Timing is Everything: The Role of Time and the Business Cycle in Fast-Food Purchasing Behavior in the United States

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Abstract

Meals, snacks, and beverages purchased at fast-food restaurants have become a large and growing portion of a typical American's budget, and have been blamed for American's expanding waistlines and poor diet quality. Previous studies have attributed this increase to many factors including budget and time constraints, demographic and health characteristics and market-level forces but no study has been able to rigorously address the effects of all of these variables on the demand for fast foods. This study uses the 2003-11 American Time Use Survey to identify associations between fast-food purchases and individual, household, and market characteristics. The primary findings of this study are: (1) Americans purchase fast food as a means of saving time in non-market activities—those that purchase fast food are associated with less time in sleep, housework, eating and drinking meals and television watching, and more time in traveling from place to place; (2) fast-food purchasers have different eating patterns than others, spending less time eating and drinking and are more likely to eat while working or driving; (3) the probability of fast-food purchase was postively associated with employment status but negatively associated with the number of hours worked by the individual in the day; and (4) the percent of the population purchasing fast food on a given day stayed fairly constant during and after the 2007-09 recession, seemingly unaffected by the economic downturn.

Keywords: Food away from home, FAFH, fast food, time use, American Time Use Survey, Great Recession, time pressure

INTRODUCTION

Meals, snacks, and beverages purchased at fast-food and sit-down restaurants have become a large and growing portion of a typical American's budget. In 1929, food purchased for away from home consumption by US households constituted only 13.4% of the food budget while in 2011 this share increased to 42.1% (USDA-ERS 2013). During the past decade, however, the growth in food away from home (FAFH) by establishment type has been uneven. Expenditure at fast-food restaurants decreased from about 4 percent to 3 percent of the total budget for all goods and services for an average U.S. household between 1998 and 2010, and seemed to be unaffected by the Great Recession (December 2007-June 2009). On the other hand, the share of the total expenditures for goods and services spent at sit-down restaurants grew until 2006 and fell during the recession (Okrent and Alston 2012). While consumers have decreased expenditures on fast food, fast food still constitutes a relatively large portion of the calorie intake by Americans.

The calories consumed from fast-food and sit-down restaurants constitutes nearly a third of the energy intake by adults in the United States, and studies suggest that the nutritional quality of these foods are lower than foods purchased for at-home consumption (Lin and Guthrie 2012). In addition, fast-food restaurants have been found to contribute to obesity (Chou, Grossman, and Saffer, 2004; Davis and Carpenter, 2009; Currie et al. 2010; Chen et al. 2012; Alviola et al. 2013). On the whole, the evidence suggests that consuming FAFH may lower dietary quality and increase body weight and that different types of FAFH may affect dietary quality and individual body weight differently. The linkage between food consumed at fast-food and sit-down restaurants and poor nutritional outcomes has caused policymakers to investigate ways to

promote consumption of healthier options and limit marketing and access of these foods to children (White House Task Force on Childhood Obesity 2010). For example, in response to First Lady Obama's *Let's Move* campaign, several food companies including McDonald's have made pledges to limit the marketing of "unhealthy" products to children (Federal Trade Commission 2012).

However, what if fast-food and sit-down purchasing decisions are more than just a story of relative prices and marketing but one of time-saving? In particular, Mincer (1963) argued that ignoring the value of time in demand relationships could produce biased results. In the new household economics, the value of time is an important factor affecting consumption and suggests that households may substitute time-saving services for their own time (Becker 1965). Indeed Zick and Stevens (2009) looked at the time spent in food-related activities over the years 1975-2006 and found that the time women spend in food preparation declined from an average of 92 minutes a day in 1975 to 51 minutes in 2006, while men's food preparation time increased only by 3 minutes, and still averaged under 20 minutes per day. They conclude that these are secular trends that persist after controlling for the demographic, economic, and household changes that have taken place over the 3 decades. Hence, households with two wage earners may consume more time-saving goods and services than do families with full-time homemakers.

This is the first study to extensively examine fast-food purchasing patterns in the United States using the 2003-11 American Time Use Survey. These data allow us to analyze the relationship between fast-food purchasing behavior and a number of determinants related to time use, sociodemographic characteristics of individuals within the United States. The advantage of using the ATUS versus food intake or food expenditure data (e.g., NHANES and Consumer

Expenditure Survey, respectively) is we can look at how time spent in work, household production, and leisure activities is related to fast-food purchasing decisions. In addition, time diaries are considered a neutral method of collecting data on time spent in various activities, less subject to under- and overreporting including social desirability bias than surveys that ask for estimates of time spent on specific activities. (Robinson and Godbey, 1997, chapter 4; Robinson et al., 2011)

Because the data cover the period of the Great Recession, we are also able to test the impact of the Great Recession on for the probability of purchasing fast food. The specific research questions addressed in this paper are (1) what individual- and household-level characteristics, including how individuals spend time, are associated with fast-food purchase? and (2) did fast-food purchasing behavior change over the recent business cycle?

RELEVANT LITERATURE ON DETERMINANTS OF FAFH DEMAND

Demand for FAFH is typically modeled as being a function of prices and income—the standard utility maximization framework. With the exception of Okrent and Alston (2012) and Richards and Mancino (2013), most previous studies have modeled demand for FAFH as a composite good, and have generally found demand for FAFH to be more responsive to price and income-induced expenditure changes than food at home (FAH) (see Okrent and Alston (2011) for a review of these studies). Okrent and Alston (2012) found that demand for fast foods to be almost perfectly inelastic to changes in prices (-0.13) while demand for meals from sit-down restaurants to be quite price elastic (-1.96). On the other hand, Richards and Mancino (2013) found the price elasticity of demand for meals at fast food and various types of sit-down restaurants to be

between -0.5 and -0.9. Demand for different types of FAFH—in particular, fast foods—may depend on time constraints, convenience, and sociodemographic characteristics rather than just relative prices and income.

Becker (1965) developed the theory of time allocation, which accounted for the time input into the commodities and activities that a household produces via a household production function, as well as the time constraint that each individual faces. The household's utility function contains the commodities and activities, and the household production function is maximized subject to the two constraints. One household commodity is meals. An increase in the value of an individual's time would lead to a substitution towards goods. "For example, an increase in the value of a mother's time may induce her to enter the labour force and spend less time cooking by using pre-cooked foods...." (p. 514). Becker's theory of time allocation spawned an extensive literature on home production (see Gronau (1986) and Gronau (1997) for excellent literature reviews). Indeed, Gronau commented that the household production function highlights the fact that "one cannot separate the analysis of consumption behavior from the analysis of time use (1997, p. 199)."

In keeping with the Becker household production model, several studies have argued that increased consumption of meals and snacks at fast-food restaurants has largely been driven by time constraints within a typical American household. With the exception of Huffman (2011), most of these studies use cross-sectional data, and assume that prices faced by consumers in a particular period are constant. All of these studies also include sociodemographic variables, arguing that household size, age, race, and so on, are important determinants of FAFH consumption. In this section we review and summarize findings of research that analyzes

demand for FAFH as a function of household time constraints and sociodemographic characteristics.

The value of time and the FAFH purchases

Much of the research that investigates the impact of the time constraint on household production and demand for FAFH treats FAFH as a composite. Most of these studies use expenditure on total FAFH as the regressand, and generally found that the value of time for household manager (sometimes assumed to be the female) to positively affect demand for total FAFH (Sexauer 1979; Soberon-Ferrer and Dardis 1991; Yen 1993; Byrne, Capps and Saha 1996). Prochaska and Schrimper (1973), Nayga and Capps (1994), and Dong et al. (2000) use the number of meals or visits to FAFH as y_{ij} in (1) and provide further evidence that demand for FAFH is affected by the value of time of the household. However, a few studies, namely Huffman (2011), Redman (1980), and Kinsey (1983), found the household time constraint to be a less important determinant of demand for FAFH. Kinsey (1983) argued that while this result may appear to contradict theory, household managers need not increase FAFH expenditures in order to substitute relatively inexpensive goods and services for time if the cost of purchasing certain types of FAFH (i.e., fast foods) is cheaper than conventional sit-down restaurants.

A handful of studies investigate whether the value of time has a differential effect on FAFH by establishment and meal type. McCracken and Brandt (1987) and Stewart et al. (2004) found that an increased value of the household food manager's time increased expenditures on fast food more than meals from sit-down restaurants. Similarly, Byrne et al. (1998) and Stewart and Yen (2004) found the effect of household manager hours to have a positive impact on demand for fast foods but to be negative for sit-down foods. Contrary to previous findings, Jekanowski et al.

(2001) do not find any significant effect of this variable on per capita fast-food sales. Jensen and Yen (1996) examined the demand for FAFH by meal type—breakfast, lunch, and dinner—and found that the effects of wife's employment are positive on both the probability and level of expenditures on lunch and dinner at FAFH, but wife's employment did not seem to affect breakfast as FAFH.

Overall, the literature generally finds that purchase frequency of and expenditures for total FAFH is generally positively affected by time-related variables. By FAFH establishment type, it was found that the value of time increased demand for fast food more than meals from sit-down restaurants.

Demographic characteristics and FAFH purchases

All of the above studies acknowledge that demand for FAFH is also determined by demographic characteristics of the household as well as household composition. Prochaska and Schrimper (1973) and Soberon-Ferrer and Dardis (1991) found that even though the presence of children in the household negatively affected demand for total FAFH, the size of the household increased demand for total FAFH. The argument is that additional number of adults in the household leads to additional FAFH because of employment and social activities. Byrne et al. (1996) found household size had a negative effect on demand for total FAFH arguing that there are economies of household size in food production at home, but Byrne et al. (1998) found that family size was only negatively related to expenditures at sit-down restaurants and positively related to expenditures at fast-food restaurants.

Many of the studies discussed look only at married households but given that the structure of a household has changed over time such that there are more households with a single person or single parents (Stewart et al. 2004), later studies began including marital status in their analysis. Byrne et al. (1998) found that unmarried households spent less on FAFH than married households regardless of restaurant type, arguing that fewer number of people were involved in the FAFH occasion. Contrary to this, Stewart and Yen (2004) and Stewart et al. (2004) found that single-person households spent around $0.5–$3.0 **more** per week at fast-food and sit-down restaurants compared to married households but single-parent households spent $0.30–$1.70 **less** at both FAFH establishments.

Gender of the household manager also seems to have a mixed effect on demand for FAFH. Byrne et al. (1996) found that female household managers spent less than those with male household managers, which they attributed to males having less culinary skills than females. This is contrary to Dong et al. (2000) who found female-household heads tended to purchase greater number of FAFH meals than male household heads but single households had no effect on number of FAFH meals. By establishment type, Byrne et al. (1998) found that female households managers spent less at up- and mid-scale sit-down restaurants but more at fast-food restaurants compared to male household managers.[1]

FAFH AND TIME USE DATA

[1] Byrne et al, (1998) define up-scale restaurants as offering full alcohol service and accepting credit card whereas mid-scale restaurants do not.

Although the papers above discuss time allocation, as time is an input to meal preparation, only recently has extensive time diary data been available to apply to time allocation models. Here we discuss research that studied FAH and FAFH using time-use data.

Hamermesh (2007) paired the 1985 Time Use Survey and the American Time Use Survey (ATUS) data with the Consumer Expenditure Survey for 1985 and 2003 to examine how married households combine expenditures on goods and time to product food, and how this relationship has changed given rising wage and income inequality in the United States. One of his major findings is that over the 20 years there has been a large decrease in the time inputs into eating, where eating appears to be a relatively goods-intensive commodity.

Tashiro (2009) developed a model of how individuals allocate non-market hours to food preparation, allowing for individuals' choice between food prepared at home and prepared food, subject to both budget and time constraints. She assumes perfect substitution between food prepared at home and prepared food, and that an individual consumes more prepared food relative to food prepared at home when the individual has a larger opportunity cost, and/or a larger input cost (i.e., sum of food and transportation costs for food prepared at home). Using 2005 ATUS data, her findings include that more time in paid work resulted in less time preparing food at home for all respondents; that time spent in purchasing prepared food increases along with time spent in leisure activities for whites and Hispanics; that Blacks increase their time spent purchasing prepared food along with increases in their paid work time; and that more educated individuals rely more on purchased prepared food.

Van der Lippe et al. (2004) looked at the outsourcing of domestic tasks in the Netherlands. They focused on outsourcing of household tasks—domestic help and take-out meals—and time-saving appliances—microwave oven, dishwasher, and clothes dryer. Which households outsource tasks, and are outsourcing and appliances really saving time? They found that income was the most important determinant of whether or not a household oursourced domestic tasks, in that the higher the income, the more likely outsourcing is used. In particular, dual earning households who spend more time in the labor market are more likely to outsource, including take-out meals. Take-out meals are strongly related to the presence of children in the household. "Households with children make more use of take-out meals, but where there are more children present, less use of take-out is made." (p. 238) This indicates that there are economies of scale in meal preparation for larger households. With respect to household appliances, they found that the microwave is time-saving for men, whereas the dishwasher was time-saving for women.

With the availability of nationally-representative time diary data, the ATUS, and the recent recession (December 2007 to June 2009[2]), some researchers have analyzed the changes in time-use patterns over the recession and in the recovery. Using 2003-10 ATUS data and analyzing cross-state variation, Aguiar et al. (2013) looked at time use changes over the 2007-09 recession. They found that the bulk of the foregone market work hours was spent in leisure, and 30 percent of this is reallocated to non-market home production, which includes a 12 percent increase in hours spent in core home production (cooking, cleaning, and laundry). Beatty and Senauer (2012) documented that food spending shifted into FAH from FAFH over the 2007-09 recession and into the recovery and also noted that low-income households spent more time on food

[2] See the National Bureau of Economic Research, US Business Cycle Expansions and Contractions, http://www.nber.org/cycles/cyclesmain.html

preparation. In addition, Todd (2014) found that dietary quality improved between 2005-06 and 2009-10, which could be partly attributable to a 127 calorie decline in daily energy intake from FAFH (of which a 53 calorie decline is from fast-food consumption). Looking at how labor force status—employment and unemployment—affects consumption, Dave and Kelly (2010) found that a higher risk of unemployment is associated with reduced consumption of fruits and vegetables, and increased consumption of snacks and fast food.

The extent to which time-use data has been used to investigate FAFH eating patterns has been limited in the literature. Time-diary data such as the ATUS can be used to directly model demand for FAFH by type (i.e., fast food and sit-down restaurant) as a function individual and household-level time-constraining activities—that is, time spent in work, personal care, household production, and leisure activities over the day—demographic and labor force household characteristics, along with market-level characteristics. In the next section we discuss variables in the ATUS that we use to analyze fast-food eating patterns in the United States.

DATA AND DEFINITIONS

In this study we identify various FAFH activities and estimating frequency and time duration, we used the pooled 2003-11 American Time Use Survey (ATUS) data. Although the data do not have the dollars spent or calories consumed associated with FAFH, they do have time diaries as well as extensive demographic and labor force participation information, and information on all members of the household, and some geographic information. This allows us to identify different FAFH behaviors in different subgroups. The ATUS data also reports information on

individuals' time diaries so that analysis of their activities and time-use patterns can be accomplished.

Other data sources exist that can be used to model demand for fast food; for example, food intake data like the National Health and Nutrition Examination Survey and food expenditure data like the Consumer Expenditure Survey have been used to look at how fast-food consumption affects diet quality (Todd 2014) and how prices and expenditures affect fast-food consumption (Okrent and Alston 2012). However these data sets do not contain information on all of the respondent's activities.

The Bureau of Labor Statistics' ATUS is a continuous survey that began in 2003. Interviews are conducted by the U.S. Census Bureau, and are done nearly every day of the year allowing for analysis of weekdays versus weekends, holidays, and seasonality over the year. One individual age 15 or older from each sampled household is interviewed about his or her activities for the 24-hour period from 4 a.m. the day before the interview to 4 a.m. on the interview day.[3] Survey respondents are asked to identify their primary activity if they were engaged in more than one activity at a time. They are also asked to report where they were and whom they were with for most diary activities. The ATUS also includes demographic, labor force participation, and household information, along with a limited amount of geographical information.

