Expenditure patterns of young single adults: two recent generations compared

Differences in spending patterns for young, never-married adults in 2004–05 and their counterparts in 1984–85 may reflect differences in demographics; however, whether the changes indicate an increase or decrease in economic status remains unclear

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For many Americans, the age of 21 is a major point of demarcation in one's life cycle. This age marks the start of full legal adulthood—that is, the age at which the young person is no longer considered a minor and can freely engage in all legal activities, such as renting or purchasing a home. By age 21, many Americans have completed their formal education, and many more will do so during their twenties.[1] In addition, numerous individuals in this age group are starting on their first jobs leading to a career, and consequently, they face many new challenges. Achieving and maintaining financial independence can be difficult and has long-term ramifications for young adults and others in society. After all, income and spending patterns established in youth will affect one's ability not only to save for the purchase of a home, provide for a family—including future children's education—and live well in retirement, but also to contribute toward programs such as Social Security for current retirees. Clearly, then, understanding the economic status of young single adults is important for society as a whole, especially when substantial structural changes in the economy occur, as they have during the last generation.

Indeed, the changes that have taken place may lead to outcomes that differ from what has happened in the past. On the one hand, there has been a persistent belief, based on experience, that the current generation of Americans will be better off economically than the previous generation. On the other hand, since the 1990s, much literature has suggested that that belief may not be true anymore.[2] This article examines expenditure and income patterns for single, never-married young adults (persons aged 21 to 29 years) who were interviewed in 2004–05 and compares the patterns with those exhibited by single young adults 20 years earlier. The aim of the comparison is to assess the economic status of the two groups of singles in each period.

Before starting the analysis, it is important to keep in mind that many factors describe one's economic status and none by itself can provide a complete answer to the question "Who was better off when?" Each measure has its own inherent strengths and limitations that must be considered before attempting to draw conclusions.

The data

The main source of data used in this article is the Interview Survey, a component of the Consumer Expenditure Survey (CE). The CE is the most detailed source of expenditure information collected directly from households by the Federal Government. In addition, data on income and other demographics are collected. Collected periodically throughout most of the 20th century, consistent data

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from the Interview Survey are available for analysis on a quarterly basis from 1984 onward.

Participants in the Interview Survey are visited once every 3 months for five consecutive quarters. In each of these interviews, respondents are asked to report expenditures that occurred during the weeks prior to the interview. For the initial interview, the relevant period is 1 month. For the second through fifth interviews, the relevant period is 3 months. Expenditures reported in the first interview are used only for bounding purposes—that is, to ensure that respondents do not report expenditures for any item(s) in any subsequent interview(s) that they have already reported in the current interview. Only data from the second through fifth interviews are used in publication of the CE data and in the analyses conducted in this study.

The Interview Survey is conducted on an ongoing basis, with different respondents participating in different interviews during the same timeframe. That is, in any particular month, some participants are interviewed for the first time, some for the fifth. When the fifth interview is completed, the participants are dropped from the sample and replaced by new ones. In this way, about 20 percent of the sample consists of new participants each quarter. In addition, if the interviewer visits the address and finds that the original participant no longer lives there, the interviewer attempts to continue the process with the new residents at the address. For example, if the original participant completed the third interview, the interviewer asks the new participant for certain demographic and other information, but otherwise continues to ask questions normally asked in the fourth interview. In any case, each quarter of data is considered to be an independent sample, even though information from the same participants is collected in more than one quarter.[3]

Finally, participants in the survey are selected from the total U.S. civilian noninstitutional population. Participants may live in urban or rural areas and in structures such as houses, condominiums, apartments, and group quarters (for example, college dormitories). However, military personnel living on base, residents of nursing homes, and those in prisons are not included in the sample.[4]

Terms and definitions

Consumer units. The basic unit of analysis in the CE is the *consumer unit*, defined as members of a household related by blood, marriage, adoption, or some other legal arrangement; a single person living alone or sharing a household with others and who is financially independent; or two or more persons living together who share responsibility for at least 2 out of 3 major types of expenses—food, housing, and other expenses. Note that a *household* and a consumer unit are not always the same thing. A household is the physical dwelling in which a person or family resides, and it may contain many consumer units. For example, two roommates sharing an apartment may purchase their own food, pay their own half of the rent, and otherwise provide for their own expenses. They then share the same household, but are separate consumer units.

