1.235)
Some College	0.588	-1.036	-2.566	-2.529	-1.200	-1.477	-2.266	-1.374
	(2.253)	(2.030)	(0.687)	(1.109)	(2.135)	(1.820)	(0.628)	(1.028)
College Grad	-4.361	-1.408	-5.479	-4.763	-1.978	-1.025	-3.203	-1.249
	(2.077)	(1.658)	(0.635)	(0.947)	(1.965)	(1.554)	(0.580)	(0.879)
Married	-3.630	-3.545	-3.292	-4.570	-3.550	-2.720	-2.594	-3.437
	(1.809)	(1.605)	(0.617)	(0.985)	(1.708)	(1.506)	(0.551)	(0.899)
Number of children under 18	-1.756	0.112	-2.339	-2.661	-1.979	-0.654	-2.673	-2.911
	(0.618)	(0.791)	(0.296)	(0.515)	(0.575)	(0.744)	(0.274)	(0.440)
Number of adults in family	1.064	1.482	-0.177	-1.044	0.098	1.097	-0.429	-1.118
	(1.084)	(0.783)	(0.385)	(0.548)	(1.109)	(0.777)	(0.350)	(0.505)
Number of children under 5	1.640	-3.165	-0.219	-0.642	0.645	-3.451	-1.232	-1.171
	(1.572)	(1.612)	(0.537)	(0.846)	(1.541)	(1.615)	(0.494)	(0.772)
Usual hours worked per week					-0.482	-0.499	-0.537	-0.543
					(0.039)	(0.034)	(0.014)	(0.021)
N				169,137				169,137
R-squared				0.227				0.350

Notes: Estimates are from regressions of hours spent in leisure activities per week on demographic characteristics for three different specifications: one that does not include work hours, one that includes the hours worked on the interview day, and one that includes the usual hours worked per week. Each column reports coefficients on the interactions of year with observable characteristics. In addition to the covariates listed above, each regression includes interview month, year, day of week, and the interaction between year and day of week. Each of the three specifications is estimated for years 1975, 1985, and 2003-2016, but we report the interaction effects for a subset of these years above. Standard errors are reported in parentheses.

Table 5: Distribution of Actual Leisure in a Day*7 and Predicted Leisure per Week, Time Use and CE Survey

Data Source	1972-1973 / 1975			1985			2003			2016		
	Time Use		CE	Time Use		CE	Time Use		CE	Time Use		CE
Measure of Leisure	Actual Leisure in Day *7	Predicted Leisure		Actual Leisure in Day *7	Predicted Leisure		Actual Leisure in Day *7	Predicted Leisure		Actual Leisure in Day *7	Predicted Leisure	
Mean	111.7	111.7	111.4	112.6	112.6	111.9	114.6	114.6	113.9	115.0	115.0	114.0
Percentiles												
10th Percentile	78.8	92.2	97.8	79.9	94.8	99.1	78.8	93.9	97.9	79.3	93.7	97.3
20th Percentile	87.5	96.1	100.5	88.7	98.6	101.8	88.1	98.5	101.7	88.7	98.9	101.7
30th Percentile	93.9	100.6	102.8	95.0	102.7	103.9	96.1	103.0	104.3	96.3	104.0	104.6
40th Percentile	100.9	105.3	105.4	102.1	107.7	106.5	103.3	108.0	107.3	103.3	108.8	107.6
50th Percentile	108.5	110.7	108.1	108.5	112.8	108.9	111.4	114.1	110.8	111.9	114.6	111.4
60th Percentile	116.3	114.7	111.4	118.8	116.5	112.4	121.9	119.5	114.7	122.5	119.6	115.6
70th Percentile	127.8	121.0	117.2	128.1	120.1	119.0	132.9	124.5	122.3	133.6	124.6	122.6
80th Percentile	138.6	126.4	122.6	139.6	124.4	124.4	143.5	129.2	129.0	144.7	129.8	129.3
90th Percentile	150.5	132.8	131.3	150.3	132.3	129.2	156.7	136.8	134.9	156.9	137.7	135.1
Ratios												
90/10 Ratio	1.91	1.44	1.34	1.88	1.40	1.30	1.99	1.46	1.38	1.98	1.47	1.39
90/50 Ratio	1.39	1.20	1.21	1.38	1.17	1.19	1.41	1.20	1.22	1.40	1.20	1.21
50/10 Ratio	1.38	1.20	1.11	1.36	1.19	1.10	1.41	1.22	1.13	1.41	1.22	1.14

Notes: Observations are at the individual level and are weighted using fixed demographic weights. Leisure is predicted using usual hours and is measured in hours per week. In the 1970s, the time use data are from 1975 while the CE data are from 1972-1973.