[3] One potential drawback of the ATUS diary data is that information on only one time-diary day per person was collected. There may be concern that some activities, such as eating fast food or engaging in sports and exercise, are not daily activities and thus that a one-day diary such as the ATUS lacks intrapersonal variability. However, some activities, such as eating patterns, have a large degree of persistency, meaning that day-to-day variation is minimal; Wansink's (2007) *Mindless Eating* discusses the myriad external influences that result in eating habits. Exercise is also considered to be a habit, and researchers have studied what contributes to habitual exercise (Aarts et al. 1997; Finlay et al. 2002). Indeed, much of an individual's daily activities can be classified as habitual repetition (Neal et. al. 2006). Another argument for using the ATUS one-day time diary data is that the ATUS are large and nationally representative, and so intrapersonal variability would wash out.

The pooled 2003-11 ATUS microdata files contain 124,517 completed interviews, yielding a total of 2,462,919 activities in the respondents' time diaries. The ATUS Respondent, Roster, Activity, Activity Summary, Who, ATUS-Current Population Survey, Replicate Weights, and Methodology Case files were used for our research. (See References for website links.)

Estimation procedures outlined in the ATUS User's Guide (U.S. Bureau of Labor Statistics, March 2013) and the Eating & Health Module User's Guide (Hamrick, 2010) were followed. All estimates presented were weighted to be nationally representative. Averages were calculated as the mean. Standard errors were calculated according to Section 7.5 of the ATUS User's Guide, using the balanced repeated replication method and the ATUS Replicate Weights file. A 90-percent level of confidence was used to determine whether estimates were statistically different. All differences between estimates discussed in the text are statistically different at the 90 percent level unless stated as not statistically different. Estimates were done in SAS 9.2 and Stata 12.

We used the ATUS time diaries to infer whether an individual made a fast-food/carry-out purchase (here referred to as fast food) or ate at a resturant (or related venue). We did this by using the ATUS "where" codes; that is, the "where" code denoted where the respondent was during an activity, and we used this information in conjunction with the sequence of events relating to a fast-food purchase. Our goal was to match the industry definitions above. Specific details on data definitions and data limitations are provided in Appendix A.

DESCRIPTIVE STATISTICS

In this section, we describe differences in fast-food and sit-down restaurant purchasing behavior between subpopulations and over time. All estimates are weighted to be nationally representative, and a 90-percent level of confidence was used to determine whether estimates were statistically different. As discussed above, many studies have found relationships between demand for FAFH and gender, age, and employment status. Hence, in the first subsection we discuss differences in time spent eating, drinking, and other household activities, and fast-food and sit-down restaurant participation rates by gender, age, and employment status. Because of evidence that the Great Recession has had a lasting impact on FAFH purchasing behavior, we also analyze how fast-food and sit-down participation rates changed over the business cycle in the second subsection.

Differences Among Gender, Age, and Employment Status Groups

Figure 1 and Appendix table 1 provide the average times spent in various activities for the total population (age 18 years old and over), men and women, and by age groups. For 2003-11, we see that on an average day Americans age 18 years old and over spent 67.5 minutes engaged in primary eating and drinking beverages, that is, eating and drinking as an individual's main activity. Of that, 14.1 minutes were eating out, mostly at a sit-down restaurant, and the remainder (53.4 minutes) was eating elsewhere.[4] In addition, 19.5 percent of the population ate out at a sit-down restaurant on an average day, and 13 percent purchased fast food/carry out (Figure 2). Eating out at a sit-down restaurant and purchasing fast food are not mutually exclusive, as 1.7 percent of Americans do both on an average day (not shown). Although 13 percent of the population purchased fast food, only about one percent of the population reported eating at a fast-food establishment. Almost all of fast-food purchasers leave with their food and

[4] Totals do not always add up exactly due to rounding. Totals will be ±0.1 minute or ±0.1 percentage point.

do not report eating it there, which creates a disconnect in time and location between the obtaining of the food and the consuming of the food.

Looking at time-use patterns of men and women over 2003-11, we see many of the same differences identified by other ATUS researchers; in particular, men spend more time in eating/drinking activities, paid work, and watching television, whereas women spend more time in grooming, meal preparation, cleanup, and other household tasks, and caring for others. Interestingly, a smaller percentage of women ate out at a sit-down restaurant on an average day (18.5 percent, versus 20.4 percent of men), and were also less likely to purchase fast food (12.5 percent versus 13.5 percent of men). This is in line with Byrne et al. (1996) who argued that households with female managers may purchase less FAFH because they have better cooking skills.

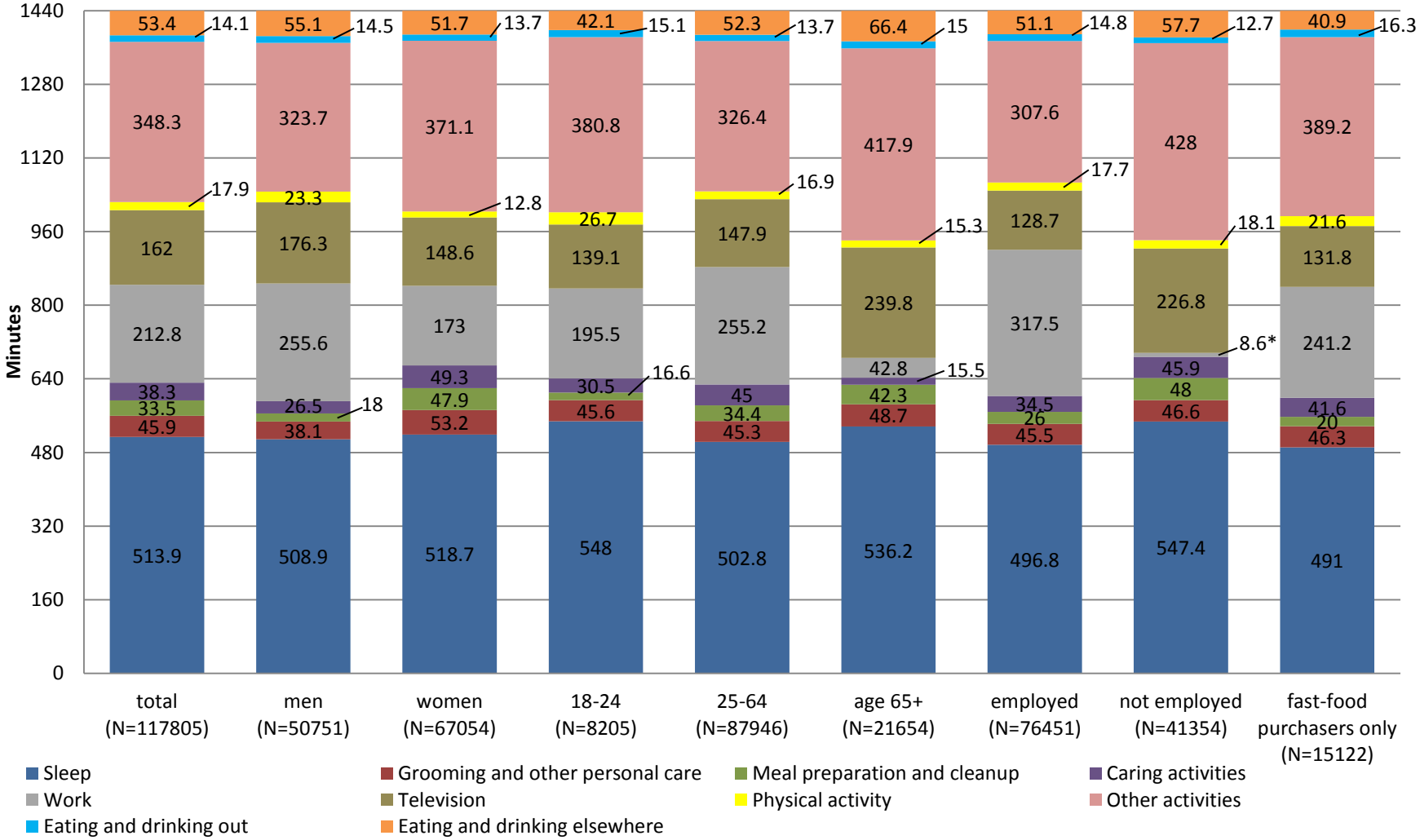
Looking among the age groups, the most striking differences in food-related time use are between those age 18-24 versus those age 25-64, and those age 65 years old versus those 25-64. Americans 18-24 years old spent the least amount of time in eating/drinking, 57.2 minutes, and the least amount of time in meal preparation (16.6 minutes). In line with their short-duration average meal preparation time, they were the most likely to purchase fast food (18.4 percent) and were more likely to eat all of their meals out (8.0 percent, Figure 2). Perhaps paradoxically, a relatively large percentage of this age group reported no eating/drinking activities during the day.[5] Those 65 and over spent the most time in eating/drinking, 81.4 minutes, and in meal

[5] Just because respondents do not report any primary eating/drinking does not mean that they are not consuming food and beverages. Hamrick et al. (2011, p. 7) found that those who reported no primary eating/drinking had much higher rates and longer duration of secondary eating and drinking; that is, eating/drinking while doing something else the respondent considers primary.

preparation, 42.3 minutes.[6] However, their participation rate of eating out (percent who ate out and elsewhere plus percent who ate out only), 20.9 percent, was about the same as those age 25-64 years old, and their average time spent in eating out was slightly longer, 15 minutes, than those age 25-64 years old (Figure 3). However, they had the lowest rate of fast-food purchase, 6.4 percent. This is consistent with Stewart et al. (2004) who found that individuals decrease spending on fast food as they age.

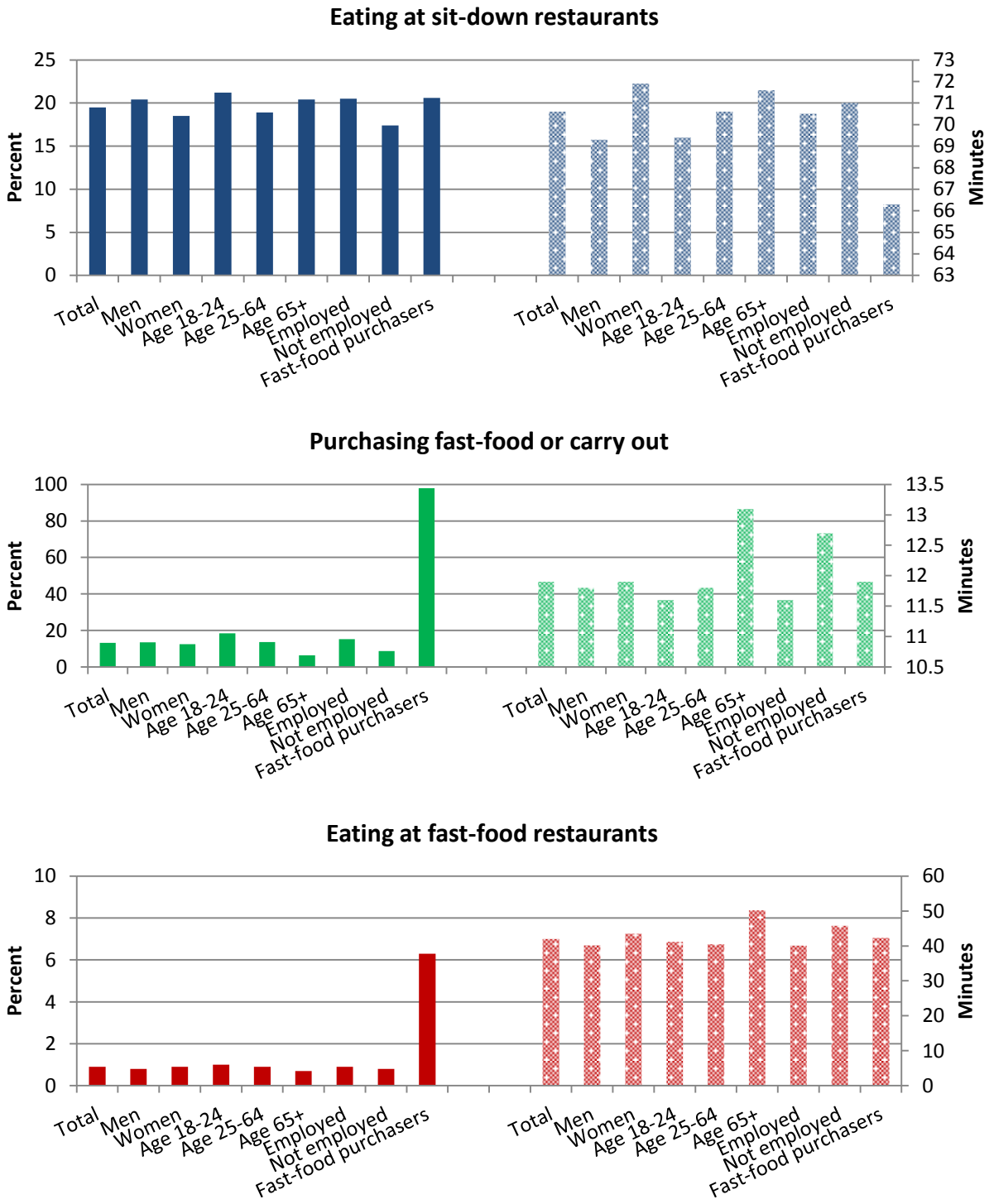
[6] Those age 65 or over who were employed spent 80.6 minutes in eating/drinking activities, and those who were not employed spent an average of 81.6 minutes, a not-statistically-different difference. (Estimates not shown.) It appears that the longer average time engaged in primary eating/drinking may be due to generational differences, and not just that those age 65 and over have more time due to retirement.

Figure 1--Time spent in various activities on an average day, 2003-2011, Age 18 years old and older



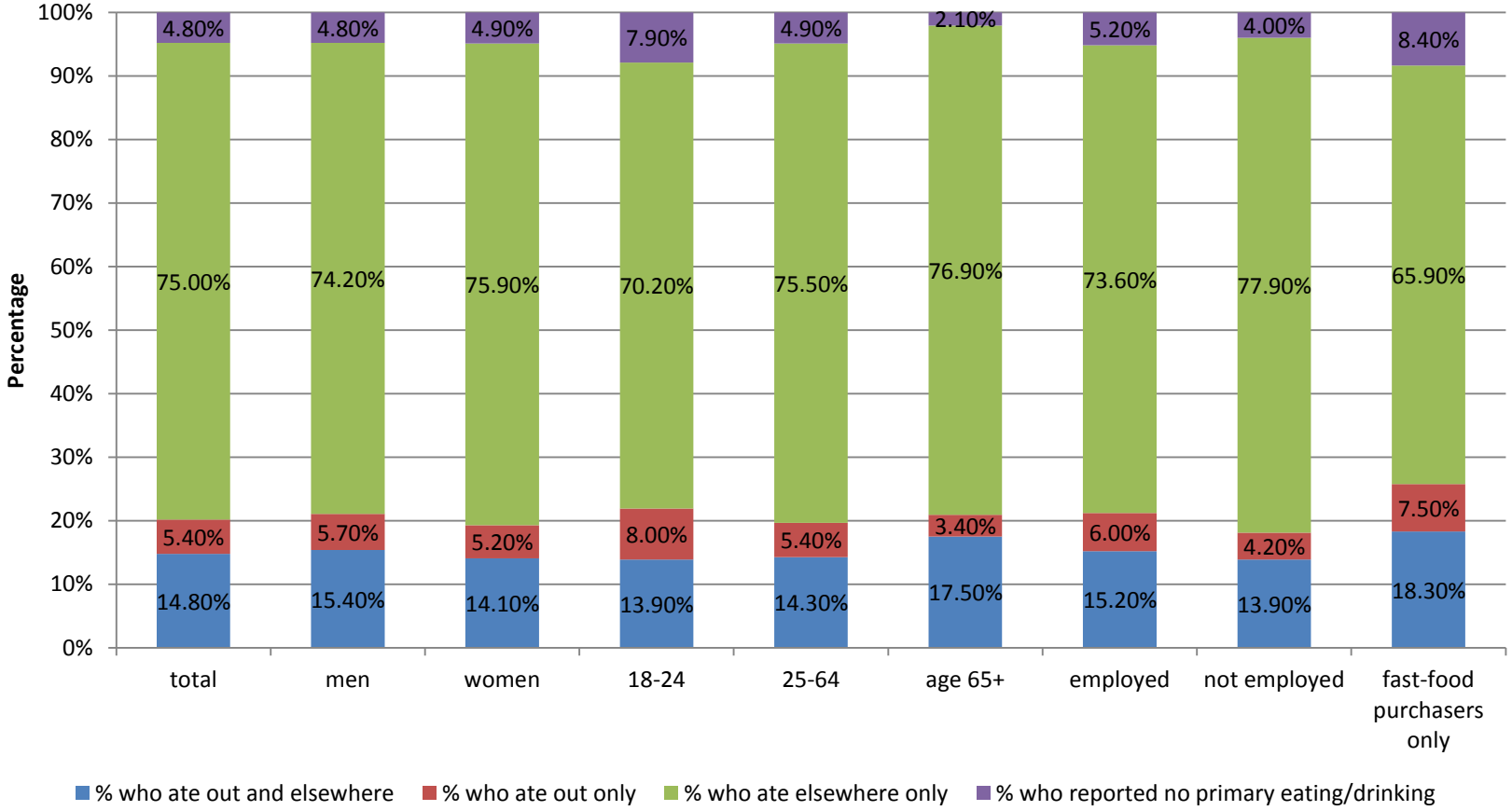
*Time spent looking for employment is considered work.
Source: ERS estimates calculated from American Time Use Survey data.