Expenditures and outlays. Technically, this article examines *outlays*, which are similar, but not identical, to *expenditures*. Both expenditures and outlays consist of the transaction costs, including taxes, of goods and services. They also include spending for gifts for persons outside the consumer unit, but exclude business purchases. However, expenditures include the full cost of each purchase, even though full payment may not have been made at the date of purchase.[5] Outlays include periodic credit or installment payments for major items already acquired, such as automobiles.[6] For example, if a consumer purchases a new automobile during the 3 months prior to the interview (that is, the "reference period"), the full cost of which is $30,000, then, under the definition of "expenditure," the consumer is taken to have spent $30,000 during the reference period. However, if the consumer financed the purchase with a loan and made payments of $500 each month of the reference period, then, under the definition of "outlays," the consumer is taken to have spent $1,500 during the reference period, plus any additional amount spent on a downpayment or a similar fee.[7] In addition, for homeowners, mortgage principal payments, if any, are excluded from the expenditure computation; for outlays, principal payments are included.[8]

Although expenditures are useful to analyze in many contexts, outlays are used in the analysis that follows because they provide a better view of monetary flows for young consumers, who presumably have less in savings or investments on which to rely for purchases and who therefore may depend on loans for financing more than do older consumers.[9]

Adjustment for expenditures for food at home. Prior to 1988, respondents to the Interview Survey were asked to report usual monthly expenditures for food at home during the reference period. Starting in 1988, respondents were asked to report usual *weekly* expenditures instead. Due to this change in the questionnaire, expenditures for food at home are not directly comparable over time. This incomparabil-

ity is evidenced by a large increase in the average for these expenditures for young single adults from 1987 to 1988 (almost 45 percent), which is inconsistent with all other year-to-year changes in these expenditures from 1984 to 2005. Therefore, prior to any analysis, 1984–85 data on food at home are adjusted to account for this change to the extent possible. Outlays that include food at home as a component, either directly (for example, total food outlays) or indirectly (for example, outlays for all other items, which are computed by subtracting several expenditures from total outlays), are recomputed with the use of the adjusted expenditures for food at home. (Details concerning the change in the questionnaire and the computation of the adjustment factor are given in "Adjusting expenditures for food at home," in the appendix, pp. 40–43.)

Group of interest: young single adults. In this article, the main analysis is performed using data from young, single, never-married adults aged 21 to 29 years who constitute their own consumer units.[10] The group is limited to single-member consumer units in order to facilitate comparisons across time. For example, if all consumer units that include at least one 21- to 29-year-old are compared, changes in patterns may be due solely to changes in the composition of these units: if there are more (or fewer) married couples, single parents, or other non-single-member units in the later period, expenditure patterns for the group as a whole will appear to differ, even if there has been no change when only married couples, single parents, or other non-single-member units are compared. In addition, the sample is limited to never-married singles because singles who were previously married may have very different expenditure or other patterns based on differences in their life experiences or differences in income resulting from their unions. These patterns may even include expenditures for a child who lives in a consumer unit different from that of the previously married parent. Therefore, to remove the potential influence of these factors on the analysis, only never-married singles are included, wherever possible.

Quarterly outlays or annualized outlays? In the Interview Survey, data for expenditures and outlays are collected quarterly in most cases. That is, respondents are usually asked to report values for expenditures or outlays that occurred during the 3 months prior to the interview. For convenience, the data for expenditures and outlays presented in this article are annualized prior to analysis. That is, quarterly values are multiplied by 4. However, the annualized values do not represent calendar-year spending. For example, respondents interviewed in January 1984 reported outlays that occurred between October and December 1983. Similarly, respondents interviewed in February 1984 reported outlays that occurred between November 1983 and January 1984, thus crossing years. Also, multiplying an individual's quarterly outlays by 4 may not accurately represent what that individual actually spent during the 12-month period of interest. However, on average, this approach provides a reasonable estimate of outlays for a 12-month period.

Real dollars or nominal dollars? In performing economic comparisons across time, it is essential to control for changes in prices, because changing prices affect purchasing power. That is, if a person spent $1 for apples yesterday, but $2 today, then the person did not buy more apples today if the price of apples doubled since yesterday. Price indexes are often used to convert *nominal* (that is, reported) dollars into *real* (that is, price-adjusted) dollars, either by converting yesterday's expenditures into today's dollars or by converting today's expenditures into yesterday's dollars. (For more information on this topic, see "Real or nominal expenditures?" in the appendix, pp. 39–40.)