Table 6: Inequality in Consumption, Predicted Leisure, and Non-Market Time, CE, 1972-2016

	1972-73, 1975	1985	2003	2016
	(1)	(2)	(3)	(4)
	Consumption			
90/10 Ratio	3.30	3.25	3.52	3.35
90/50 Ratio	1.72	1.70	1.85	1.81
50/10 Ratio	1.92	1.91	1.90	1.85
Variance of Log	0.27	0.27	0.28	0.26
	Predicted Leisure			
90/10 Ratio	1.30	1.27	1.32	1.33
90-10 Difference	29.81	27.28	32.53	33.43
90/50 Ratio	1.18	1.16	1.19	1.20
90-50 Difference	20.23	17.73	21.48	21.86
50/10 Ratio	1.10	1.09	1.11	1.12
50-10 Difference	9.58	9.55	11.05	11.57
Variance of Log	0.01	0.01	0.01	0.01
	Predicted Leisure less ESP			
90/10 Ratio	1.65	1.61	1.84	1.93
90-10 Difference	18.65	18.57	26.02	27.03
90/50 Ratio	1.32	1.32	1.46	1.48
90-50 Difference	11.56	11.91	17.87	18.31
50/10 Ratio	1.25	1.22	1.26	1.30
50-10 Difference	7.09	6.66	8.14	8.72
Variance of Log	0.03	0.03	0.05	0.06
	Predicted Leisure plus Child Care			
90/10 Ratio	1.29	1.25	1.28	1.29
90-10 Difference	29.17	25.55	29.59	30.36
90/50 Ratio	1.17	1.15	1.17	1.18
90-50 Difference	19.09	16.54	19.86	20.46
50/10 Ratio	1.10	1.09	1.09	1.10
50-10 Difference	10.08	9.02	9.73	9.90
Variance of Log	0.01	0.01	0.01	0.01
	Non-Market Time			
90/10 Ratio	1.34	1.34	1.35	1.35
90-10 Difference	42.63	42.35	43.21	43.88
90/50 Ratio	1.15	1.17	1.17	1.17
90-50 Difference	21.40	24.39	24.93	24.93
50/10 Ratio	1.17	1.14	1.15	1.15
50-10 Difference	21.23	17.95	18.28	18.95
Variance of Log	0.01	0.01	0.01	0.01

Note: Leisure is predicted using usual hours. ESP: eating, sleeping, and personal care. Observations are at the family level and are person weighted. Family level leisure and non-market time are per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale. Annual consumption measures are expressed using the biased corrected CPI-U-RS as explained in the data appendix.

Table 7: Mean Predicted Leisure by Decile of Consumption, CE, 1972-2016

	Predicted Leisure					Percentage Change	
	1972-73	1985	2003	2010	2016	2016/ 1972-73	2016/ 2003
Consumption Decile							
First	113.3	113.6	115.3	118.0	114.7	1.19%	-0.51%
	(1.20)	(1.19)	(0.54)	(0.67)	(0.89)		
Second	111.8	113.0	114.2	116.1	113.9	1.89%	-0.24%
	(1.08)	(0.98)	(0.50)	(0.60)	(0.68)		
Third	111.8	112.4	114.5	115.6	113.5	1.55%	-0.82%
	(1.00)	(0.86)	(0.46)	(0.56)	(0.67)		
Fourth	111.3	112.1	114.1	114.7	113.4	1.91%	-0.60%
	(0.90)	(0.78)	(0.47)	(0.54)	(0.61)		
Fifth	111.1	111.9	113.6	114.3	113.1	1.81%	-0.44%
	(0.93)	(0.75)	(0.42)	(0.54)	(0.58)		
Sixth	111.6	111.6	113.4	114.3	112.9	1.22%	-0.40%
	(0.91)	(0.76)	(0.41)	(0.53)	(0.56)		
Seventh	110.8	111.8	113.1	113.9	113.2	2.15%	0.10%
	(0.96)	(0.85)	(0.42)	(0.54)	(0.53)		
Eighth	110.8	111.2	112.4	113.8	113.9	2.75%	1.27%
	(0.91)	(0.80)	(0.38)	(0.51)	(0.53)		
Ninth	111.4	110.8	112.6	113.9	113.5	1.91%	0.82%
	(0.98)	(0.85)	(0.39)	(0.52)	(0.53)		
Tenth	112.8	111.4	113.2	113.4	114.9	1.89%	1.59%
	(1.07)	(0.90)	(0.42)	(0.54)	(0.50)		
N	19,497	20,783	32,319	28,406	25,420		

Notes: We report mean family leisure per adult. Leisure is predicted using usual hours. Observations are person weighted. Bootstrapped standard errors are in parentheses.