Figure 2—Participation rates and average time spent by participants for FAFH, on an average day, 2003-11, Age 18 years old and older.



Source: ERS estimates calculated from American Time Use Survey data.

Figure 3—Distribution of eating behaviors, 2003-2011, age 18 and over



Source: ERS estimates calculated from American Time Use Survey data.

Turning now to averages based on employment status, figures and table above and Appendix table 2 present averages for those employed and those not employed. Because the ATUS data span the 7 days of the week, including holidays, and most employed work occurs only 5 days a week, employed averages included both those who are employed and engaged in paid work on the average day, and also for those employed who did not engage in paid work. Since those not employed may engage in job search, which is considered a work-related activity, they have an average work time. Those who were employed spent, on average, less time in eating/drinking than those not employed, 65.9 minutes versus 70.5 minutes, and also less time in meal preparation and cleanup, 26 minutes versus 48 minutes.

However, looking at FAFH behavior, 20.5 percent of those employed ate out at a sit-down restaurant on the average day, a higher rate than those not employed (17.4 percent) although the average amount of time spent at the restaurant was about the same for the two groups, about 71 minutes. Similarly, 15.2 percent of those employed also purchased fast food compared with only 8.8 percent of those not employed.

Of particular interest are those who purchased fast food (figures and and Appendix table 2). Compared with averages for the total population, fast-food purchasers spent less time in primary eating/drinking, slept less,[7] spent less time in meal preparation and cleanup as well as other household activities, slightly more time in caring for household and non-household members, more time in paid work and accompanying travel, and less time watching television. Fast-food purchasers were considerably more likely to report no primary eating/drinking (8.4 percent

[7] Fast food purchasers spent, on average, 3.0 minutes in sleeplessness and 488.0 minutes actually sleeping, for a total of 491.0 minutes. The total population spent, on average, 3.5 minutes in sleeplessness and 510.5 minutes actually sleeping, totaling 513.9 minutes.

versus 4.8 percent) and more likely to report that all their eating/drinking was at an eating out establishment (7.5 percent).

Before and after the Business Cycle Peak

The National Bureau of Economic Research dates the last business cycle peak as December 2007, the end of an expansion, and the beginning of a recession that would last until the business cycle trough June 2009, ending the Great Recession. Although a new expansion started at the trough, economic recovery was slow post-recession, and in particular, the labor market has been slow to recover. As of this writing, the unemployment rate has yet to decline to its pre-recession level of 4.7 percent (November 2007). [NOTE: We will adjust this sentence closer to publication to characterize the labor market's recovery.] Although time-use patterns change little if any year-to-year, the economic impact of a recession, especially one with the depth of the 2007-09 recession, would be expected to cause changes in Americans' activities due to more workers being unemployed, lower household income, and lower economic confidence, as well as other factors, such as a decreased rate of household formation.[8]

We analyzed the time-use patterns of Americans during January 2003-November 2007 (the ATUS data available for the 2001-07 expansion) and also over December 2007-December 2011 (post Great Recession peak[9]) (Table 1). Looking at the total population (columns 1 and 2), there are small but systematic changes in Americans' time-use patterns—less time, on average, spent in paid work and in travel; more time spent in meal preparation; less time spent in making

[8] The rate of household formation—people setting up new households—dropped considerably over 2007-11 as families and unrelated individuals "doubled up" in the same household. See Elliott et al. (2011) and Paciorek (2013).

[9] We also analyzed the data for the time periods January 2003-November 2007, December 2007-June 2009, and July 2009-December 2011, and found little difference between time-use patterns for December 2007-June 2009 and for July 2009-December 2011. This is likely due to the soft labor market during the recovery.

purchases as households' discreationary income decreases or households' uncertainty about future income causes them to cut back on spending; and more time watching television. However, average time spent in primary eating/drinking was essentially the same, but there was a decrease in the amount of time spent eating out and a corresponding increase in the amount of time eating elsewhere.

The percent of the population who reported no primary eating/drinking post-peak declined to 4.5 percent from 5.1 percent. Although the difference in these estimates is statistically significant, this drop is likely due to a statistical artifact—the ATUS had a large number of respondents (9 percent) report no primary eating/drinking in the first year of the survey (2003) and as a result changes were made in the survey instrument. The percent of the population with no primary eating/drinking has been consistently lower since the survey change in 2004.

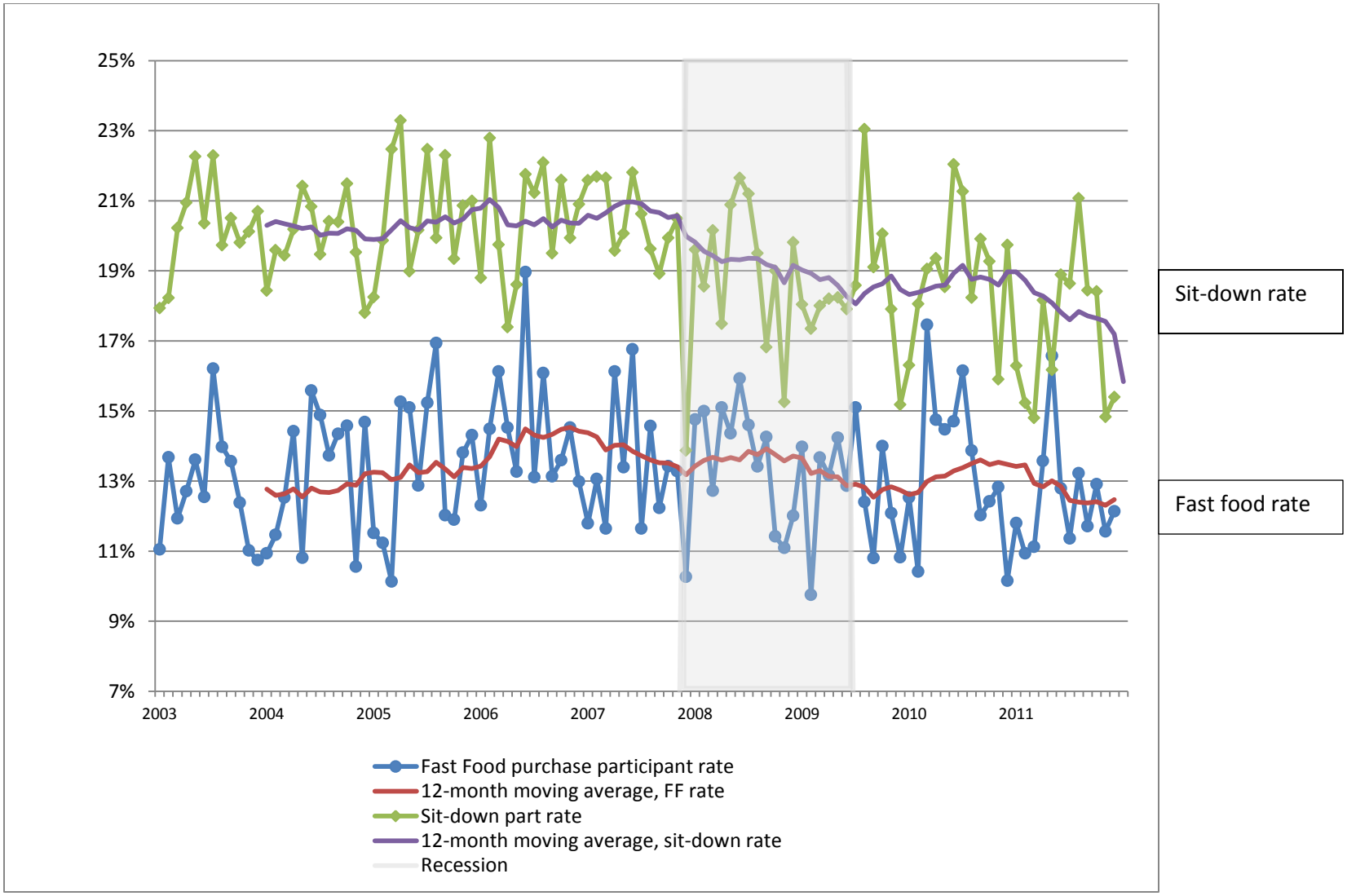
The rate of eating out at sit-down restaurants declined post-peak from 20.4 percent to 18.4 percent of the population on an average day. With the rate of fast-food purchase staying essentially the same, 13.2 to 12.8 percent, a not-statistically significant difference, Americans maintained their pattern of purchasing fast food, despite or because of the recession.

The percentage of the population age 18 years old and over purchasing food from fast-food or sit-down restaurants on an average day in a month are shown in Figure 3. The percentage of those individuals purchasing fast food appear to have an upward trend between 2003 and 2005, but since has leveled off and declined slightly in 2011. The rate at which individuals purchase food from sit-down restaurants, however, appears to be in secular decline since the recession,

that is, on a downward trend.[10] So, even with the fast food rate decline in 2011, the fast food rate weathered the recession better than the sit-down rate.

[10] We conducted likelihood ratio tests for structural change on our probit model below. We found that chi-squared value for the probability of fast-food purchase was greater than the upper-tail critical value of chi-square at the 0.1 level (that is, probability less than the critical value is 0.999) indicating a structural break in the data when evaluating 2003-07 and 2007-11. Even though we saw in Figure 4 that the participation rates for fast food seemed unaffected by the recession and that the indicator for post-business cycle peak in the probit model of all data (Table 3) was statistically insignificant the Chow test indicates that the slope and intercept coefficients the period before the recession are statistically different from those during and after the recession.

Figure 4. Rates of Fast-Food and Sit-Down Purchases by the U.S. Adult Population, 2003-2011



Looking at differences in pre- and post-peak changes between men and women (columns 3-6), we see the expected trends, although the increase in men's meal preparation time from 17 to 19.2 minutes, stands out. This is consistent with the findings of Berik and Kongar (2013), that gender difference in housework hours narrowed during the recession from a small increase in fathers' unpaid work and a decrease in mothers' unpaid work.

Also we see that women had a larger decline in their rate of eating out at sit-down resaturants than men did. Looking at the working-age population only (columns 7-12), we see less change in behavior between the two time periods, although apparent is the decline in the rate of sit-down restaurant eating while the rate of fast-food purchase stays essentially the same (differences are not statistically different).

Fast-food purchasers exhibited less change in behavior pre- and post-peak than the total population (Table 2). Their time-use patterns are fairly stable between the two periods. Particularily striking is that the percent of the fast-food purchasers who ate out (sit-down or fast-food restaurant) stayed about the same while the share of the total population who ate out declined.

Table 1—Time spent in various activities on an average day, 2003-2011, Age 18 years old and older, by time period: pre-recession (January 2003 to November 2007), recession and recovery (December 2007 to December 2011).												
Note: BC peak was Dec. 2007, trough was June 2009	**Jan 2003-Nov 2007**	**Dec 2007-Dec 2011**	**Jan 2003-Nov 2007**	**Dec 2007-Dec 2011**	**Jan 2003-Nov 2007**	**Dec 2007-Dec 2011**	**Jan 2003-Nov 2007**	**Dec 2007-Dec 2011**	**Jan 2003-Nov 2007**	**Dec 2007-Dec 2011**	**Jan 2003-Nov 2007**	**Dec 2007-Dec 2011**
	TOTAL (1)	**TOTAL (2)**	**MEN (3)**	**MEN (4)**	**WOMEN (5)**	**WOMEN (6)**	**AGE 25-64 (7)**	**AGE 25-64 (8)**	**MEN 25-64 (9)**	**MEN 25-64 (10)**	**WOMEN 25-64 (11)**	**WOMEN 25-64 (12)**
N	67,746	50,059	29,017	21,734	38,729	28,325	50,762	37,184	22,284	16,598	28,478	20,586
	minutes											
EATING AND DRINKING	67.4	67.5	69.5	69.7	65.6	65.3	66.0	66.0	68.7	68.9	63.4	63.2
Eating/drinking out	14.7	13.4	15.0	13.9	14.4	12.9	14.3	13.1	14.7	13.6	13.8	12.5
Sit-down restaurant	14.4	13.0	14.8	13.5	14.1	12.5	14.0	12.7	14.5	13.2	13.5	12.1
Fast food/carry out	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.4	0.2	0.4	0.3	0.4
Eating/drinking elsewhere	52.7	54.1	54.4	55.8	51.2	52.4	51.7	52.9	54.0	55.3	49.6	50.7
PERSONAL CARE												
Sleep	511.1	517.2	505.9	512.2	515.9	521.8	500.7	505.2	495.0	498.9	506.2	511.3
Grooming & other pers. care	45.8	46.0	38.2	38.0	52.9	53.5	45.3	45.3	38.3	37.9	52.0	52.5
HOUSEHOLD ACTIVITIES												
Meal prep and cleanup	32.8	34.2	17.0	19.2	47.5	48.3	33.6	35.3	17.5	20.0	49.1	50.0
Other household activities	80.0	75.4	66.4	63.9	92.6	86.1	80.4	74.0	66.3	61.6	93.9	86.0
CARING ACTIVITIES												
Caring for HH members	29.2	27.8	18.0	18.2	39.6	36.8	35.9	34.7	22.4	23.4	48.9	45.6
Caring for non-HH members	10.2	9.2	8.7	8.0	11.6	10.3	9.9	9.4	8.1	7.8	11.6	10.9
WORKING AND WORK-RELATED	216.8	208.2	262.1	248.1	174.8	170.8	259.2	250.6	309.4	295.6	211.1	207.1
EDUCATIONAL ACTIVITIES	13.9	14.3	12.8	13.1	14.9	15.4	7.9	7.6	6.8	6.5	9.1	8.7
PURCHASING GOODS AND SERVICES												
Grocery purchases	6.4	6.5	4.4	4.8	8.3	8.1	6.5	6.5	4.2	4.7	8.7	8.4
Other purchases	25.2	23.1	20.0	18.6	30.0	27.3	25.0	22.8	19.2	18.1	30.6	27.3
Fast food/carry out purch	1.6	1.5	1.6	1.6	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6