Sample or population? In conducting the CE, it is impossible to interview every consumer unit in the United States (*the population*). Therefore, a representative group is interviewed. The members of this group constitute the *sample*. To obtain population estimates, each consumer unit in the sample is weighted by the number of consumer units it represents. In 1984–85, there were 2,359 consumer units of interest sampled; as shown in table 1, together they are estimated to represent nearly 4.9 million consumer units in the population. In 2004–05, there were 2,158 consumer units of interest sampled, representing about 4.6 million consumer units in the population.[11]

Statistical significance. Because data compared across groups come from samples of each group, rather than entire populations, it is important to consider the probability that differences in outcomes are the result of actual differences in the population and not due to chance. Depending on the type of sampling performed, different formulas are available to compute the *statistical significance* of the outcome—that is, the probability that the difference was due to chance alone, rather than being a real difference in outcomes. In the analysis that follows, when results are described as "statistically significant," the outcome is not likely to have been due to chance alone. (Tests used to measure statistical significance are described in "Measuring statistical significance: types and computations of *t*-statistics," in the appendix, pp. 43–44.)

Table 1. Demographic characteristics of never-married young adults (aged 21 to 29 years), 1984–85 and 2004–05

[In percent]

Characteristic	1984–85	2004–05
Estimated population (rounded)	4,854,000	4,610,000
Percent distribution		
Educational status:		
Highest level attained:		
High school diploma or less	26.2	17.8
College experience	73.8	82.2
Attended college	[1]40.1	[2]45.3
Graduated college	[3]33.7	[4]36.9
Currently enrolled in college:		
Full time	25.6	35.7
Part time	7.0	7.4
Not at all	64.7	53.4
Not eligible[5]	2.7	3.5
Housing tenure:		
Homeowner	8.0	15.8
Renter	92.0	84.2
Race and ethnic origin:		
Hispanic	3.5	7.1
Non-Hispanic	96.5	92.9
Black	8.3	10.1
White and other	88.2	82.8
Men	57.6	59.3
Women	42.4	40.7
Size of dwelling:		
Homeowners		
Rooms, other than bathrooms	5.0	5.3
Bedrooms	2.4	2.5
Bathrooms	1.2	1.5
Half baths	.2	.2
Renters:		
Rooms, other than bathrooms	4.1	4.2
Bedrooms	1.8	2.1
Bathrooms	1.2	1.3
Half baths	.1	.1

[1] Includes those who report attending or completing 1 to 3 years of college and those who report attending, but not completing, 4 years of college.

[2] Includes those who report some college, but no degree, and those who report receiving an associate's degree (occupational/vocational or academic).

[3] Includes those who report completing 4 years of college or attending graduate school.

[4] Includes those who report receiving a bachelor's degree, master's degree, professional school degree, or doctoral degree.

[5] Did not garaduate high school.

Limitations of the data

A complete description of economic well-being includes measures that are not available in the data analyzed. For example, the CE does not collect information about expectations of the future. Presumably, the anticipation of a particular event or outcome in the future influences expenditure patterns in the present. For example, if one expects to make a major purchase (for instance, a home or a car) soon, one may save more in the present than someone who does not expect to do so for some time; or, as discussed subsequently, the more one expects to earn in the future as the result of obtaining a college degree, the more one is willing to pay for it. As another example, rapid changes in technology, such as those which occurred during the period under study, presumably have ramifications for economic well-being that are impossible to measure by examining expenditures alone.[12]

In addition, a consideration of assets and liabilities is excluded from this analysis. Although the CE collects information on assets and liabilities, the information is not detailed enough for purposes of analysis. For example, some information about levels of debt and to whom it is owed is collected; however, information about many sources of debt, including school loans, is not collected separately from information about other debt.[13] Furthermore, the CE data on assets and liabilities are not considered as reliable as expenditure data, due to nonresponse.[14] Finally, unlike expenditure data, which are collected during each interview, data on assets and liabilities are collected only during the fifth interview. Therefore, not all consumer units that are interviewed have an opportunity to provide information about assets and liabilities.[15] Despite these data limitations, young singles presumably make expenditure decisions with the preceding factors in mind. Consequently, those factors are implicitly included in the analysis that follows.