Table 8: Bivariate Relationship between Consumption and Predicted Leisure or Non-Market Time, CE, 1972-2016

	1972-73	1985	2003	2010	2016
Panel A. Full Sample					
Predicted Leisure					
Correlation	0.007	-0.060	-0.049	-0.083	0.019
	(0.04)	(0.04)	(0.01)	(0.02)	(0.02)
Slope	-2.069	-2.872	-2.606	-3.773	0.428
	(1.13)	(1.27)	(0.45)	(0.56)	(0.59)
Non-market Time					
Correlation	-0.161	-0.188	-0.129	-0.179	-0.127
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Slope	-10.641	-13.830	-9.621	-11.965	-8.222
	(0.43)	(0.47)	(0.38)	(0.37)	(0.45)
N	19,497	20,783	32,319	28,406	25,420
Panel B. Single Parent					
Predicted Leisure					
Correlation	-0.180	-0.270	-0.167	-0.305	-0.092
	(0.08)	(0.07)	(0.04)	(0.03)	(0.04)
Slope	-5.480	-9.440	-7.044	-11.005	-4.704
	(1.94)	(1.89)	(0.84)	(0.98)	(1.02)
Non-market Time					
Correlation	-0.378	-0.416	-0.249	-0.351	-0.272
	(0.05)	(0.05)	(0.03)	(0.03)	(0.03)
Slope	-23.952	-28.410	-19.023	-23.648	-19.182
	(1.92)	(1.65)	(1.21)	(1.27)	(1.40)
Panel C. Married Parent					
Predicted Leisure					
Correlation	0.030	-0.093	-0.202	-0.216	-0.109
	(0.06)	(0.06)	(0.03)	(0.03)	(0.04)
Slope	0.599	-2.229	-5.412	-7.159	-3.407
	(1.45)	(1.44)	(0.55)	(0.71)	(0.83)
Non-market Time					
Correlation	-0.108	-0.225	-0.209	-0.254	-0.250
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Slope	-5.192	-11.587	-9.792	-13.958	-12.321
	(0.67)	(0.86)	(0.73)	(0.78)	(0.91)
Panel D. Single Individuals					
Predicted Leisure					
Correlation	-0.146	-0.176	-0.274	-0.317	-0.260
	(0.06)	(0.06)	(0.02)	(0.02)	(0.03)
Slope	-5.271	-6.016	-10.480	-12.253	-10.511
	(1.27)	(1.50)	(0.67)	(0.85)	(0.86)
Non-market Time					
Correlation	-0.253	-0.304	-0.292	-0.337	-0.313
	(0.04)	(0.03)	(0.02)	(0.02)	(0.02)
Slope	-16.455	-22.586	-21.421	-23.164	-21.690
	(1.04)	(0.68)	(0.62)	(0.64)	(0.77)
Panel E. Married without Children					
Predicted Leisure					
Correlation	-0.085	-0.177	-0.237	-0.284	-0.180
	(0.06)	(0.04)	(0.02)	(0.03)	(0.03)
Slope	-3.684	-5.273	-7.650	-9.586	-7.028
	(1.06)	(1.11)	(0.61)	(0.76)	(0.74)
Non-market Time					
Correlation	-0.158	-0.185	-0.176	-0.249	-0.202
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)
Slope	-10.900	-11.084	-9.604	-14.188	-14.088
	(0.85)	(1.06)	(1.03)	(0.90)	(1.05)
Panel F. Head 65 and Over					
Predicted Leisure					
Correlation	-0.022	-0.033	-0.047	-0.020	-0.014
	(0.06)	(0.06)	(0.03)	(0.03)	(0.03)
Slope	-2.366	-1.149	-2.677	-1.816	-1.669
	(0.99)	(1.28)	(0.53)	(0.65)	(0.64)
Non-market Time					
Correlation	-0.060	-0.084	-0.033	-0.053	-0.036
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
Slope	-3.939	-3.277	-2.680	-3.044	-2.633
	(0.56)	(0.65)	(0.57)	(0.56)	(0.62)

Note: This table reports correlation coefficients between predicted leisure or non-market time and consumption percentile, and the slope coefficient from the bivariate regression of predicted leisure or non-market time on consumption percentile. Consumption percentiles are defined over the entire sample in both the full sample and subsample analyses. Observations are at the family level and are person weighted. Family level leisure and non-market time are per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale. Bootstrapped standard errors are in parentheses.

Table 9: Bivariate Relationship between Consumption and Leisure less ESP or Leisure plus Child Care, CE, 1972-2016

	1972-73	1985	2003	2010	2016
Panel A. Leisure less ESP					
Predicted Leisure					
Correlation	-0.027	-0.060	0.000	-0.045	0.080
	(0.05)	(0.05)	(0.01)	(0.02)	(0.02)
Slope	-2.043	-2.432	-0.419	-1.206	2.658
	(0.97)	(1.23)	(0.41)	(0.53)	(0.55)
Panel B. Leisure plus Child Care					
Predicted Leisure					
Correlation	-0.044	-0.117	-0.105	-0.135	-0.034
	(0.04)	(0.04)	(0.01)	(0.02)	(0.02)
Slope	-4.077	-4.650	-5.029	-6.064	-1.955
	(1.17)	(1.28)	(0.45)	(0.54)	(0.63)
N	19,497	20,783	32,319	28,406	25,420

Note: This table reports correlation coefficients between predicted leisure or non-market time and consumption percentile, and the slope coefficient from the bivariate regression of predicted leisure or non-market time on consumption percentile. Consumption percentiles are defined over the entire sample in both the full sample and subsample analyses. Observations are at the family level and are person weighted. Family level leisure and non-market time are per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale. The number of observations (N) applies to both panels.