continued

Table 1 continued	1/2003-11/2007	12/2007-12/2011	1/2003-11/2007	12/2007-12/2011	1/2003-112007	12/2007-12/2011	1/2003-11/2007	12/2007-12/2011	1/2003-11/2007	12/2007-12/2011	1/2003-11/2007	12/2007-12/2011
	TOTAL (1)	TOTAL (2)	MEN (3)	MEN (4)	WOMEN (5)	WOMEN (6)	AGE 25-64 (7)	AGE 25-64 (8)	MEN 25-64 (9)	MEN 25-64 (10)	WOMEN 25-64 (11)	WOMEN 25-64 (12)
GOV'T, CIVIC, RELIGIOUS, VOLUNTEER	16.1	17.7	13.9	15.5	18.0	19.9	15.0	16.6	13.1	14.5	16.9	18.6
LEISURE ACTIVITIES												
Watching television	156.7	167.9	170.2	183.3	144.2	153.6	142.3	154.4	157.5	170.4	127.7	138.8
Other socializing, leisure, and screen time	118.7	114.6	118.4	112.1	119.0	117.0	102.6	99.6	100.8	95.7	104.3	103.4
SPORTS & EXERCISE	17.9	17.8	23.2	23.4	12.9	12.7	16.8	17.1	21.0	21.5	12.8	12.7
PHONECALLS, mail, email	6.3	6.2	3.4	3.7	9.0	8.5	5.5	5.4	2.9	3.2	8.0	7.5
TRAVEL	76.2	72.3	79.2	75.0	73.4	69.9	79.5	76.4	81.6	78.8	77.4	74.0
Other activities not elsewhere classified	9.2	14.0	8.7	13.3	9.6	14.7	7.9	13.1	7.3	12.2	8.5	13.9
TOTAL TIME	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0
Participation rates and time spent by participants												
% who ate out, sit-down (%)	20.4%	18.4%	21.2%	19.5%	19.6%	17.4%	19.8%	18.0%	20.7%	19.1%	18.9%	16.9%
Ave. time spent by those who ate out, sit-down (min)	70.7	70.5	69.6	69.0	71.9	72.0	70.8	70.4	70.0	69.1	71.6	72.0
% who purchased fast food/carry out (%)	13.2%	12.8%	13.8%	13.0%	12.5%	12.6%	13.7%	13.5%	14.0%	13.4%	13.3%	13.5%
Ave. time spent in purchasing FF (minutes)	11.8	11.9	11.7	12.0	11.9	11.8	11.7	11.9	11.6	11.8	11.8	11.9
% who ate out, FF restaurant (%)	0.8%	1.0%	0.7%	1.0%	0.8%	1.0%	0.7%	1.0%	0.7%	1.0%	0.8%	1.0%
Ave. time spent eating at FF restaurant (min)	41.2	42.7	38.8	41.4	43.1	43.8	40.6	40.4	37.2	40.6	43.4	40.3
Distribution of eating behaviors												
% who ate out and elsewhere	15.3%	14.1%	15.9%	14.9%	14.8%	13.3%	14.8%	13.6%	15.5%	14.5%	14.2%	12.8%
% who ate out only	5.7%	5.1%	5.9%	5.3%	5.4%	4.9%	5.5%	5.2%	5.7%	5.5%	5.3%	5.0%
% who ate elsewhere only	74.0%	76.3%	73.2%	75.3%	74.7%	77.2%	74.5%	76.5%	73.8%	75.8%	75.2%	77.3%
% who reported no primary eating/drinking	5.1%	4.5%	5.1%	4.4%	5.1%	4.7%	5.1%	4.6%	5.0%	4.3%	5.3%	5.0%
Total eating/drinking time	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: ERS estimates using American Time Use Survey data.

Table 2—Time spent in various activities on an average day, 2003-2011, Age 18 years old and older, by time period: pre-recession (Jan. 2003 to Nov. 2007), recession and recovery (Dec. 2007 to Dec. 2011).				
	Jan 2003-Nov 2007	Dec 2007-Dec 2011	Jan 2003-Nov 2007	Dec 2007-Dec 2011
	TOTAL	TOTAL	Only fast food purchasers	Only fast food purchasers
N	67,746	50,059	8,739	6,383
EATING AND DRINKING	67.4	67.5	56.9	57.6
Eating/drinking out	14.7	13.4	16.4	16.3
Sit-down restaurant	14.4	13.0	14.1	13.2
Fast food/carry out	0.3	0.4	2.2	3.1
Eating/drinking elsewhere	52.7	54.1	40.5	41.3
PERSONAL CARE				
Sleep	511.1	517.2	488.7	493.7
Grooming & other pers. care	45.8	46.0	45.5	47.3
HOUSEHOLD ACTIVITIES				
Meal prep and cleanup	32.8	34.2	19.7	20.4
Other household activities	80.0	75.4	62.9	57.7
CARING ACTIVITIES				
Caring for HH members	29.2	27.8	30.4	30.2
Caring for non-HH members	10.2	9.2	11.5	11.0
WORKING AND WORK-RELATED	216.8	208.2	247.5	233.8
EDUCATIONAL ACTIVITIES	13.9	14.3	19.0	18.3
PURCHASING GOODS AND SERVICES				
Grocery purchases	6.4	6.5	5.3	5.7
Other purchases	25.2	23.1	43.8	41.7
Fast food/carry out purch	1.6	1.5	11.6	11.7
GOV'T, CIVIC, RELIGIOUS, VOLUNTEER	16.1	17.7	17.8	18.3
LEISURE ACTIVITIES				
Watching television	156.7	167.9	128.7	135.5
Other socializing, leisure, and screen time	118.7	114.6	113.3	116.8
SPORTS & EXERCISE	17.9	17.8	22.2	20.9
PHONECALLS, mail, email	6.3	6.2	7.4	7.5
TRAVEL	76.2	72.3	110.4	111.1
Other activities not elsewhere classified	9.2	14.0	9.0	12.8
TOTAL TIME	1440.0	1440.0	1440.0	1440.0

continued

Table 2 continued	Jan 2003-Nov 2007	Dec 2007-Dec 2011	Jan 2003-Nov 2007	Dec 2007-Dec 2011
	TOTAL	TOTAL	Only fast food purchasers	Only fast food purchasers
Participation rates and time spent by participants				
% who ate out, sit-down (%)	20.4%	18.4%	21.0%	20.2%
Ave. time spent by those who ate out, sit-down (min)	70.7	70.5	67.4	65.0
% who purchased fast food/carry out (%)	13.2%	12.8%	98.0%*	97.7%*
Ave. time spent in purchasing FF (minutes)	11.8	11.9	11.8	11.9
% who ate out, FF restaurant (%)	0.8%	1.0%	5.4%	7.3%
Ave. time spent eating at FF restaurant (min)	41.2	42.7	41.5	42.9
Distribution of eating behaviors				
% who ate out and elsewhere	15.3%	14.1%	17.7%	19.0%
% who ate out only	5.7%	5.1%	7.6%	7.3%
% who ate elsewhere only	74.0%	76.3%	66.1%	65.6%
% who reported no primary eating/drinking	5.1%	4.5%	8.6%	8.1%
Total eating/drinking time	100.0%	100.0%	100.0%	100.0%

*Note: Percent who purchased fast food/carry out is not 100% because some individuals do not report purchase time, only eating/drinking time. Here the category "Only those who purchased fast food" includes those with zero purchase time but some fast food eating/drinking time.
Source: ERS estimates using American Time Use Survey data.

MULTIVARIATE ANALYSIS

The descriptive results provide a motivation for multivariate treatment because many of the explanatory factors are correlated, which makes it difficult to determine the direct associations of these factors. For example, fast-food purchase appears to be related to employment and also to time spent in travel. However those who are employed tend to spend more time in travel on an average day as travel includes their work commute. In addition, fast-food purchasers tend to spend less time in certain activities, such as household tasks and watching television, but spend more time in paid work. Lastly, men are more likely to eat out and are also more likely to be employed. As a consequence, time patterns are interelated with labor force status and demographic characteristics, and with fast-food purchasing behavior as well.

We adopted Becker's (1965) model and applied it to fast food.[11,12] We modeled whether individual *j* purchased fast food, y_j, as a function of a matrix of demographic, health, employment status and household composition characteristics of individual *j* ($\boldsymbol{D_j}$), the value of time as proxied by time spent in market labor, household and leisure activities ($\boldsymbol{W_j}$), geographic covariates including price for market *m* ($\boldsymbol{M_{mt}}$), which vary over time, *t*, and household income (V_j). Note that we are modeling whether the individual, not the household, purchased fast food. Specifically, we adopt a probit model such that

$$(1)\quad p_j = \Pr[\, y_j = 1 \mid \mathbf{D}_j, \mathbf{W}_j, \mathbf{M}_{mt}, V_j \,] = \Phi(\mathbf{D}'_j\boldsymbol{\beta}_1 + \mathbf{W}'_j\boldsymbol{\beta}_2 + \mathbf{M}'_{mt}\boldsymbol{\beta}_3 + V_j\beta_4),$$

where $\Phi(\cdot)$ is the cumulative distribution function for the standard normal. We used a probit model as the vast majority of fast-food purchasers made one purchase on an average day.[13] The marginal effect of the *k*th explanatory variable, x_k, on the probability of fast-food purchase is calculated as

[11] We look at fast-food purchase as a demand for a commodity, fast food, and not strictly from a household production standpoint. By focusing on the purchase, we do not have to consider the alternative, meal production, and determine who in the household prepares the meals. However, time spent in household tasks are included as factors determining the probability of a fast-food purchase. This approach allows us to consider all individuals, and not just specific subsets, such as married couples, that a household production and division of labor approach would warrant.

[12] We considered modeling demand for fast food as double-hurdle model such that the first hurdle would be the probability of purchasing fast food, and then the second hurdle would be predicting the time spent in purchasing and/or eating fast food conditional upon fast-food purchase. However, since the distribution of the time duration of purchasing fast food is fairly narrow, and the time spent eating fast food is not straight forward, we concluded that a double-hurdle model would not be useful. First, almost half of fast-food purchasers do not report eating fast-food as a primary activity within 90 minutes of purchasing fast food, and those that do report eating fast food typically do so in a small window of time (between 15 and 30 minutes). Looking at the 2006-08 data, which included data on secondary eating and drinking (i.e., eating/drinking while doing something else), we found that of those who reported no primary eating/drinking time after fast food purchase, only 22.5 percent reported secondary eating and only 9 percent reported secondary drinking after fast food purchase. Consequently, we concluded that estimating the amount of time spent eating/drinking fast food would be difficult, fraught with measurement error, and not particularly interesting since fast-food purchasers reported relatively short durations of eating/drinking occurrences, if any at all.

[13] 85.3 percent of fast food purchasers had only one purchase; 13.0 percent had 2 purchases; 1.4 percent had 3 purchases; and the remainder had 4-6 purchases. As a robustness check, we also modeled the number of fast-food purchases within a day by an individual as a zero-inflated Poisson model. The results of the zero-inflated Poisson models were consistent with the findings presented in this paper and are presented in Appendix B.

(2) $dp_j / dx_k = \phi(\mathbf{X}'\boldsymbol{\beta})\beta_k$,

where $\mathbf{X}$ is the matrix of $\mathbf{D}_j$, $\mathbf{W}_j$, $\mathbf{M}_{mt}$, and V_j, and $\phi(\cdot)$ is the denisty of the standard normal. We evaluate (4) at the means of the variables, which are in appendix table 1.

Demographic, employment and household characteristics. The demographic characteristics include gender, age group, education level, citizen status, race, and Hispanic ethnicity. Employment status of the respondent is also included to account potential changes in employment during the Great Recession on fast-food purchasing status. Household attributes include household composition, size, and income. Composition of household was included as different households face different preferences and pressures, and have different decision-making processes as noted by others in the relevant literature section. A single-person household would have different meal and snack behavior than a married couple with children. We defined household composition as: (1) single person, (2) single parent with children under 18 years old, (3) couple (married or unmarried) without children, (4) couple with children, (5) other type of household without children, (6) and other type of household with children.[14] Included in household characteristics is the number of persons in household squared, as others have found that frequency of eating out increases with number in the household, but then declines for larger households due to economies of scale, as discussed above. Number of persons in household is

[14] These categories are based on the ATUS respondent and not the totality of the household as we have information only on the individual who did or did not purchase fast food. The "other type of household" categories occur because of this focus on the respondent. For example, a household with a married couple with two children, one 20 years old and the other child 15 years old, would have different categorizations depending on which family member was the respondent. If either parent was the respondent, then the category would be "married couple with children." If either of the children was the respondent, then the category would be "other type of household with children." If the household had just a married couple and a 20 year old child, then the household would be married couple without children (since the child is 18 years or over) if either parent was a respondent, and other type of household without children if the 20-year-old were the respondent.

not included because household composition is included in the model. Also included is an indicator of whether the household has a child or children less than 6 years old in the household.

Value of time. We proxy the value of time by first, indicators for employment and part-time schedule; and second, the amount of time spent at various "necessary" and "committed" activities. Following Kalenkoski, Hamrick, and Andrews (2011) "necessary" activities are sleeping and grooming whereas "committed" activities are household activities (includes household, meal preparation), caring for household members, paid work and work-related activities, and travel associated with these activities. If individuals have greater necessary and committed activities, they may be more likely to purchase fast food due to time pressures. Indeed, above we see that fast-food purchasers spent less time in personal care activities due to less sleep, and spent more time in paid work and travel than the total population. This indicates that time constraints are likely a factor in the fast-food purchase decision. We included the recreational activity watching television, which is by far the dominant recreational activity with the longest average time duration (2.7 hours a day) over the total population and usual subgroups. We also included primary eating and drinking time because in Table 1 we found that fast-food purchasers were more likely to have no primary eating/drinking time over the day, and we wanted to determine if a relationship exists between primary eating/drinking time and fast-food purchases while controlling for other factors.

Market-level and macroeconomic variables. We also include several market-level and time-varying variables. We include indicators for Census region and metro/nonmetropolitan area of residence because previous studies have found that nonmetro residence would be expected to

have a negative relationship with the probability of fast-food purchase due to less access to fast-food establishments. While such regional indicators proxy for price effects, we also include the price of a limited-service meal. This is the average quarterly price of meals and entrees in a Census division at an establishment that does not have table service (Kumcu and Okrent, 2014). We deflate the price using the Census region CPI for all items (US DOL Bureau of Labor Statistics 2013). Indicators of the quarter of the year were included to account for seasonality in eating-out behavior. Also, an indicator of day of week was included—weekday day (Monday through Friday, and not a holiday) and weekend day or holiday (Saturday, Sunday, or holiday). We also included a time trend variables (1-9) because we are using pooled cross-section data.

One of our objectives was to analyze fast-food purchase behavior during the recent business cycle. Consequently, we included a monthly unemployment rate variable (US DOL Bureau of Labor Statistics 2013) as well as an indicator of post-business cycle peak. That is, whether the ATUS respondent's diary day is during the recession (December 2007-June 2009) or after.

Household income. For household income, we include a fairly blunt variable to define "high-income" for 2003-11, indicating whether the household had an income greater than 200 percent of the poverty threshold for a family of four. The reason that a more precise indicator was not used is because of the difficulty of working with the ATUS income variable.[15]

RESULTS

[15] The income survey question—household income over the previous 12 months—was asked of the respondent's household in the first month of the Current Population Survey, which would have been 18-21 months before the ATUS interview. In addition, the CPS income variable has a large amount of nonresponse, which is why we included an "income value missing" variable in the model. To complicate the variable, imputation of missing income values begun in January 2010. These income imputations start appearing in the ATUS in March 2010.

We present the results of the probit model (equation 3) in two subsections for: (1) the entire ATUS sample for the period 2003-2011; and (2) a subsample of the ATUS for the pre-recession period, 2003-2007, and a subsample for the recession and post-recession period of 2008-2011. All estimates are weighted to be nationally representative. The estimates of the probit model of fast-food purchase over the entire sample period and for the pre- and post-business cycle peak (table 3) are described below. (See appendix table 4 for the mean values of the variables used in the models.)

Analysis of the Entire Sample Period, 2003-11.