Demographic analysis

Before comparing groups, it is important to understand their basic demographic characteristics. Changes in demographics, such as educational attainment, may explain differences in economic attainment. For example, a higher percentage attending college may indicate a better trained workforce whose members are more able to enter professional or skilled careers. At the same time, changes in demographics may be associated with changes in tastes and preferences that would change expenditure patterns.

Population share. The data indicate that, despite growth in the U.S. civilian noninstitutional population, the number of young adults (of any marital status, living alone or with others) in that population has decreased over time.

For example, the number of consumer units in the U.S. population increased from more than 90.5 million in 1984–85 to more than 116.6 million in 2004–05. At the same time, the approximate number of 21- to 29-year-olds who lived in consumer units of any size decreased from 37.5 million in 1984–85 to 34.3 million in 2004–05. As a result, the number of consumer units reporting at least one member between the ages of 21 and 29 fell from nearly 27.7 million (almost 31 percent) to 25.7 million (22 percent).

Nevertheless, despite the overall decrease in the number of young adults over this time span, the estimated number of young *single* (never-married) adults increased from about 17.2 million to 20.3 million. In addition, the number of consumer units that included at least one young single increased from 14.5 million to 16.7 million, and the values increased dramatically for consumer units with at least one young adult of *any* marital status. For example, in 1984–85, more than half (53 percent) of these consumer units included at least one young *single* adult, with an average of 0.6 per consumer unit. In 2004–05, nearly two-thirds (65 percent) included at least one young single adult, with an average of nearly 0.8 per consumer unit.

Presumably, these findings indicate that although, due to demographic shifts, there were fewer young adults in the population, they were marrying later in life in 2004–05 than they were in 1984–85.[16] If so, whether this trend indicates an improvement or a deterioration in that age group's economic status is not clear. On the one hand, the decision to wait may reflect the desire to complete a degree or establish a career before undertaking such an important commitment as marriage. On the other hand, it may be that young persons still want to marry early, but find it too difficult financially. At any rate, as evidenced by this discussion, the trend toward later marriage again underscores the importance of narrowing the subject of study to young singles. Attempting to include marriage, and even children, into the analysis introduces comparisons that are too complex to complete meaningfully.

Education. According to table 1, in 2004–05 young singles reported higher levels of educational attainment than they did in 1984–85.[17] From the earlier survey period to the later one, the percentage reporting a high school diploma or less dropped substantially (from 26 percent to 18 percent), while the percentage reporting at least some college experience increased notably (from 74 percent to 82 percent).[18] In addition, those enrolled in college full time increased their share from a little more than 1 in 4 (26 percent) to well over 1 in 3 (36 percent).[19]

Higher education is usually considered to be a benefit, leading to higher pay for professional or skilled workers. This is especially true as changes in technology and communications during the intervening years have created jobs, such as computer technicians and administrators, that may require at least some college education for a jobseeker to qualify for employment. However, at the same time, the Consumer Price Index (CPI), which measures changes in prices for goods and services that urban U.S. consumers purchase, shows that the cost of college tuition and fees more than quadrupled—rising 365.3 percent—from January 1984 to December 2005.[20] This increase is in contrast to one of 93.1 percent—less than double—for *all* goods and services over the same period. Thus, young singles in the later period may have been receiving education in larger numbers, but they were facing considerably higher prices than their historical counterparts. In order to benefit from their education, at least in a purely financial way, expected wages and salaries or other income would have to rise substantially to compensate for the increased cost of education.

Housing status. In recent years, there has been much discussion regarding students moving back into their parents' homes after college, rather than into their own dwellings. Many reasons for this development have been posited, and some would suggest that it is due to a decrease in economic well-being—for example, because nowadays students are unable to afford housing on their own. However, others suggest that moving back with parents is a benefit to young adults, as it allows them to forego rent and spend savings therefrom on consumer goods.[21] It could also be that young adults who choose to live with parents do so in order to save for a downpayment on a nicer home than they could have afforded if they had to pay housing expenses while saving.