Table 10: Bivariate Relationship between Consumption and Predicted Leisure or Non-

	1972-73	1985	2003	2010	2016
Panel A. Head Age<=48					
Predicted Leisure					
Correlation	-0.052	-0.169	-0.196	-0.281	-0.130
	(0.06)	(0.05)	(0.02)	(0.02)	(0.03)
Slope	-1.019	-5.334	-6.956	-10.061	-4.915
	(1.43)	(1.37)	(0.55)	(0.74)	(0.77)
Non-market Time					
Correlation	-0.316	-0.348	-0.294	-0.364	-0.324
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Slope	-13.303	-21.246	-17.578	-21.893	-18.513
	(0.55)	(0.51)	(0.49)	(0.45)	(0.60)
N	9,831	11,825	16,755	13,191	14,724
Panel B. Head Age >48					
Predicted Leisure					
Correlation	-0.091	-0.133	-0.103	-0.123	-0.051
	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)
Slope	-7.510	-6.234	-7.472	-7.519	-4.436
	(1.16)	(1.50)	(0.54)	(0.66)	(0.66)
Non-market Time					
Correlation	-0.155	-0.180	-0.112	-0.164	-0.127
	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)
Slope	-12.016	-12.040	-10.572	-12.397	-9.867
	(0.55)	(0.74)	(0.59)	(0.56)	(0.60)
N	9,666	8,958	15,564	15,215	10,696

Note: This table reports correlation coefficients between predicted leisure or non-market time and consumption percentile, and the slope coefficient from the bivariate regression of predicted leisure or non-market time on consumption percentile. Consumption percentiles are defined over the entire sample in both the full sample and subsample analyses. Observations are at the family level and are person weighted. Family level leisure and non-market time are per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale.

Table 11: Bivariate Relationship between Income and Predicted Leisure or Non-Market Time, TU, 2003-2016

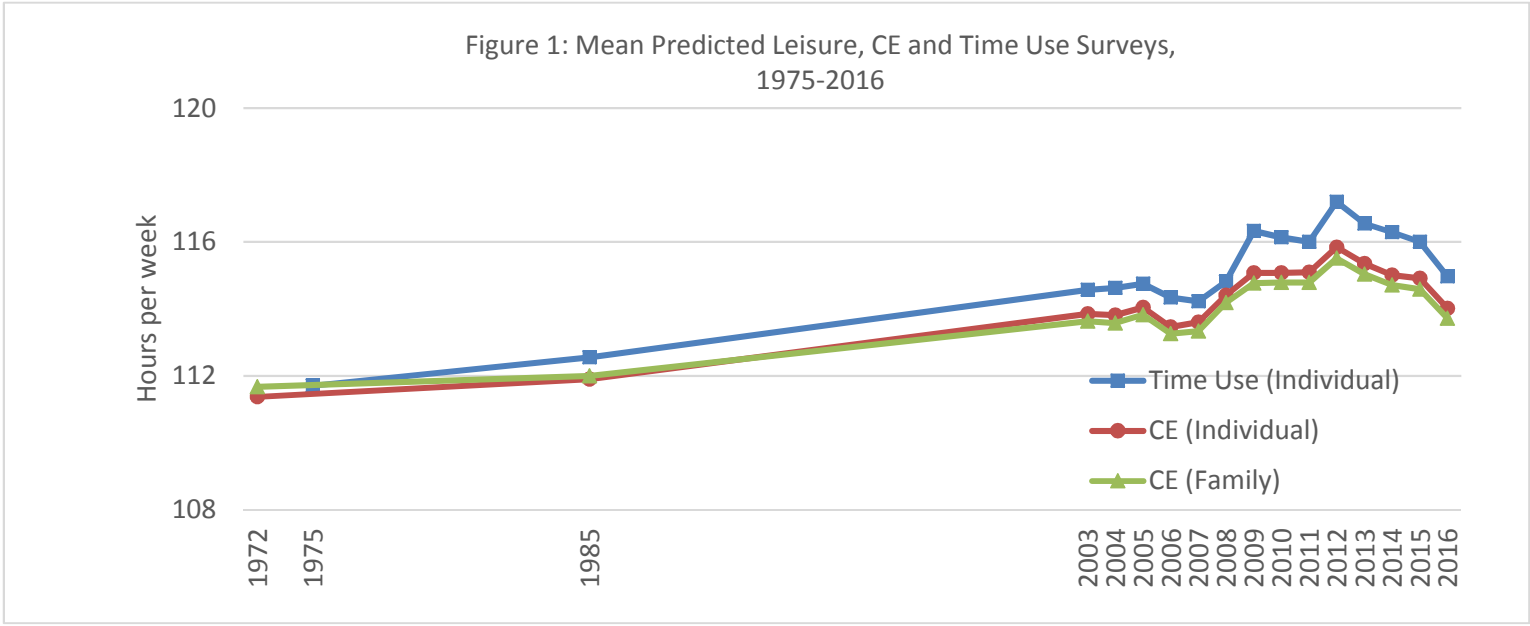
	2003	2010	2016
Panel A. Full Sample			
Predicted Leisure			
Correlation	-0.196	-0.201	-0.142
	(0.01)	(0.01)	(0.02)
Slope	-13.673	-16.345	-12.886
	(0.67)	(0.87)	(0.94)
Non-market Time			
Correlation	-0.239	-0.229	-0.211
	(0.01)	(0.01)	(0.02)
Slope	-21.729	-23.968	-22.506
	(0.73)	(0.94)	(1.01)
N	16,506	11,411	9,604
Panel B. Single Parent			
Predicted Leisure			
Correlation	-0.111	-0.069	0.064
	(0.03)	(0.03)	(0.05)
Slope	-9.615	-10.332	-5.583
	(1.24)	(1.66)	(1.92)
Non-market Time			
Correlation	-0.179	-0.119	-0.053
	(0.03)	(0.04)	(0.05)
Slope	-20.737	-20.652	-17.464
	(1.69)	(2.23)	(2.53)
Panel C. Married Parent			
Predicted Leisure			
Correlation	-0.189	-0.211	-0.120
	(0.02)	(0.02)	(0.02)
Slope	-9.935	-11.203	-7.094
	(0.97)	(1.11)	(1.21)
Non-market Time			
Correlation	-0.189	-0.213	-0.176
	(0.02)	(0.02)	(0.02)
Slope	-16.949	-18.417	-16.400
	(1.30)	(1.48)	(1.73)
Panel D. Single Individuals			
Predicted Leisure			
Correlation	-0.292	-0.253	-0.196
	(0.02)	(0.03)	(0.03)
Slope	-16.967	-20.007	-18.351
	(0.89)	(1.18)	(1.27)
Non-market Time			
Correlation	-0.313	-0.283	-0.210
	(0.02)	(0.03)	(0.03)
Slope	-25.915	-31.392	-30.261
	(1.16)	(1.38)	(1.50)
Panel E. Married without Children			
Predicted Leisure			
Correlation	-0.262	-0.214	-0.241
	(0.02)	(0.03)	(0.03)
Slope	-13.178	-14.520	-14.433
	(1.20)	(1.70)	(1.62)
Non-market Time			
Correlation	-0.236	-0.194	-0.270
	(0.02)	(0.03)	(0.03)
Slope	-19.226	-19.887	-25.085
	(1.56)	(2.32)	(2.28)
Panel F. Head 65 and Over			
Predicted Leisure			
Correlation	-0.106	-0.172	-0.151
	(0.02)	(0.03)	(0.03)
Slope	-5.908	-7.892	-5.988
	(0.90)	(1.24)	(1.19)
Non-market Time			
Correlation	-0.085	-0.175	-0.182
	(0.02)	(0.03)	(0.03)
Slope	-6.731	-9.960	-10.720
	(1.11)	(1.56)	(1.41)