Controlling for other covariates, we find many of the demographic variables to be associated with the probability of fast-food purchase. Specifically, individuals age 18-24 are 3.5 percentage points (marginal probability of 0.0354) more likely to make a fast-food purchase on an average day than the control group of age 25-64 years old, and those age 65 years old or older are less likely to purchase fast food by 4 percentage points (marginal probability of -0.0374). Interestingly, although we found a statistically significant difference between the rate of fast-food purchase between men and women in the descriptive statistics above, after controlling for other factors there does not appear to be a gender difference given the small and insignificant coefficient on the female variable. Those with more education are more likely to purchase fast food. The probability that noncitizens would purchase fast food compared with citizens was lower with a marginal probability of -0.0593.

In terms of employment status of the respondents, those employed are more likely to purchase fast food, although having a part-time schedule does not seem to make a difference. However, we found that the association between time spent in paid work on an average day and probability of fast-food purchase to be nonlinear and negative. Compared with control group, individuals with zero minutes of paid work, those who engaged in paid work or work-related activities (such as job search) for some positive amount of time (greater than zero minutes) up to and including 720 minutes (12 hours), reduced the marginal probability of purchasing fast food of 1.8 percentage points. Working more than 12 hours is associated with a reduction of the marginal probability of fast food purchase of 8.75 percentage points, one of the larger model results. Upon investigation we found that the individuals who reported working more than 12 hours were more likely to own a business or farm (30.4 percent), and concentrated in the management, healthcare, and transportation occupations. For these individuals, the long hours indicate that it is difficult for them to get away from their jobs, either due to the nature of the work or the isolation of the work location, and so they may bring their own food or have food provided for them. Although the result that those who work on an average day are less likely to purchase fast food seems counter-intuitive, it is those who are employed who do not work on the average day that have the highest marginal probability of fast food purchase among the labor force and work time use groups, with the exception of those who work more than 12 hours, as the marginal probability of employment is 0.024. This may indicate that the time pressure of the work week spills into days off making fast food a desirable option.

Similar to findings in the literature, we also find that household composition and income play an important role in fast-food purchasing behavior. All households with the exception of couples

with children were more likely to purchase fast food than the control of couples with no children. The coefficient for number in household squared was negative as expected and significant at the 90-percent level, although the effect was very small. Despite the bluntness of the income indicator variables, household income greater than 200 percent poverty threshold for a family of four, and for missing income value are positive, as expected, and significant. A positive coefficient was expected for missing income value because higher income households tend to be less likely to report income.[16] This is consistent with others who have found that higher household incomes are associated with fast-food purchase (Stewart et al. 2004; Kim and Leigh 2011).

Looking at the time-use variables, personal care time, which is mostly sleep, was negatively related to fast-food purchase. An increase of an hour of personal care time was associated with a decrease in the probability of fast-food purchase of about one percentage point (-0.0068 marginal probability). This is consistent with the descriptive statistics above. Personal care activities are considered necessary activities, and the less time spent in personal care and committed activities, the more discretionary time that an individuals has. However, with our finding of fast-food purchase being associated with less sleep, it is possible that these individuals are so time pressured that they do not have enough time to sleep in order to tend to their necessary tasks.[17]

[16] The authors' analysis of missing income observations in the Current Population Survey Food Security Supplement found that the prevalence of food insecurity of the unknown income group is about the same as for households with income 185 percent of the poverty threshold. (Household Food Security in the United States, 2006, http://www.ers.usda.gov/publications/err49/). Indeed, for other measures of food security in the report, the estimates of the missing income group were similar to those for households with income 185 percent of the poverty threshold. The authors concluded that the households with missing income were disproportionately households with income above 185 percent of the poverty threshold.

[17] This result is consistent with Kalenkoski and Hamrick (2013). A model including time poverty (not shown) found the coefficient negative and significant, indicating time poverty is associated with a lower probability of fast-food purchase, which Kalenkoski and Hamrick also found. Here we explore the components of time poverty and their association with fast-food purchase. We speculate that fast-food purchasers may be time pressured in a way that is

This finding is also consistent with other research that found less sleep is associated with poorer food choices (Buxton et al. 2009; Chaput et al. 2011; Nishiura et al. 2010).

Time spent in household tasks was negatively related to fast-food purchase, as expected. Meal preparation is part of household tasks, so by definition fast-food purchasers would not be expected to spend as much time on meal preparation. Although the descriptive statistics above showed fast-food purchasers spent slightly more time in caring for household children and adults than the total population, after controlling for other factors, time spent in caring activities does not seem to contribute to the probability of fast food purchase. Greater travel time was associated with a greater probability of fast-food purchase as expected, both because individuals "on the go" would be expected to find fast food a convenient choice, and also because of the time pressure that more hours of travel would produce.

Watching televison, the one recreational time variable in the model, was negatively related to fast-food purchase. This is as expected, since watching TV is a discretionary activity, and fast-food purchase would be more likely to occur the more time pressured the individual is with necessary and committed activities. However, the effect is small—an additional hour of TV watching is associated with 0.45 percentage point decline in the probabiliy of fast food purchase. Perhaps this small result speaks to the dominance of television as Americans' main recreational activity.

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not captured by a time poverty threshold. Their shorter average sleep time, which may be the result of time pressure, appears to give them more discretionary time. Fast-food purchasers had an average total discretionary time of 516.0 minutes, and the total population, 498.1 minutes. The difference, 17.9 minutes, is much of the difference between the average time fast food purchasers sleep (491.0 minutes) and the total population sleep (513.9 minutes).

Time spent in primary eating and drinking, the other discretionary activity variable, was negative and significant—an additional hour of primary eating/drinking time is associated with a reduction of 3.4 percentage points probability of fast-food purchase. This is one of the larger marginal effects estimated. There is no inherent reason that actual eating/drinking time is less for a fast-food meal or snack than other food, although there would be less waiting to eat time for fast food, such as time between courses.[18] However, this result could also indicate different eating patterns, as several studies have found an association between speed of eating and energy intake, satiety, and/or BMI. (Andrade et al. (2008); Leong et al. (2011); Greene et al. (2008)); Sasaki et al. (2003))

In short, although it appears that fast-food purchasers have more discretionary time than others—they spend less time sleeping, doing household tasks, and caring for others—however, they work more hours and spend more time traveling from place to place. They spend less time eating/drinking and are more likely to report no primary eating/drinking. We speculate that fast-food purchasers are time pressed, but not in a way that is easily measurable. Their different time-use patterns stand out from other groups, and indicate that they have distinctly different eating patterns.

The market-level variables had mixed effects on the probability of fast-food purchase. Regional factors were not particularily strong, except nonmetro residence was associated with a lower probability of purchasing fast food. The significance of the nonmetro dummy variable is likely

[18] Waiting to eat time (activities 1102xx) is infrequently reported in the ATUS diaries. Fast food purchasers and those who ate at sit-down restaurants both reported average "waiting associated with eating time" as less than one minute. It is likely that respondents instead report their wait time as socializing, grooming (restroom visit), reading, or cell phone use.

due to individuals having less access to fast-food establishments. It is not surprising that the regional dummies are mostly insignificant because we include price of fast foods in each region, and previous studies used region to proxy for regional price differences (e.g., Jensen and Yen 1996). Indeed, we found that the real price of fast food was also negatively related as expected. A dollar increase in the price (in 2011 $) of a fast-food meal was associated with a decline of about one percentage point of the probability of fast-food purchase, which is consistent with demand theory. The unemployment rate was negatively related to the probability of fast-food purchase, as expected. An increase in unemployment would lead to both lower household incomes for some, and overall increased economic uncertainty that may curtail purchases.

Looking at behavior over the business cycle, being in the post-business cycle peak period did not seem to affect the probability of fast food-purchase. The coefficient is negative, although very small and not statistically significant. This is consistent with our visual inspection of the fast-food purchase participation rates during 2003-11 (Figure 3 above), and also consistent with findings based on expenditure data (e.g., Okrent and Alston 2012), and data that shows sales as fast-food restaurants did not change much between 2008 and 2009 (see footnote 11). In addition, the time trend variable is positive and signifiant indicating that there may be a secular trend towards more individuals purchasing fast food on a given day. This could be due to the increased number of fast-food establishments and expanded food/beverage choices during the 2000s.

Analysis of Pre- and Post-Business Cycle Peak.

We next investigated the effects of the business cycle on fast-food purchasing behavior by estimating the model for the time period January 2003 through November 2007, and for December 2007 through December 2011. Results are similar to the model for 2003-11, with small changes post-business cycle peak. Several of the variables have slightly smaller positive coefficients for the post-peak period, reflecting the decline in jobs, income, and economic confidence of the recession and the recovery's soft labor market.

The biggest change pre- and post-peak is for those employed—being employed added 1.5 percentage points to the probability of fast-food purchase pre-peak, but added 3.35 percentage points post-peak. Perhaps those employed shifted expenditure from sit-down restaurants to fast food during the recession and afterwards. This increase in probability of fast-food purchase by those employed seems to hold up the participation rate (Figure 1) as many of the post-peak changes decreased the probability or increased the probability by tiny amounts.

Table 3--Probit model, 2003-2011	2003-11			January 2003-November 2007			December 2007-December 2011		
Fast food=1	Estimate		Marginal probability	Estimate		Marginal probability	Estimate		Marginal probability
Intercept	-0.6713	***	-0.1306	-0.0937		-0.0184	-0.6321	***	-0.1210
Demographic characteristics									
Female	0.0059		0.0011	-0.0051		-0.0010	0.0180		0.0035
Age 18-24	0.1819	***	0.0354	0.1992	***	0.0391	0.1614	***	0.0309
Age 65+	-0.1925	***	-0.0374	-0.2127	***	-0.0418	-0.1731	***	-0.0331
Education, less than high school diploma	-0.0986	***	-0.0192	-0.1405	***	-0.0276	-0.0483		-0.0093
Education, some college	0.0683	***	0.0133	0.0334		0.0066	0.1117	***	0.0214
Education, college degree	0.0776	***	0.0151	0.0487	*	0.0096	0.1131	***	0.0217
Education, advanced degree	0.0242		0.0047	-0.0054		-0.0011	0.0559		0.0083
Noncitizen	-0.3049	***	-0.0593	-0.3165	***	-0.0622	-0.2986	***	-0.0572
African American/Black	-0.0109		-0.0021	-0.0334		-0.0066	0.0151		0.0029
Asian	-0.1446	***	-0.0281	-0.1423	***	-0.0279	-0.1448	**	-0.0277
Mixed race	0.0026		0.0005	0.0691		0.0136	-0.0796		-0.0152
Hispanic	-0.0580	**	-0.0113	-0.0416		-0.0082	-0.0741	**	-0.0142
Geographic characteristics									
Midwest region	-0.0132		-0.0026	-0.0347		-0.0068	0.0020		0.0004
South region	0.0373	*	0.0072	0.0041		0.0008	0.0725	**	0.0139
West region	0.0277		0.0054	-0.0181		-0.0036	0.0713	*	0.0137
Nonmetro residence	-0.0313	**	-0.0061	-0.0562	***	-0.0110	0.0023		0.0004
Labor Force Characteristics									
Employed	0.1236	***	0.0240	0.0762	***	0.0150	0.1751	***	0.0335
Employed part-time schedule	-0.0256		-0.0050	-0.1538	**	-0.0302	0.1335		0.0256
Household type									
Single person household	0.0724	***	0.0141	0.0900	***	0.0177	0.0544	*	0.0104
Single parent household	0.1297	***	0.0252	0.1821	***	0.0358	0.0659		0.0126
Couple with child(ren) household	0.0394		0.0077	0.0478		0.0094	0.0293		0.0056
Other type of household, with children	0.0930	***	0.0181	0.1198	***	0.0235	0.0647		0.0124
Other type of household, no children	0.0627	***	0.0122	0.1027	***	0.0202	0.0178		0.0034
Number in household, squared	-0.00184	*	-0.0004	-0.0012		-0.0002	-0.0026	**	-0.0005
Child less than 6 years old in household	0.00356		0.0007	0.0062		0.0012	0.0003		0.0001
HH income > 200% poverty thresh	0.1009	***	0.0196	0.1113	***	0.0219	0.0872	***	0.0167
HH income value missing	0.0938	***	0.0182	0.1109	***	0.0218	0.0492		0.0094

continued

Table 3 continued	2003-11			January 2003-November 2007			December 2007-December 2011		
	Estimate		Marginal probability	Estimate		Marginal probability	Estimate		Marginal probability
Time use									
Work and work related,1-12 hrs	-0.0930	***	-0.0181	-0.0545	**	-0.0107	-0.1391	***	-0.0266
Work and work related, > 12 hrs	-0.4501	***	-0.0875	-0.4380	***	-0.0860	-0.4653	***	-0.0891
Primary eating/drinking, hours	-0.1747	***	-0.0340	-0.1827	***	-0.0359	-0.1663	***	-0.0319
Personal care time, hours	-0.0349	***	-0.0068	-0.0352	***	-0.0069	-0.0350	***	-0.0067
Housework, hours	-0.0561	***	-0.0109	-0.0518	***	-0.0102	-0.0615	***	-0.0118
Household child/adult care, hrs	-0.0019		-0.0004	-0.0097		-0.0019	0.0068		0.0013
Watching TV, hours	-0.0233	***	-0.0045	-0.0231	***	-0.0045	-0.0238	***	-0.0046
Travel time, hours	0.1406	***	0.0273	0.1317	***	0.0259	0.1506	***	0.0288
Calendar variables									
Weekend/holiday day	-0.0048		-0.0009	-0.0043		-0.0008	-0.0043		-0.0008
QUARTER2 (April, May, June)	0.0793	***	0.0154	0.0887	***	0.0174	0.0587	**	0.0112
QUARTER3 (July, August, Sept)	0.0432	**	0.0084	0.0648	***	0.0127	0.0030		0.0006
QUARTER4 (October, Nov, Dec)	-0.0102		-0.0020	0.0124		0.0024	-0.0621	**	-0.0119
Time trend 1-9	0.0115	**	0.0022	-0.0163		-0.0032	-0.0088		-0.0017
Business cycle and price variables									
Unemployment rate	-0.0118	**	-0.0023	-0.0941	*	-0.0185	0.0018		0.0003
Fast food meal price (2011 $)	-0.0365	**	-0.0071	-0.0437	*	-0.0086	-0.0453	*	-0.0087
Post business cycle peak (12/07)	-0.0066		-0.0013						
N	117,214			67,384			49,830		
Percent of observations that are fast-food purchasers	12.8%			12.9%			12.8%		
Likelihood Ratio, Pr>ChiSq	<.0001			<.0001			<.0001		
Score, Pr>ChiSq	<.0001			<.0001			<.0001		
Wald, Pr>ChiSq	<.0001			<.0001			<.0001		
Association of predicted and observed:									
Concordant	70.2			69.9			70.6		
Discordant	29.1			29.5			28.7		
Tied	0.7			0.7			0.7		

NOTE: Alaska and Hawaii are not included due to missing fast-food meal prices. Other variables have missing values due to "Don't Know" and "Refused" responses. See appendix table 1 for means and more discussion of missing values.
Note: Excluded group is Male, age 25-64, high school diploma, not employed with zero hours worked on average day, citizen, White, non-Hispanic, Northeast and metro residence, couple without children household, household income less than 200% of the poverty threshold, weekday day, pre-December 2007, and first quarter (January, February, March).
Note: * indicates significance at the 90% level; ** indicates significance at the 95% level; and *** indicates significance at the 99% level.
Note about Concordant-Discordant: The observations are paired up without pairing the observation with itself. Pairs that are both 1's or 0's for the dependent variable are ignored. For the remaining pairs, the predicted value of the observation with a 1 is compared with the predicted value of the observation with a 0. If the predicted value of the 1 observation is greater than the predicted value of the 0 observation, then the pair is concordant. If not, the pair is discordant, and if the predicted values in the pair are the same, then the pair is a tie. For more information, see Paul D. Allison, Logistic Regression Using the SAS System: Theory and Application, Cary, NC: SAS Institute Inc., 1999.
Source: ERS estimates using American Time Use Survey and other data discussed in text.