Whatever the case, the CE data do not support this conclusion. To demonstrate, the sample is expanded to include all consumer units consisting of *at least* one never-married adult aged 21 to 29 years. Expanding the sample to take these individuals into account ensures that young singles who live with their parents, as well as those who live with others but who do not pay rent or are otherwise not financially independent, are included in the analysis. In this new sample, 35 percent of young singles were reported to be the child of the reference person[22] in 2004–05, compared with 48 percent in 1984–85. In addition, the percentage reporting that they were the reference person increased from 39 percent in 1984–85 to 43 percent in 2004–05.[23]

Another key factor in considering well-being is that, despite a sharp increase in home prices in many U.S. cities in recent years, young single adults in 2004–05 were more likely to own their homes than they were in 1984–85. The percentage of young single homeowners doubled from 8 percent to 16 percent during that time. Usually, homeownership is considered to indicate higher economic status than renting. Owning a home provides the purchaser with not only living quarters, but a valuable asset against which to borrow in case of emergency. Of course, if young adults in the later period were buying homes with riskier, more exotic mortgages that were not available in the earlier period, that could have led to worse outcomes than renting. However, the answer to that question is beyond the scope of the CE data.

Economic analysis

Macroeconomic factors. One indicator of economic conditions is the real value of *gross domestic product* (*GDP*). GDP measures the value of all goods and services produced in an economy.[24] According to this measure, both groups look like they were about equally well off. Each group lived and worked during a period of economic growth. Real GDP expanded both from 1983 to 1985 (by 11.6 percent) and from 2003 to 2005 (by 6.8 percent).[25] Interestingly, the two groups also grew up in similar historical contexts as far as economic growth is concerned. In this regard, real GDP grew at an average annual rate of about 3.3 percent from 1964–65 to 1984–85 and 3.0 percent from 1984–85 to 2004–05,[26] while the population grew at an average annual rate of about 1 percent over each of the two periods.[27] Therefore, each group experienced periods in which real GDP grew faster than population growth, indicating that there were more goods and services per person available to be consumed or otherwise used in the economy.

Though important, the GDP values reflect changes for the economy as a whole—not necessarily for the group of interest. Therefore, other macroeconomic indicators also are useful to examine. One of these is the *unemployment rate*. This measure describes the ratio of persons actively seeking work, but unable to find it, to all persons in the labor force, which includes the former group as well as those who currently hold jobs.[28] Although the available measures are not precise or specific to the group in question, there are historical data readily available to describe outcomes.[29] Using such data enables rates for young (never-married) singles to be computed for those aged 20 to 24 years. Data also are available for adults aged 25 to 29 years, but no data are available for never-married persons in that age group.

Both sets of data show a decline of nearly 2 percentage points in unemployment rates for young adults in each age group. Although they experienced higher rates of unemployment than the general population (all adults aged 20 years and older) did in each period (about 6.5 percent in 1984–85 and 4.7 percent in 2004–05), the decline in rates for young adults indicates that they were better off in the later period than the earlier one.[30] The following tabulation shows unemployment rates for young singles and for all young adults for 1984–85 and 2004–05:

	Young singles only (20 to 24 years)		*All young adults aged 25 to 29 years*	
Category	*1984–85*	*2004–05*	*1984–85*	*2004–05*
Total.....	11.7	9.6	7.8	6.0
Men.....	12.8	10.6	7.6	5.8
Women	10.2	8.3	8.0	6.2

In addition to these unemployment figures, certain related macroeconomic factors may have affected economic well-being differently for young adults in the two periods. If so, these factors also support the hypothesis that young adults were better off in the second period. For example, the first group experienced several serious economic recessions from the mid-1970s to the early 1980s that were marked by historically high levels of unemployment. By contrast, there were only two recessions from 1984–85 to 2004–05 (in 1990–91 and 2001), each with peak unemployment rates lower than in the earlier downturns.[31] Although 1984–85 and 2004–05 were each periods of growth in real GDP, the differences in economic outcomes in the preceding years may have affected the abilities of the young adults to secure jobs or savings prior to the years of study or may have affected the finances of those on whom they would normally rely for support, such as parents or other family members.[32] These experiences also may have affected the group's expectations about the future and therefore affected its members' planning.

Microeconomic factors: measures using outlays. In defining the economic status of a particular group, many persons would probably immediately think of income as the appropriate measure. However, outlays are used in this article, for both theoretical and practical reasons.