Note: This table reports correlation coefficients between predicted leisure or non-market time and income percentile, and the slope coefficient from the bivariate regression of predicted leisure or non-market time on income percentile. See notes to Table 8 for more details.

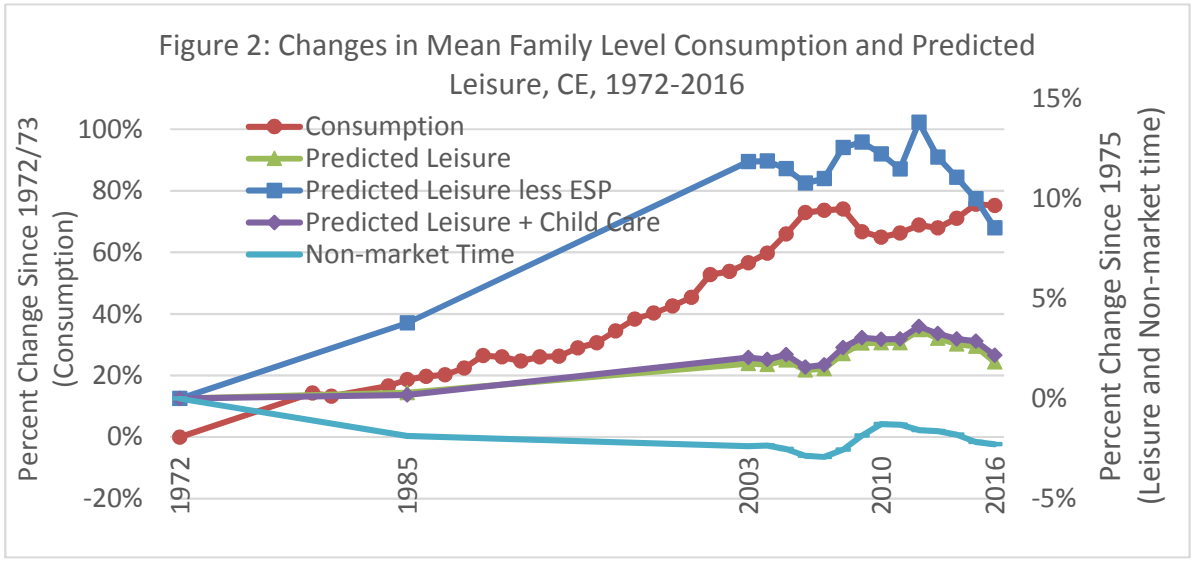
Appendix Table1: Description of Time Use Surveys