DISCUSSION

Our research addressed several questions on fast-food purchasing behavior that have not been studied in the literature because of limited information on factors that have potentially affected demand for fast foods. Specifically, what characteristics are related to fast-food purchase?; and did fast-food purchase behavior change during or after the Great Recession?

First, we found evidence that Americans purchase fast food as a means of saving time. Supporting this claim, we found that the probability of fast-food purchase was negatively correlated with time in primary eating and drinking (and in some cases did no primary eating and drinking at all), in personal care activities (primarily sleep), in meal preparation, and and was positively correlated with employment and time spent in travel.

However, we also found that the greater the number of hours a person engaged in labor market work on an average day, the less likely they were to purchase fast food, even after controlling for income, education, and health attributes of the individual. This is a somewhat surprising result given what has been found previously in the literature in that McCracken and Brandt (1987), Byrne et al. (1998), Stewart and Yen (2004) and Stewart et al. (2004) found that an increased value of and hours employed in a week by the household food manager increased demand for fast food. However previous studies used weekly hours spent in work whereas in our study we use daily hours spent in work and work-related activities, and the weekly hours worked may be a proxy for whether a person was employed full time or part time. Hence, these previous studies might actually be picking up the positive relathionship between full-time and part-time work and demand for fast food, which we also found. Also, the previous studies do not control for time

spend in leisure, travel, and household activities, which we found to have statistically significant relationships with demand for FAFH and fast food. Lastly we found that those employed but on their day off were more likely than others to purchase fast food, indicating that the time pressure from work days spills over into non-work days.

Second, we found that fast-food purchasers have different eating patterns than others. They spent less time eating meals and snacks on an average day, and are more likely to report no primary eating and/or drinking beverages time. Although they spend about the same amount of time in secondary eating and drinking, that is eating and drinking during another "main" activity, they are more likely to engage in eating while at work and while driving. To the extent that eating quickly may not be ideal, that eating/drinking activities may be so inconsequental to an individual that they are not remembered as part of the day, and that eating is done while engaged in activities that demand focus—work and driving—it appears that fast food purchasers may have poor eating habits.

Third, we found that youth and household composition (single person, single parent, and households with children) have relatively large positive, and statistically significant relationship with probability of fast-food purchase. Given that age and household composition have changed significantly over the last several decades these factors will become important determinants of fast-food industry growth (Stewart et al. 2004). Also, we found income to increase probability of fast-food purchase by 1-2 percent, which is consistent with Stewart et al. (2004), Byrne et al. (1998) and McCracken and Brandt (1987), suggesting that households with more income purchase more leisure as well as dining amenitites. We should note that this effect may be

attributable to the bluntness of the income variable, and usage of an income variable with finer income gradients or that was continuous may lead to a different interpretation of income on fast-food purchasing behavior.

Fourth, we found that fast-food purchase behavior in terms of the percent of the population purchasing fast food on a given day stayed fairly constant during and after the 2007-09 recession, the Great Recession. Indeed, those employed were even more likely to purchase fast food during the recession than before the recession. Purchasing fast food has become an established part of Americans' meal and snack habits, seemingly unaffected by an economic downturn. Another plausible explanation is that the downturn fueled the demand for low-priced fast food as Americans spent less at sit-down restaurants. This is consistent with findings that average household expenditures on fast food remained unchanged or even increased slightly during the recession (Okrent and Alston 2012). Also, according to the Food Expenditure Series (USDA ERS 2013) sales of meals and snacks at sit-down restaurants declined between 2008 and 2009 from $750 to $725 per capita whereas sales of meals and snacks at fast-food restaurants actually increased from $264 to $275.

Todd (2014) found a 166 calorie decline from FAFH for adults age 25-64 between 2005-06 and 2009-10 with almost half of this decline from a decrease in calories consumed of fast food (84 calories). However once demographic and employement characterisitics and income were controlled energy from FAFH declined 134 calories with a little over a third of this decline attributable to fast-food consumption. This may seem contradictory to our finding that the rate of fast-food purchase appeared to be unaffected by the recession. However, it may be the case

that individuals purchased fast food at the same frequency during the recession but were choosing items of lesser calorie content. In fact many fast-food restaurants have started offering "healthier" menu items especially in states and municipalities which have implemented regulations requiring provision of nutrition information at chain restaurants (e.g., Bruemmer et al. 2012). Also, Todd (2014) found evidence that between 2005-06 and 2009-10, the quality of at-home and away-from-home food increased partly due to individuals demanding more nutritional foods.

Better understanding fast-food purchase behavior can inform nutrition programs and education, especially since fast food may be higher in calories and less nutritious. To the extent that fast-food purchasers appear to be more time pressured than others, the challenge is to make lower-calorie, nutritious meals fast and convenient for those who need to save time.

REFERENCES

Aarts, H., T. Paulussen, and H. Schaalma. 1997. "Physical Exercise Habit: On the Conceptualization and Formation of Habitual Health Behaviours," *Health Education Research* 12:363–74.

Aguiar, M., E. Hurst, and L. Karabarbounis. 2013. "Time Use During the Great Recession," *American Economic Review*, 103(5): 1664-1696.

Alviola, P.A., R.M. Nayga, M.R. Thompsen, D. Danforth, and J. Smartt. 2013. The Effect of Fast-Food Restaurants on Childhood Obesity: A School Level Analysis. *Economics and Human Biology*. http://dx.doi.org/10.1016/j.ehb.2013.05.001.

Andrade, A.M., G.W. Greene and K.J. Melanson. 2008. Eating slowly led to decreases in energy intake within meals in healthy women. Journal of the American Dietetic Association 108(7): 1186-1191.

Beatty, T. K. M. and B. Senauer. 2012. "The New Normal? U.S. Food Expenditure Patterns and the Changing Structure of Food Retailing," *American Journal of Agricultural Economics* 95(2): 318-324.

Becker, G. S. (1965). "A Theory of the Allocation of Time." *The Economic Journal* 75(299): 493-517.

Berik, G. and E. Kongar. 2013. "Time Allocation of Married Mothers and Fathers in Hard Times: The 2007–09 US Recession." *Feminist Economics*, DOI: 10.1080/13545701.2013.798425.

Bruemmer, B., J. Krieger, B.E. Saelens, and N. Chan. 2012. "Energy, saturated fat, and sodium were lower in entrées at chain restaurants at 18 months compared with 6 months following the implementation of mandatory menu labeling regulation in King County, Washington." *Journal of the Academy of Nutrion and Dietetics* 112(8): 1169-76.

Buxton, O. M., L. M. Quintiliani, M. H. Yang, C. B. Ebbeling, A. M. Stoddard, L. K. Pereira and G. Sorensen. 2009. "Association of Sleep Adequacy with More Healthful Food Choices and Positive Workplace Experiences Among Motor Freight Workers." *American Journal of Public Health* 99 Suppl 3: S636-643.

Byrne, P. J., O. Capps, Jr., and A. Saha. 1996. "Analysis of Food-Away-from-Home Expenditure Patterns for U.S. Households, 1982-89." *American Journal of Agricultural Economics* 78(3): 614-627.

Byrne, P. J., O. Capps, Jr., and A. Saha. 1998. "Analysis of Quick-serve, Mid-scale, and Up-scale Food Away from Home Expenditures." *International Food and Agribusiness Management Review* 1(1): 51-72.

Chaput, J.-P., J.-P. Després, C. Bouchard and A. Tremblay. 2011. "The Association between Short Sleep Duration and Weight Gain Is Dependent on Disinhibited Eating Behavior in Adults," *SLEEP* 34(10): 1291-1297.

Chen, S.E., R.J.G.M. Florax, and S.D. Snyder. 2013. "Obesity and Fast-Food Markets: A New Approach Using Geo-referenced Micro Data," *Health Economics* 22(7): 835-856.

Chou, S.-Y., M. Grossman, and H. Saffer. 2004. "An Economic Analysis of Adult Obesity: Results from the Behavioral Risk Factor Surveillance System," *Journal of Health Economics* 23(3): 565-587.

Currie, J., S. Della Vigna, E. Moretti, and V. Pathania. 2010. "The Effect of Fast Food Restaurants on Obesity and Weight Gain," *American Economic Journal: Economic Policy* 2(3): 32-63.

Davis, B., and C. Carpenter. 2009. "Proximity of Fast-Food Restaurants to Schools and Adolescent Obesity," *American Journal of Public Health* 99(3): 505-510.

Dave, D. M. and I. R. Kelly. 2010. "How Does the Business Cycle Affect Eating Habits?" NBER Working Paper No. 16638, National Bureau of Economic Research, http://www.nber.org/papers/w16638.

Dong, D., P.J. Byrne, A. Saha, O. Capps, Jr. 2000. "Determinants of Food-Away-From-Home (FAFH) Visit Frequency: A Count-Data Approach," *Journal of Restaurant & Foodservice Marketing* 4(1): 31-46.

Elliott, D.B., R. Young, and J.L. Dye. 2011. "Variation in the Formation of Complex Family Households during the Recession," Social, Economic, and Housing Statistics Division (SEHSD) Working Paper Number 2011-32, US Census Bureau. Available at http://www.census.gov/hhes/families/data/NCFR2011_Variation_in_Formation_of_Multifamily_Households_in_Recession_FINAL.pdf
Tables available at http://www.census.gov/hhes/families/data/NCFR2011_Variation_in_Formation_tables_FINAL.pdf

Federal Trade Commission. 2012. *A Review of Food Marketing to Children and Adolescents.* Federal Trade Commission, Washington, DC.

Finlay, K. A., D. Trafimow and A. Villarreal. 2002. "Predicting Exercise and Health Behavioral Intentions: Attitudes, Subjective Norms, and Other Behavioral Determinants," *Journal of Applied Social Psychology* 32(2): 342-358.

Greene, G.W., A. Andreade, K. Melanson, S. L. Hoerr and K. Kattelmann. 2008." Eating Rate and Body Mass Index in College Students," *Journal of the American Dietetic Association* 108(9): A26.

Gronau, R. 1986. "Home Production – A Survey," chapter 4 (pp. 273-304) in *Handbook of Labor Economics*, Vol. 1, edited by O. Ashenfelter and R. Layard. North-Holland: Amsterdam.

Gronau, R. 1997. "The Theory of Home Production: The Past Ten Years," *Journal of Labor Economics* 15(2): 197-205.

Hamermesh, D. S. 2007. "Time to Eat: Household Production under Increasing Income Inequality," *American Journal of Agricultural Economics* 89(4): 852-863.

Hamrick, K. 2010. *Eating & Health Module User's Guide (2010) Edition*. USDA Economic Research Service, Administrative Publication AP-047. Available at: http://ers.usda.gov/Publications/AP/AP047/

Hamrick, K. 2012. *Nonresponse Bias Analysis of Body Mass Index Data in the Eating and Health Module*, USDA Economic Research Service, Technical Bulletin TB-1934. Available at: http://www.ers.usda.gov/publications/tb-technical-bulletin/tb1934.aspx

Hamrick, K, M. Andrews, J. Guthrie, D. Hopkins, and K. McClelland. 2011. *How Much Time Do Americans Spend on Food?* USDA Economic Research Service, Economic Information Bulletin No. EIB-86, November 2011. Available at: http://www.ers.usda.gov/publications/eib-economic-information-bulletin/eib86.aspx

Huffman, W. E. 2011. "Household Production and the Demand for Food and Other Inputs: U.S. Evidence." *Journal of Agricultural and Resource Economics* 36(3): 465-487.

Jekanowski, M.D., J.K. Binkley, and J. Eales. 2001. "Convenience, Accessibility, and the Demand for Fast Food." *Journal of Agricultural and Resource Economics* 26(1): 58-74.

Jensen, H.H. and S.T. Yen. 1996. "Food Expenditures Away From Home by Type of Meal," *Canadian Journal of Agricultural Economics* 44: 67-80.

Kalenkoski, C.M. and K.S. Hamrick. 2013. "How Does Time Poverty Affect Behavior? A Look at Eating and Physical Activity," *Applied Economic Perspectives and Policy* 35(1): 89-105.

Kalenkoski, C.M., K.S. Hamrick and M. Andrews. 2011. "Time Poverty Thresholds and Rates for the US Population," *Social Indicators Research* 104(1): 129-155.

Kim, D. and J.P. Leigh. 2011. "Are Meals at Full-Service and Fast-Food Restaurants "Normal" or "Inferior"?" *Population Health Management* 14(6): 307-315.

Kinsey, J. 1983. "Working Wives and the Marginal Propensity to Consume Food Away from Home," *American Journal of Agricultural Economics* 65(1): 10-19.

Kumcu, A. and A.M. Okrent (forthcoming). *Methodology for the Food-Away-From-Home and Alcohol Prices Database*, USDA Economic Research Service, Technical Bulletin.

Leong, S.L., C. Madden, A. Gray, D. Waters and C. Horwath. 2011. "Faster self-reported speed of eating is related to higher body mass index in a nationwide survey of middle-aged women," *Journal of the American Dietetic Association* 111(8): 1192-1197.

Lin, B-H. and J. Guthrie. 2012. *Nutritional Quality of Food Prepared at Home and Away From* Home, 1977-2008, USDA Economic Research Service, Economic Information Bulletin EIB-105. Available at: http://www.ers.usda.gov/publications/eib-economic-information-bulletin/eib105.aspx

Long, J.S. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Sage Publications: Thousand Oaks.

McCracken, V. A. and J. A. Brandt. 1987. "Household Consumption of Food-Away-from-Home: Total Expenditure and by Type of Food Facility," *American Journal of Agricultural Economics* 69(2): 274-284.

Mincer, J. 1963. "Market Prices, Opportunity Costs, and Income Effects," in *Measurement in Economics: Studies in Mathematical Economic and Econometrics in Memory of Yehuda Grunfeld*, Stanford, CA, Stanford University Press: 67-82.

Nayga, Jr., R.M., and O. Capps, Jr. 1994. "Impact of Socio-Economic and Demographic Factors on Food Away from Home Consumption: Number of Meals and by Type of Facility," *Journal of Restaurant and Foodservice Marketing* 1: 45-69.

Neal, D., W. Wood, and J. M. Quinn. 2006. "Habits–A Repeat Performance," *Current Directions in Psychological Science* 15(4):198–202.

Nishiura, C., J. Noguchi and H. Hashimoto. 2010. "Dietary Patterns Only Partially Explain the Effect of Short Sleep Duration on the Incidence of Obesity," *SLEEP* 33(6): 753-757.

Okrent, A.M., and J.M. Alston. 2011. "The Demand for Food in the United States: A Review of the Literature, Evaluation of Previous Estimates, and Presentation of New Estimates of Demand," Giannini Foundation of Agricultural Economics Monograph 48, Berkeley, CA, April.

Okrent, A.M. and J.M. Alston. 2012. *The Demand for Disaggregated Food-at-Home and Food-Away-from-Home Products in the United States*, Economic Research Report ERR-139. U.S. Department of Agriculture, Economic Research Service. Available at: http://www.ers.usda.gov/publications/err-economic-research-report/err139/.aspx

Paciorek, A. 2013. "The Long and the Short of Household Formation," Finance and Economics Discussion Series working paper 2013-26, Federal Reserve Board, Washington, DC, April 1, 2013.

Prochaska, F.J. and R.A. Schrimper. 1973. "Opportunity Cost of Time and Other Socioeconomic Effects on Away-from Home Food Consumption," *American Journal of Agricultural Economics* 55(4, part 1): 595-603.

Redman, B.J. 1980. "The Impact of Women's Time Allocation on Expenditure for Meals Away from Home and Prepared Foods," *American Journal of Agricultural Economics* 62(2): 234-237.

Richards, T.J. and L. Mancino. 2013. "Demand for Food-Away-From-Home: A Multiple Discrete/Continuous Extreme Value Model," *European Review of Agricultural Economics* doi:10.1093/erae/jbt008.

Robinson, J.P. and G. Godbey. 1997. *Time for Life: The Surprising Ways Americans Use Their Time*, The Pennsylvania State University Press, University Park, PA.