From a theoretical viewpoint, total outlays reflect not only income received today (that is, current income), but expectations of future income. For example, an applicant seeking a student loan almost certainly knows that his or

her current savings and income are inadequate to cover tuition, but has the expectation that future earnings (enhanced by the degree sought) will more than repay the loan. The sum of current income and expected future income is known as *permanent income*; the idea that consumers spend money on the basis of their permanent income levels is known as the "permanent-income hypothesis."[33] Because outlays are hypothesized to be based on permanent income, they are used as a proxy thereof in this analysis.

Among the practical reasons for using outlays rather than (current) income with CE data is that, prior to 2004, income before taxes was published only for "complete income reporters." In general, complete reporters were those for whom at least one member of the consumer unit (usually the reference person) reported a value for a major source of income, such as wages and salaries. However, even complete income reporters did not necessarily provide a full accounting of income from all sources. For example, the respondent might have provided a value for wage and salary income, but not known or refused to provide the value for interest income. Relying on complete reporters only, then, reduced available information in two ways: Not all respondents were complete reporters, and not all complete reporters provided full income information for analysis. Using total outlays as a proxy for permanent income solves both problems, because values for outlays are either reported or, where appropriate, estimated by various methods.[34]

Using outlays to assess economic status. Perhaps the first answer to come to mind to the question, "Which group is economically better off?" is the answer to another question: "Which group has more income?" As has already been demonstrated, even answering this question is not as straightforward as it might seem. A simple comparison of permanent incomes would make it seem as if the young adults in 2004–05 were better off than those in 1984–85: total annualized outlays for the average young single adult studied rose from $13,145 to $22,744 over the period between the two surveys, an increase of 73 percent! However, in the United States, total annualized outlays probably would be observed to increase during *any* 20-year period since World War II, simply because of inflation, which is defined as a rise in prices for goods and services when other factors (such as size and quality) remain essentially constant. Given this situation, it is more accurate to compare *real* outlays (those adjusted for price change with the use of the CPI for all goods and services) than *nominal* outlays (unadjusted figures, as cited earlier). The 2-year average of the annual CPI for all goods and services rose nearly 82 percent from its base in 1984–85 (105.8) to its value in 2004–05 (192.1). That means that the $13,145 spent in 1984–85 would purchase about the same amount of goods and services as would $23,867 in 2004–05. By this measure, young adults in 2004–05 were *worse* off than their earlier counterparts, experiencing a decrease of almost 5 percent ($23,867, compared with $22,744) in their real outlays. However, caution must be used in interpreting this finding, because the difference in means is not statistically significant.

Of course, the preceding finding relies on certain assumptions, namely, that the same goods and services are purchased in each year by each group, that qualities remain unchanged, and so forth. Even so, by this measure, young adults in the later period appear to be worse off than they were in the earlier period. But perhaps the same is true of all other consumers. If so, is the decrease in purchasing power experienced by young singles larger, smaller, or about the same as that experienced by others? In other words, how are young adults faring compared with the rest of the population?

Comparing the changes in real total outlays from 1984–85 to 2004–05 for young singles with those of other single, never-married adults who also were surveyed during those periods is one way to attempt to answer this question. Before proceeding, however, it is useful to remove outlays for food at home from both groups, because of the change in questionnaire occurring in 1988. As noted earlier, young, single, never-married adults exhibit a large change (almost 45 percent) in food-at-home expenditures from 1987 to 1988 that is inconsistent with annual changes in these expenditures for this group in other years. Other single, never-married adults exhibit a similarly large (more than 38 percent) and inconsistent change in these expenditures. However, the factors required to adjust their expenditures are almost certainly different from those required for young single adults. Performing this adjustment would therefore add one more element of uncertainty to the comparison: if differences are found in the rates of change of total outlays for these groups, how much will be due to actual differences in expenditure patterns and how much to qualitative differences in the estimated factor for adjustment of food-at-home expenditures for each group? Therefore, for simplicity, outlays less food at home are compared.

For young singles, real total outlays less food at home fell 3.8 percent over time, from $21,613 in 1984–85 to $20,795 in 2004–05. For other singles, real total outlays less food at home increased 6.1 percent over the same

period, from $24,415 to $25,906. Although this finding appears to indicate that young singles are falling behind in permanent income while others are gaining, it is not conclusive. First, neither change is statistically significant, indicating that the differences in means observed for each group across time may be due to chance alone. Second, the increase in outlays for other singles may be due to changing demographics within this group. For example, the proportion of singles aged 35 to 54 years increased from 39 percent in 1984–85 to 56 percent in 2004–05. In each year during the period examined, never-married adults in both age groups had the highest levels of average total outlays. Therefore, even if average real total outlays for singles aged 35 to 54 years have not changed over time, the fact that there are more members of that group in the sample will increase the mean for the entire sample of other singles.