Survey	Period Covered	Sample Restrictions/Details	Pre-restriction sample size	Excluding observations with age<18	Excluding observations with missing key demographic characteristics	Excluding observations with low-quality diaries
American's Use of Time: Time Use in Economic and Social Accounts	Fall 1975 - Summer 1976	This longitudinal survey consists of five waves. The diaries in the initial wave was collected in face-to-face interviews whereas the follow-up surveys were collected in phone interviews. The data collects information from both the main respondent and the spouse if a spouse was present. The AHTUS version of the data contains diaries only for main respondents. We only use diaries from the initial wave in our analysis.	1,511	1,507	1,488	1,469
American's Use of Time Project	1985	This survey collected diaries from three samples, with different data collection methods: the mail-back, face-to-face interview, and phone interview samples. The original sequence files of the telephone and personal interview samples have corrupted and been lost, and the AHTUS data contains the mail-back household sample only.	3,339	2,765	2,613	2,557
American Time Use Survey	2003	The ATUS sample is selected from a random sample of households that have completed their final CPS interview. A civilian household member age 15 or older is randomly selected to respond to the survey by telephone. Half of the diaries were collected on weekend days, and half on week days	20,720	19,759	19,018	18,724
	2004		13,973	13,318	13,134	12,971
	2005		13,038	12,419	12,108	11,947
	2006		12,943	12,200	11,828	11,687
	2007		12,248	11,606	11,302	11,158
	2008		12,723	12,108	11,698	11,539
	2009		13,133	12,568	12,088	11,906
	2010		13,260	12,679	12,148	11,915
	2011		12,479	11,978	11,549	11,309
	2012		12,443	11,975	11,534	11,333
	2013		11,385	10,953	10,566	10,383
	2014		11,592	11,189	10,801	10,650
	2015		10,905	10,549	10,152	9,985
	2016		10,493	10,125	9,727	9,604
Consumer Expenditure Survey	1972-2016	Sample size reported here reflects individuals covered in the survey. Some analysis is performed at the consumer unit level.		816,736	816,734	816,734

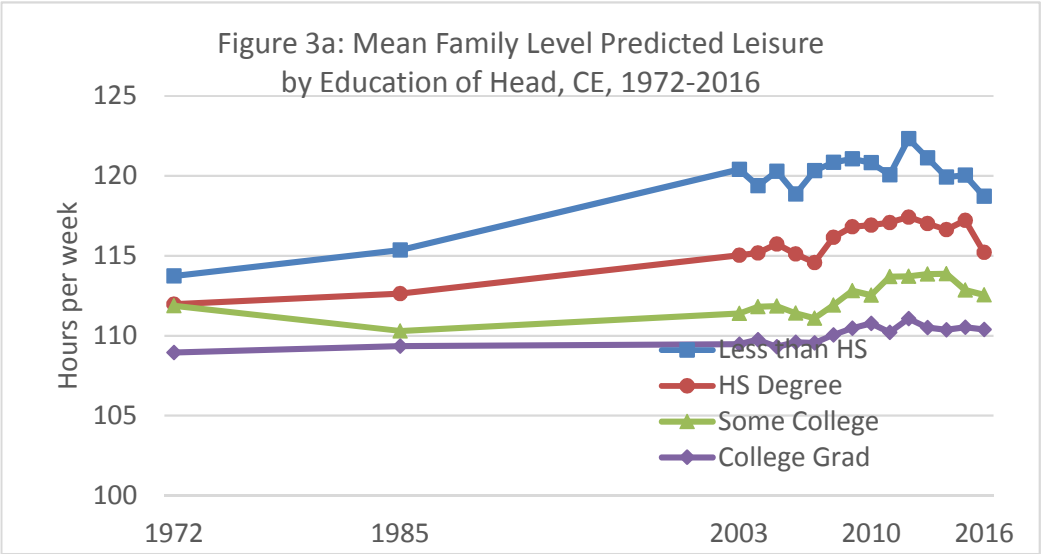
Notes: Unless otherwise indicated, all surveys are nationally representative. Before analysis is performed, all samples are restricted to include only those respondents who are at least 18 years of age. Additionally, respondents with missing values for age, number of children, gender, marital status, education, interview day, usual hours worked in a week, hours worked on interview day, and number of children under five years of age are excluded.