Robinson, J. P., S. Martin, I. Glorieux and J. Minnen. 2011. "The overestimated workweek revisited," *Monthly Labor Review* 134(6): 43-53.

Sasaki, S., A. Katagiri, T. Tsuji, T. Shimoda and K. Amano. 2003. Self-reported rate of eating correlates with body mass index in 18-y-old Japanese women. Internaltional Journal of Obesity 27(11): 1405-1410.

Sexauer, B. 1979."The Effect of Demographic Shifts in Changes in the Income Distribution on Food-Away-from-Home Expenditure," *American Journal of Agricultural Economics* 61(5): 1046-1057.

Soberon-Ferrer, H. and R. Dardis. 1991. "Determinants of Household Expenditures for Services," *Journal of Consumer Research* 17(4): 385-397.

Stewart, H., N. Blisard, S. Bhuyan, and R.M. Nayga, Jr. 2004. *Food Away From Home: Full-Service or Fast Food?*, USDA Economic Research Service, Agricultural Economic Report No. 829, January 2004. Available at: http://www.ers.usda.gov/Publications/AER829/

Stewart, H. and S.T. Yen. 2004. "Changing Household Characteristics and the Away-from-Home Food Market: a Censored Equation System Approach," *Food Policy* 29: 643-658.

Tashiro, S. 2009. "Differences in Food Preparation by Race and Ethnicity: Evidence from the American Time Use Survey," *The Review of Black Political Economy* 36(3-4): 161-180.

Todd, J. (2014). *Changes in Eating Patterns and Diet Quality Among Working-Age Adults, 2005-2010*, Economic Research Report, USDA Economic Research Service. Available online: http://www.ers.usda.gov/publications/err-economic-research-report/err161.aspx

USDA Economic Research Service. 2013. Food Expenditure Series. Available online: http://www.ers.usda.gov/data-products/food-expenditures.aspx

U.S. Department of Labor Bureau of Labor Statistics. 2013. *American Time Use Survey User's Guide: Understanding ATUS 2003 to 2011*, March 2013.

U.S. Department of Labor Bureau of Labor Statistics. 2013. Consumer Price Database: All Urban Consumers (Current Series). Available online: http://www.bls.gov/cpi/.

U.S. Department of Labor Bureau of Labor Statistics. 2013. Employment, Hours and Earnings-State and Metro Area Database. Available online: http://www.bls.gov/sae/

Van Der Lippe, T. 2004. "Outsourcing of Domestic Tasks and Time-saving Effects," J*ournal of Family Issues* 25(2): 216-240.

Wansink, B. 2007. *Mindless Eating: Why We Eat More Than We Think*, Bantam Books, New York, NY.

White House Task Force on Childhood Obesity Report to the President. 2010. *Solving the Problem of Childhood Obesity Within a Generation*, Executive Office of the President of the United States. Available online: http://www.letsmove.gov/sites/letsmove.gov/files/TaskForce_on_Childhood_Obesity_May2010_FullReport.pdf

Yen, S. T. 1993. "Working Wives and Food Away from Home: The Box-Cox Double Hurdle Model," *American Journal of Agricultural Economics* 75(4): 884-895.

Zick, C. D. and R. B. Stevens. 2009. "Trends in Americans' Food-Related Time Use: 1975–2006," *Public Health Nutrition* 13(07): 1064-1072.

Websites

American Time Use Survey: stats.bls.gov/tus/

Eating & Health Module: ers.usda.gov/data-products/eating-and-health-module-(atus)

USDA Food and Nutrition Service: http://www.fns.usda.gov/fns/

Centers for Disease Control and Prevention (CDC), U.S. Obesity Trends: www.cdc.gov/obesity/data/trends.html

National Bureau of Economic Research Business Cycle page: www.nber.org/cycles/main.html

APPENDIX A—Data Definitions

The 2003-11 American Time Use Survey data were used. We used only data for respondents age 18 years old or older, and excluded bad diaries, resulting in 117,805 respondents. Bad diaries are those with variable TUDQUAL2, "Collected from interviewer after interview: why do you think the data should not be used?", equal to 1 (Respondent intentionally providing wrong answer), 2 (Respondent trying to provide correct acswer, but could not correctly remember his/her activities), 3 (Respondent deliberately reported very long duration activities), or 4 (Other). There were 861 of these cases.

Primary eating and drinking occurrences were ATUS activities 11xxxx (ATUS major activity group Eating and Drinking) and 050202 (Eating and drinking as part of job).

Eating out was defined as primary eating/drinking activities that took place at restaurant or related, which includes:

TEWHERE= 4 (restaurant or bar)
6 (grocery store)
7 (other store/mall),
11 (Other place)

Eating/drinking at TEWHERE=11, Other place, is usually an entertainment venue when eating/drinking is involved.[19] All other primary eating/drinking we classified as eating/drinking elsewhere. We did not include meals obtained at school with eating out, and so they are classified as eating/drinking elsewhere.

If primary eating/drinking and TEWHERE=mode of travel, then this is a **miscode**. It is unclear if the respondent's intention was to report primary eating/drinking while traveling, or if the interviewer recorded the activity on the wrong line. The miscodes are:
Activity is 11xxxx or 050202 and
TEWHERE=12 (vehicle, driver), 13 (vehicle, passenger), 14 (walking),
15 (bus), 16 (subway/train), 17 (bicycle), 18 (boat/ferry),
19 (taxi/limo), 20 (airplane), 21 (other mode), or 99 (unspecified mode)
There are 624 respondents who have at least one travel miscode in their diaries. The number of miscodes range from one to three in a diary. We reassigned the time spent in 11xxxx or 050202 with TEWHERE=travel mode from eating/drinking time to travel time.

Because there were cases of individuals reporting **long-duration eating/drinking activities** (11xxxx and 050202) at a restaurant or related location, we identify those eating/drinking activities greater than 180 minutes (3 hours) as "events" that are likely to be catered. Or, because TEWHERE=4 includes both restaurants and bars, long-duration activities could be hanging out at the bar watching sports or spending time at a nightclub. It is unlikely that these

[19] Secondary eating and secondary drinking that were coded as "Other place" mostly took place at a stadium, arena, ball field, or a movie theater. Personal correspondent with Dorinda Allard, Bureau of Labor Statistics, and Jennifer Montcalm, Census Bureau, via email on February 28 and 29, 2008.

activities are regular sit-down dinners at a restaurant. 180 minutes was the 75th percentile value for those who reported an eating activity that was over 120 minutes in their diaries. There were 317 respondents who reported eating/drinking occasions at a restaurant (or related) of 180 minutes or more. These cases were reassigned from eating out to primary eating/drinking elsewhere.

We identified **carry out/fast-food** purchases as activity 070103, food (not grocery) purchase that immediately follows a travel activity (180782) in the time diary. This is identifying food purchased as counter service and not at a sit-down restaurant as the respondent reported paying first. The examples given in the ATUS 2011 lexicon for activity 070103 are: paying the pizza delivery person, paying for meal at restaurant, paying check for a meal/drink/snack, picking up take-out food, buying fast food, placing order at a deli/fast food place, paying for fast food at drive-through, and talking to fast-food cashier/talking to the waiter. So, we excluded cases of 070103 that are paying for food or talking to a waiter at a sit-down restaurant. After the food purchase the individual may travel away from the restaurant (carry out the food), or may eat the food at the restaurant. Sequence:

18xxxx	Travel	TEWHERE=mode of transport
070103	Purchase food not groceries	TEWHERE=4,6,7,11

There are 11,908 respondents who have at least one reported carry out/fast food purchase in their diaries over 2003-11. The number of carry out/fast-food purchases over the day range from one to six.

There are a number of reported eating activities at restaurants and related locations that are of short duration with no reported purchase of food. We identify **short duration restaurant visits** as fast food if they are 20 minutes or fewer of eating/drinking (110101). Waiting time (110201) is not included in the 20 minutes limit. The median time of those who purchased carry out/fast food and then reported eating/drinking within the next 2 activities was 20 minutes. As a consequence, we categorize short-duration, 20 minutes or fewer, restaurant visits as carry out/fast food. The respondent may have neglected to report paying for the food, or the respondent may not have been the person who paid for the food. There are 4,035 respondents who reported eating at a restaurant (or related) for a duration of 20 minutes or less. The number of such occurrences in a diary ranged from one to 4. The time reported as eating/drinking at a restaurant for these short-duration restaurant visits was reassigned from eating/drinking to purchasing food (070103), and an indicator was added for fast food/carry out for these respondents.

There are a number of reported **long duration purchasing food activities** (070103). These are frequently not followed by an eating/drinking activity in the time diary. Above, we identify short duration restaurant visits as fast food if they are 20 minutes or fewer. Here we identify these long-duration 070103 activities as purchasing and eating/drinking food if the reported activity is more than 20 minutes. There are 458 respondents who reported purchasing carry out/fast food for durations greater than 20 minutes, with two respondents reporting 2 such occurrences. The time spent in these long-duration food purchasing activities was reassigned from purchasing food (070103) time to eating/drinking time (11xxxx and 050202). Although we reassigned the time, these cases were still counted as fast food purchases.

Major activity groups were defined as follows:

Activity category	**ATUS Activity Codes**
EATING AND DRINKING	11xxxx and 050202
Eating/drinking out	11xxxx and 050202 and TEWHERE=4,6,7,11
Sit-down restaurant	as defined in text above
Fast food/carry out	as defined in text above
Eating/drinking elsewhere	11xxxx and 050202 and TEWHERE not 4,6,7,11
PERSONAL CARE	
Sleep	0101xx
Grooming and other personal care	0102xx, 0103xx, 0104xx, 0105xx, 019999
HOUSEHOLD ACTIVITIES	
Meal preparation and cleanup	0202xx
Other household activities	all 02xxxx activities (except 0202xx, 020904)
CARING ACTIVITIES	
Caring for household members	03xxxx
Caring for non-household members	04xxxx
WORKING & WORK-RELATED	all 05xxxx activities except 050202
EDUCATIONAL ACTIVITIES	06xxxx
PURCHASING GOODS AND SERVICES	
GROCERY purchases	070101
Other purchases	all 07xxxx (except 070101), 08xxxx, and 09xxxx
Fast food/carry out purchases	070103 as specified in text above
GOV'T, CIVIC, RELIGIOUS, VOLUNTEER	10xxxx and 14xxxx and 15xxxx except 150101
LEISURE ACTIVITIES	
Watching television	120303 and 120304
Other socializing and leisure, includes (non-work, non-school) computer time	all 12xxxx (except 120303 and 120304), 020904, 120307, 120308, and 150101
SPORTS & EXERCISE	13xxxx
PHONECALLS, mail, email	16xxxx
TRAVEL	18xxxx
Other activities not elsewhere classified	50xxxx

Limitations

A time diary is a narrative—the story of a person's day. Because of the way a respondent may report his/her day, and the way in which interviewers code the reported activities, the nuances of fast-food purchase versus eating a meal at a sit-down restaurant may be lost. A respondent may not report every step of the activity and, for example, may not report paying for the food first before eating the meal at a fast-food restaurant. Or, it may be the case that the respondent was at a fast-food restaurant, but someone else paid for the meal so the respondent did not engage in the activity of purchasing food. A respondent is unlikely to report a purchase at a vending machine due to the short amount of time involved. Because of the lack of this specific information pertaining to FAFH, we made the adjustments described above. In some cases we needed to

infer the type of restaurant and specific type of activity. For example, a respondent reporting eating/drinking at a restaurant for a 10-minute duration is unlikely to be at a sit-down restaurant. Also, a respondent reporting being at a restaurant or bar from 10:00pm to 2:00am is unlikely to be eating dinner and more likely to be at a bar or club. There is the possibility that we inferred incorrectly in making these adjustments. In addition, we cannot tell the specific type of fast-food/carry out restaurant that the respondent visited. It could be a national chain limited-service restaurant, or it could be carry out from a sit-down restaurant.

There is also the limitation that we do not know what foods or beverages that the respondent ate/drank and consequently the caloric intake. An occurrence of fast-food purchase could be just for coffee and not a meal or snack. We also do not know how much the respondent spent (or someone else spent) on the respondent's food/beverages.

More general limitations are that the ATUS asks the respondent to report his/her primary activity only, and this missing eating as a secondary activity. Consequently, while the data contain the purchase of fast food, they may not contain the consumption of fast food.

Another possible limitation is that we use a blunt income variable to indicate if the household income is "high income"—above 200 percent poverty threshold (for 2003-11 analysis). Were a continuous income variable available that was timely and consistent over 2003-11 we may have been able to better identify probabilities of fast food purchase for various income groups before and after the business cycle peak.

A discussion of the reliability of the American Time Use Survey estimates including sampling and nonsampling error is in the Technical Note in each American Time Use Survey News Release.

Appendix table 1—Time spent in various activities on an average day, 2003-2011. Age 18 years old and older						
	TOTAL	**Men**	**Women**	**Age 18-24**	**Age 25-64**	**Age 65+**
N	117,805	50,751	67,054	8,205	87,946	21,654
	minutes					
EATING AND DRINKING	67.5	69.6	65.5	57.2	66.0	81.4
Eating/drinking out	14.1	14.5	13.7	15.1	13.7	15.0
Sit-down restaurant	13.7	14.2	13.3	14.7	13.4	14.6
Fast food/carry out	0.4	0.3	0.4	0.4	0.3	0.4
Eating/drinking elsewhere*	53.4	55.1	51.7	42.1	52.3	66.4
PERSONAL CARE						
Sleep	513.9	508.9	518.7	548.0	502.8	536.2
Grooming and other personal care	45.9	38.1	53.2	45.6	45.3	48.7
HOUSEHOLD ACTIVITIES						
Meal preparation and cleanup	33.5	18.0	47.9	16.6	34.4	42.3
Other household activities	77.8	65.2	89.6	43.8	77.4	105.3
CARING ACTIVITIES						
Caring for household members	28.6	18.1	38.3	21.7	35.3	4.6
Caring for non-household members	9.7	8.4	11.0	8.8	9.7	10.9
WORKING & WORK-RELATED	212.8	255.6	173.0	195.5	255.2	42.8
EDUCATIONAL ACTIVITIES	14.1	12.9	15.1	66.8	7.8	1.4
PURCHASING GOODS AND SERVICES						
Grocery purchases	6.5	4.6	8.2	3.9	6.5	8.1
Other purchases	24.2	19.3	28.7	22.9	24.0	26.1
Fast food/carry out purchases	1.5	1.6	1.5	2.1	1.6	0.8
GOV'T, CIVIC, RELIGIOUS, VOLUNTEER	16.8	14.7	18.9	11.7	15.8	25.4
LEISURE ACTIVITIES						
Watching television	162.0	176.3	148.6	139.1	147.9	239.8
Other socializing, leisure, and screen time	116.8	115.4	118.1	131.9	101.2	172.6
SPORTS & EXERCISE	17.9	23.3	12.8	26.7	16.9	15.3
PHONECALLS, mail, email	6.3	3.5	8.8	7.8	5.4	8.7
TRAVEL	74.4	77.2	71.8	80.3	78.0	54.3
Other activities not elsewhere classified	11.4	10.9	11.9	11.7	10.3	16.0
TOTAL TIME	1440.0	1440.0	1440.0	1440.0	1440.0	1440.0
Particiation rates and average time spent by participants						
% who ate out, sit-down (%)	19.5%	20.4%	18.5%	21.2%	18.9%	20.4%
Ave. time spent by those who ate out, sit-down (minutes)	70.6	69.3	71.9	69.4	70.6	71.6
% who purchased fast food/carry out (%)	13.0%	13.5%	12.5%	18.4%	13.6%	6.4%
Ave. time spent in purchasing FF, those who purchased FF (minutes)	11.9	11.8	11.9	11.6	11.8	13.1
% who ate out, FF restaurant (%)	0.9%	0.8%	0.9%	1.0%	0.9%	0.7%
Ave. time spent eating at FF restaurant, those who ate at FF restaurant (minutes)	42.0	40.2	43.5	41.2	40.5	50.2
Distribution of eating behaviors						

% who ate out and elsewhere	14.8%	15.4%	14.1%	13.9%	14.3%	17.5%
% who ate out only	5.4%	5.7%	5.2%	8.0%	5.4%	3.4%
% who ate elsewhere only	75.0%	74.2%	75.9%	70.2%	75.5%	76.9%
% who reported no primary eating/drinking	4.8%	4.8%	4.9%	7.9%	4.9%	2.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*Note: Eating out is defined as primary eating/drinking at the ATUS locations restaurant or bar, grocery store, other store/mall, and Other place. Eating elsewhere is any other place. The main elsewhere locations are at home or at the workplace.