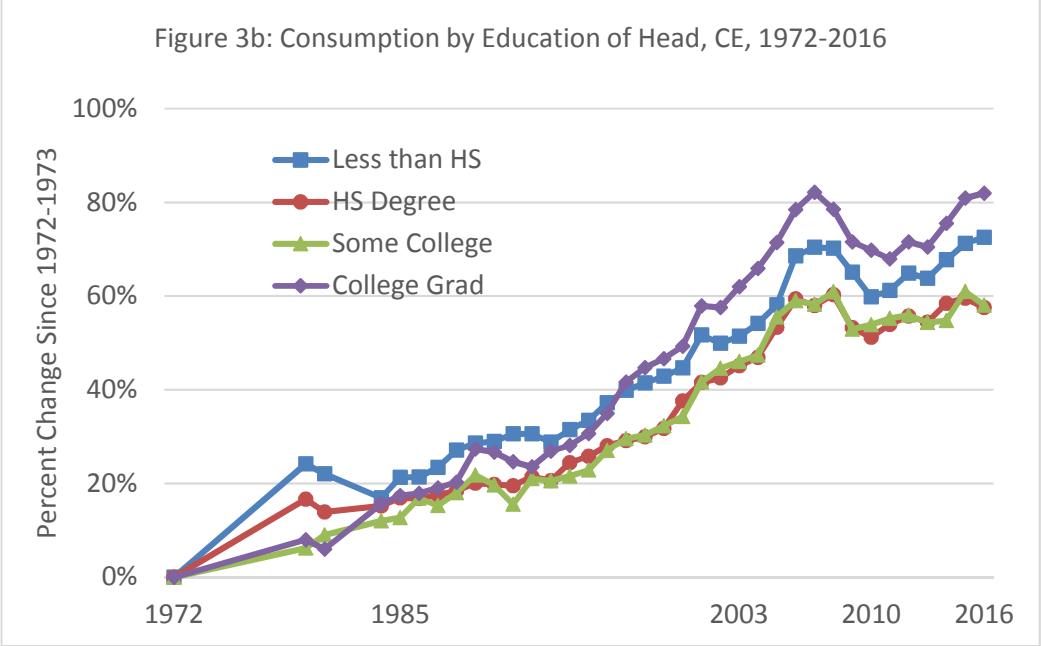


Note: We report mean individual or per adult (family) leisure. Leisure is predicted using usual hours. Estimates are for the years 1972-1973 (CE), 1975 (Time Use), 1985, and 2003-2016. We interpolate estimates for the other years. Observations are person weighted.

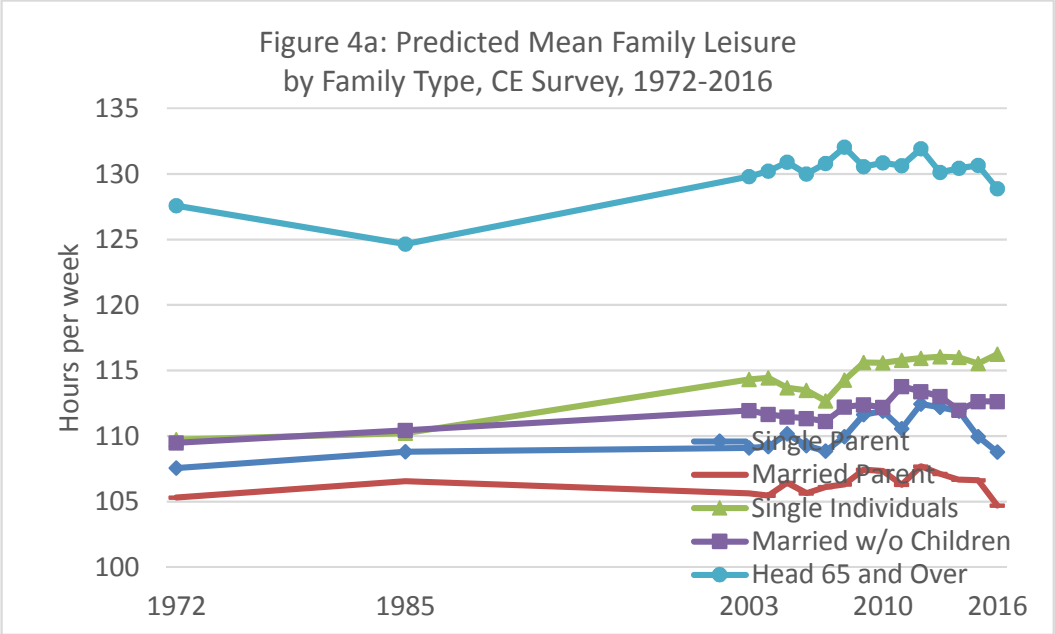


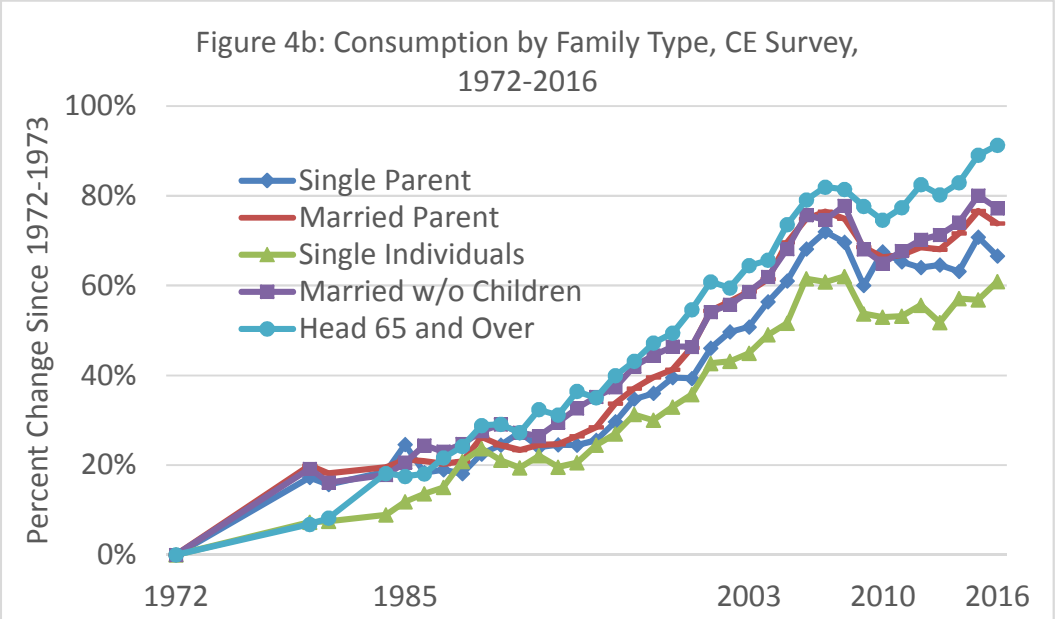
Note: Leisure is predicted using usual hours. ESP: eating, sleeping, and personal care. Observations are at the family level and are person weighted. Leisure and time use estimates are reported for years when time use data are available to generate estimates for the prediction equation. We interpolate for missing years. Changes in consumption are adjusted for inflation using the biased corrected CPI-U-RS as explained in the Data Appendix. Family level leisure and non-market time are per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale.





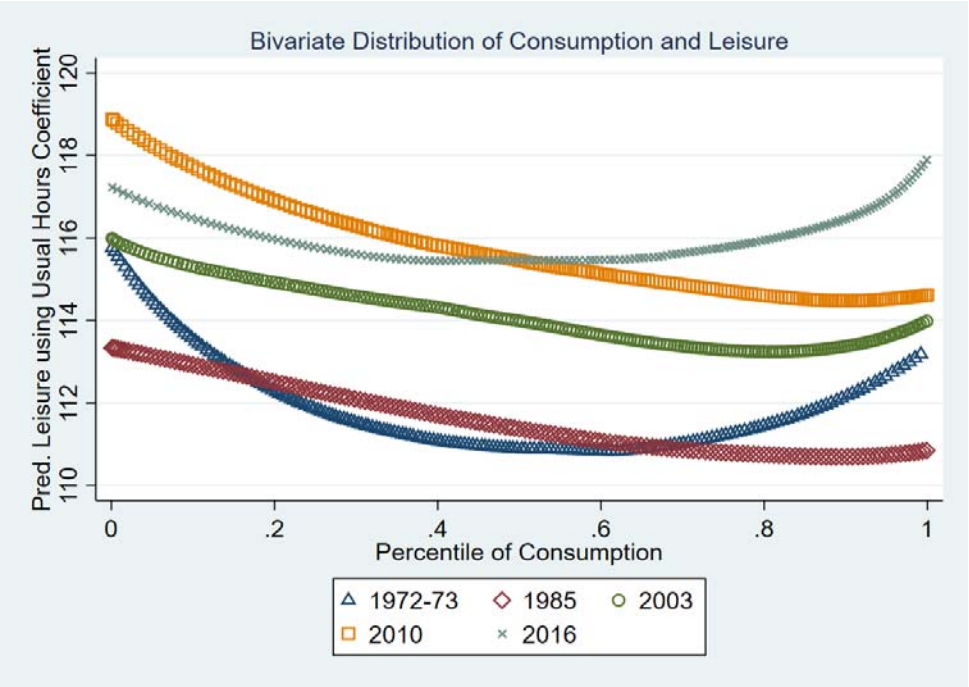
Note: Groups are defined based on the educational attainment of the head of the consumer unit. Leisure is predicted using usual hours. Observations are at the family level and are person weighted. Family level leisure is per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale. Changes in consumption are expressed in real terms using the biased corrected CPI-U-RS as explained in the Data Appendix. See notes to Figure 2 for more details.





Note: Leisure is predicted using usual hours. Observations are at the family level and are person weighted. Family level leisure is per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale. Changes in consumption are expressed in real terms using the biased corrected CPI-U-RS as explained in the Data Appendix. The five family types are mutually exclusive and exhaustive. See notes to Figure 2 for more details.

Figure 5



Note: Predicted Leisure is smoothed using LOWESS (locally weighted scatterplot smoothing) regression of predicted leisure on consumption percentiles. Observations are at the family level and are person weighted. Family level leisure is per adult and consumption is adjusted for family size using the NAS-recommended equivalent scale.