Source: ERS estimates calculated from American Time Use Survey data.

Appendix table 2— Time spent in various activities on an average day, 2003-2011, by employed status and day of the week. Age 18 years old and older				
	TOTAL	**Employed**	**Not employed**	**Fast-food purchasers only**
N	117,805	76,451	41,354	15,122
	minutes			
EATING AND DRINKING	67.5	65.9	70.5	57.2
Eating/drinking out	14.1	14.8	12.7	16.3
Sit-down restaurant	13.7	14.4	12.3	13.7
Fast food/carry out	0.4	0.3	0.4	2.6
Eating/drinking elsewhere	53.4	51.1	57.7	40.9
PERSONCAL CARE				
Sleep	513.9	496.8	547.4	491.0
Grooming and other personal care	45.9	45.5	46.6	46.3
HOUSEHOLD ACTIVITIES				
Meal preparation and cleanup	33.5	26.0	48.0	20.0
Other household activities	77.8	63.9	105.0	60.5
CARING ACTIVITIES				
Caring for household members	28.6	26.6	32.5	30.3
Caring for non-household members	9.7	7.9	13.4	11.3
WORKING AND WORK-RELATED	212.8	317.5	8.6*	241.2
EDUCATIONAL ACTIVITIES	14.1	11.6	18.9	18.7
PURCHASING GOODS AND SERVICES				
Grocery purchases	6.5	5.5	8.3	5.4
Other purchases	24.2	22.4	27.8	42.8
Fast food/carry out purchases	1.5	1.8	1.1	11.6
GOV'T, CIVIC, RELIGIOUS, VOLUNTEER	14.7	14.0	22.5	18.0
LEISURE ACTIVITIES				
Watching television	162.0	128.7	226.8	131.8
Other socializing, leisure, and screen time	116.8	94.2	160.9	114.9
SPORTS & EXERCISE	16.4	17.7	18.1	21.6
PHONECALLS, mail, email	6.3	4.9	9.0	7.4
TRAVEL	74.4	82.1	59.4	110.7
Other activities not elsewhere classified	11.4	9.0	16.2	10.8
TOTAL TIME	1440.0	1440.0	1440.0	1440.0
Participation rates and time spent by participants				
% who ate out, sit-down (%)	19.5%	20.5%	17.4%	20.6%
Ave. time spent by those who ate out, sit-down (minutes)	70.6	70.5	71.0	66.3
% who purchased fast food/carry out (%)	13.0%	15.2%	8.8%	97.9%**
Ave. time spent in purchasing FF, those who purchased FF (minutes)	11.9	11.6	12.7	11.9
% who ate out, FF restaurant (%)	0.9%	0.9%	0.8%	6.3%
Ave. time spent eating at FF restaurant, those who ate at FF restaurant (minutes)	42.0	40.1	45.8	42.3
Distribution of eating behaviors				
% who ate out and elsewhere	14.8%	15.2%	13.9%	18.3%
% who ate out only	5.4%	6.0%	4.2%	7.5%

% who ate elsewhere only	75.0%	73.6%	77.9%	65.9%
% who reported no primary eating/drinking	4.8%	5.2%	4.0%	8.4%
Total	100.0%	100.0%	100.0%	100.0%

* Work activities for those not employed are job search activities. **Percent who purchased fast food/carry out is not 100% because some individuals do not report purchase time, only eating/drinking time. Here the category "Only those who purchased fast food" includes those with zero purchase time but some fast food eating/drinking time.

Source: ERS estimates calculated from American Time Use Survey data.

Appendix table 3—Mean values of variables used in probit models

	N	Mean	Min Value	Max Value	Standard Error	90% CI Min	90% CI Max
2003-11 ATUS and other data							
FastFood (=1 if fast food purchase, 2 otherwise)	117,214	1.87	1	2	0.0014	1.865	1.870
FEMALE (=1 if female, 0 if male)	117,214	0.52	0	1	0.0004	0.517	0.519
Age 18-24	117,214	0.12	0	1	0.0006	0.124	0.125
Age 65+	117,214	0.17	0	1	0.0002	0.165	0.165
Education, less than high school diploma	117,214	0.14	0	1	0.0013	0.134	0.139
Education, some college	117,214	0.26	0	1	0.0014	0.262	0.267
Education, college degree	117,214	0.18	0	1	0.0014	0.180	0.184
Education, advanced degree	117,214	0.10	0	1	0.0011	0.096	0.100
Employed	117,214	0.66	0	1	0.0014	0.658	0.663
Employed part-time schedule	117,214	0.02	0	1	0.0005	0.014	0.016
Noncitizen	117,214	0.08	0	1	0.0011	0.082	0.085
African American/Black	117,214	0.12	0	1	0.0005	0.115	0.116
Asian	117,214	0.04	0	1	0.0010	0.038	0.041
Mixed race	117,214	0.01	0	1	0.0005	0.012	0.013
Hispanic	117,214	0.13	0	1	0.0004	0.131	0.132
Midwest region	117,214	0.25	0	1	0.0020	0.242	0.248
South region	117,214	0.36	0	1	0.0022	0.353	0.360
West region	117,214	0.21	0	1	0.0018	0.212	0.218
Nonmetro residence	117,214	0.19	0	1	0.0045	0.178	0.193
Single person household	117,214	0.15	0	1	0.0019	0.147	0.154
Single parent household	117,214	0.03	0	1	0.0005	0.028	0.029
Couple with child(ren) household	117,214	0.05	0	1	0.0009	0.052	0.055
Other type of household, with children	117,214	0.30	0	1	0.0011	0.297	0.301
Other type of household, no children	117,214	0.21	0	1	0.0020	0.205	0.211
Number in household, squared	117,214	10.90	1	256	0.0663	10.794	11.012
Child less than 6 years old in household	117,214	0.79	0	1	0.0012	0.791	0.794
Household income > 200% poverty threshold	117,214	0.54	0	1	0.0021	0.538	0.545
Household income value missing	117,214	0.12	0	1	0.0014	0.114	0.119
Work time>0 and ≤12 hours	117,214	0.45	0	1	0.0016	0.452	0.457
Work time>12 hours	117,214	0.02	0	1	0.0007	0.023	0.025
Primary eating/drinking time, hours	117,214	1.12	0	14.9	0.0033	1.119	1.130
Personal care time, hours	117,214	9.33	0	24.0	0.0092	9.316	9.346
Housework, hours	117,214	1.85	0	21.8	0.0083	1.840	1.868
Household child/adult care, hours	117,214	0.48	0	19.2	0.0040	0.469	0.482
Watching TV, hours	117,214	2.70	0	23.8	0.0097	2.686	2.717
Travel time, hours	117,214	1.24	0	24	0.0054	1.231	1.249
Weekend/holiday day	117,214	0.30	0	1	0.0005	0.297	0.298
Time trend 1-9	117,214	5.08	1	9	0.0017	5.073	5.079
Unemployment rate	117,214	6.65	4.4	10	0.0015	6.651	6.656
Fast food meal price (2011 $)	117,214	3.68	2.431	5.798	0.0017	3.677	3.683
Post business cycle peak (12/07)	117,214	0.47	0	1	0.0005	0.465	0.467
QUARTER2 (April, May, June)	117,214	0.25	0	1	0.0003	0.249	0.250
QUARTER3 (July, August, September)	117,214	0.25	0	1	0.0003	0.251	0.253

QUARTER4 (October, November, December)	117,214	0.25	0	1	0.0003	0.253	0.254
	N	Mean	Min Value	Max Value	Standard Error	90% CI Min	90% CI Max

Source: ERS estimates using American Time Use Survey and Eating & Health Module data and the appropriate sample weights for nationally representative means. Other data sources discussed in text. The estimates above exclude all respondents who have missing values for any of the variables included in the probit models. Fast-food meal prices were unavailable for Alaska and Hawaii, so those respondents have missing values for prices. Variables from the household surveys (Current Population Survey and the American Time Use Survey) will have some missing values for every survey question except sex/gender as some respondents may not know the answer (Don't know response) or refuse to answer the question. The time use estimates for 2003-11 match those in Table 1 indicating that there is likely not bias due to item nonresponse.

APPENDIX B—Count Models

In addition to probit models, we also estimated count model for the probability of fast-food purchase. We estimated two models:

(A) $\Pr(y_i \mid x_i)$ where y = 0, 1, and 2 or more fast food purchases

(B) $\Pr(y_i \mid x_i)$ where y = 0, 1, 2, and 3 or more fast food purchases

Note that 272 or 15,122 individuals purchasing fast food had 3 or more purchases over a day, and only 39 had 4, 5, or 6 purchases over the day.

The count model we used is the zero-inflated Poisson. Following Long (1997), the Poisson distribution was used because the mean and variance of the unweighted data were close as to approximate equidispersion:

y = 0, 1, and 2 or more	E(y) = 0.1546
	Var(y) = 0.1713
y = 0, 1, 2, and 3 or more	E(y) = 0.1570
	Var(y) = 0.1828

However, the variable contains 87.16% zeros (unweighted) indicating that a zero-inflated model is warranted. The zero-inflated model assumes that some individuals will always have a zero value, and so a two-step process is used to first predict zeros, then a second step to estimate the original model. We estimated the models in Stata 12 using the ZIP model procedure.

We estimated the count models as a robustness check of the probit models presented in the text. We found that the coefficient estimates in Appendix table 5 and Appendix table 6 were consistent with those of our probit models, both in sign and significance. We concluded that the probit specification was capturing fast-food purchase behavior.

APPENDIX TABLE 4 ZIP model	2003-11			2003-07			2007-11		
fastfoodcount2 =0,1,2	Coef.	P>|t|	dy/dx	Coef.	P>|t|	dy/dx	Coef.	P>|t|	dy/dx
Female	-.009027	0.700	-.001578	-.026008	0.400	-.004521	.011228	0.725	.001954
Age 18-24	.166122	0.000	.030939	.190097	0.000	.035519	.134712	0.015	.024691
Age 65+	-.328293	0.000	-.051635	-.378131	0.000	-.058146	-.278317	0.000	-.044335
Education < HS	-.142789	0.001	-.023715	-.195036	0.001	-.031654	-.082154	0.216	-.013878
Education some college	.076819	0.006	.013675	.049204	0.212	.008649	.110477	0.006	.019748
Education college	.107095	0.001	.019376	.072821	0.091	.012957	.147541	0.002	.026915
Education advanced	.029594	0.428	.005235	.022706	0.678	.003981	.032575	0.559	.005746
Employed	.132889	0.000	.024843	.066378	0.168	.013019	.205764	0.000	.037369
Part-time work	-.016092	0.861	-.002791	-.155240	0.270	-.025044	.150747	0.189	.028268
Noncitizen	-.512058	0.000	-.073098	-.525768	0.000	-.074222	-.506213	0.000	-.072140
African Am/Black	-.020002	0.470	-.003469	-.042228	0.263	-.007218	.003833	0.930	.000668
Asian	-.230614	0.000	-.036330	-.212662	0.018	-.033541	-.240020	0.013	-.037543
Mixed race	.024619	0.798	.004355	.112917	0.393	.020738	-.083692	0.558	-.013993
Hispanic	-.132615	0.001	-.022090	-.112270	0.026	-.018714	-.154792	0.005	-.025503
Midwest	-.016930	0.645	-.002946	-.053084	0.256	-.009102	.006943	0.907	.001211
South	.053845	0.085	.009485	-.000018	1.000	-.000003	.108958	0.034	.019268
West	.048745	0.208	.008640	-.016248	0.760	-.002810	.106962	0.068	.019204
Nonmetro	.009967	0.676	.001748	-.038571	0.248	-.006623	.071066	0.039	.012664
Single person hh	.129776	0.000	.023752	.155264	0.002	.028525	.103615	0.038	.018704
Single parent hh	.157151	0.001	.029610	.232699	0.000	.045204	.071000	0.374	.012786
Couple w/children	.078564	0.360	.014225	.121387	0.309	.022274	.027772	0.810	.004896
Other hh, children	.138950	0.002	.024994	.203709	0.001	.036892	.066794	0.309	.011793
Other hh, no children	.107124	0.007	.019327	.171151	0.002	.031336	.038652	0.501	.006804
Number in hh, squared	-.001483	0.472	-.000260	-.000261	0.936	-.000045	-.002737	0.188	-.000476
Child lt 6yo in hh	.009039	0.753	.001576	.030616	0.444	.005272	-.017913	0.663	-.003135
Work time, hrs,	-.043825	0.000	-.007660	-.035988	0.000	-.006252	-.053797	0.000	-.009366
Prim eat/drink time,hrs	-.317122	0.000	-.055427	-.318155	0.000	-.055272	-.316194	0.000	-.055050
Personal care(sleep),hr	-.050905	0.000	-.008897	-.054198	0.000	-.009416	-.047151	0.000	-.008209
Housework, hrs	-.088469	0.000	-.015463	-.082564	0.000	-.014344	-.095341	0.000	-.016599
Child/Ad care, hrs	-.006956	0.424	-.001216	-.021284	0.067	-.003698	.009066	0.482	.001578
Watching TV, hrs	-.017690	0.000	-.003092	-.016311	0.014	-.002834	-.019590	0.013	-.003411
Travel time, hrs	.057369	0.000	.033992	.054634	0.000	.027448	.061880	0.000	.040219
Weekend/holiday day	-.043138	0.037	-.007475	-.052714	0.065	-.009061	-.033864	0.346	-.005856
Time trend 1-9	.017321	0.042	.003027	-.015350	0.635	-.002667	-.015523	0.418	-.002703
Unemployment rate	-.021657	0.017	-.003785	-.122935	0.126	-.021357	-.001052	0.932	-.000183
FF meal price (2011$)	-.042318	0.141	-.007396	-.058691	0.141	-.010196	-.056346	0.190	-.009810
Post BC peak (12/07)	.010283	0.840	.001798						
HH income gt 200% pov	.125839	0.000	.022274	.108002	0.004	.019714	.144857	0.002	.024333
HH income missing	.064915	0.117	.014003	.095504	0.046	.019089	-.025655	0.693	-.001774
Quarter 2 (Apr-June)	.133011	0.000	.024052	.167533	0.000	.030366	.076472	0.083	.013580
Quarter 3 (July-Sept)	.074677	0.028	.013299	.115501	0.003	.020650	.005232	0.918	.000912
Quarter 4 (Oct-Dec)	-.027985	0.381	-.004858	.013958	0.753	.002434	-.110574	0.023	-.018774

Constant	-.595135	0.001		.111803	0.839		-.463670	0.070	
Inflate equation									
Employed	-.390298	0.001	.002054	-.398734	0.026	.001544	-.394414	0.020	.002570
Travel time, hours	-4.554019	0.000		-4.637895	0.000		-4.581455	0.000	
HH income gt 200% pov	-.072672	0.513	.000382	-.260026	0.108	.001007	.110488	0.468	-.000733
HH income missing	-.511617	0.006	.002692	-.553354	0.014	.002142	-.507384	0.115	.003255
Constant	2.532562	0.000		2.593391	0.000		2.506139	0.000	

Note: The model was estimated as a zero-inflated Poisson count model. The dependent variable is the number of fast-food purchases, 0, 1, or 2, where 2 is 2 or more fast food purchases in a day. The number of observations is the same as that used for the probit model and reported in appendix table 1.
Source: ERS estimates using American Time Use Survey data.