Using shares to measure outcomes

Another useful tool for comparing the economic well-being of different groups is derived from a finding known as *Engel's proposition*. In 1857, Prussian economist Ernst Engel reported that, as income increases, the share of total expenditures allocated to food decreases.[35] The assumption in the analysis presented in this article is that the smaller the share of total expenditures a consumer allocates to expenditures for basic needs such as food, the larger is the share available to allocate to other items. Therefore, understanding the allocation of shares of total outlays provides insight into the economic well-being of the groups studied. (For more information on analyzing shares, including caveats associated with this type of analysis, see "Analyzing shares," in the appendix, pp. 38–39.) Table 2 shows shares of total outlays that young adults allocated to selected goods and services in 1984–85 and 2004–05.

Several findings are of note. First, the share of outlays allocated to food has declined over time—by more than 2 percentage points, in fact. Taken alone, this may indicate an increase in economic well-being. However, food outlays can be decomposed into two parts: outlays for food at home (for example, food purchased at grocery stores) and outlays for food away from home (for instance, food purchased at restaurants). Analyzing these components separately is useful, because they represent two different types of spending. Because of the convenience, change in ambience, and typically higher cost associated with meals at restaurants, these meals are considered to be a treat for many consumers; therefore, it is reasonable to suppose that an increased share for food away from home indicates an increase in well-being, while an increased share for food at home indicates a decrease in well-being. Over the period examined, the shares for food at home *and* for food away from home both decreased. Each of these changes is statistically significant, as are many of the other changes in share shown in the table. However, the directions of the changes in the components of food spending are contradictory, one indicating an increase, and the other a decrease, in economic well-being. Resolving this apparently paradoxical outcome is the topic of the next section. (See also "Analyzing shares," in the appendix, pp. 38–39, especially p. 39.)

Other measures using outlays

Although analyzing shares of outlays provides an easy, intuitive way to compare economic statuses, it has its limitations. In historical comparisons, one major limitation is, once again, price change. When outlays within a certain period are compared, it is usually assumed that all groups face roughly the same prices. However, across different periods, prices for some goods and services may have risen, perhaps rapidly, while others stayed the same or even dropped. When prices are not changing at a uniform rate, the shares can be affected in ways that do not accurately reflect the underlying idea of analysis using a framework based on Engel's proposition. (See "Analyzing shares," in the appendix, pp. 38–39.) Therefore, comparing real (price-adjusted), rather than nominal (contemporaneous), outlays for specific items is a useful way of seeing whether a decrease in share is due to less consumption or a change in prices.

The CPI for food at home rose more than 81 percent from 1984–85 (103.6) to 2004–05 (188.0). Therefore, the real-dollar expenditure for food at home in 1984–85 was about $2,252, which is more than the $1,950 spent in 2004–05. Similarly, the CPI for food away from home rose about 79 percent from 1984–85 (106.3) to 2004–05 (190.5). Therefore, the real-dollar expenditure for food away from home in 1984–85 was about $1,437, which is more than the $1,073 spent in 2004–05. In each case, the real-dollar expenditure in 1984–85 is statistically significantly different from the value observed in 2004–05. Consequently, these findings are consistent with the Engel analysis, which indicates a higher economic well-being in the second period than in the first due to a decrease in expenditures for food at home, but a lower economic well-being in the second period due to a decrease in expenditures for food away from home.

Further analysis reveals another interesting finding: Although the percentage of respondents reporting expenditures for food at home remained unchanged (almost 97

Table 2. Average annualized outlays and shares, young single adults, 1984–85 and 2004–05

Outlay category	Average annualized outlay			Share (percent)		
	1984–85		2004–05			
	Nominal dollars	Real 2004–05 dollars	Nominal/ real dollars	1984–85	2004–05	*t*-statistic
Total outlays[1]	$13,145	$23,866	$22,744	100.0	100.0	…
Food, total less trips[1]	2,043	3,710	3,022	15.5	13.3	[2]–4.49
Food at home, less trips[1]	1,241	2,254	1,950	9.4	8.6	[2]–2.55
Food away from home, less trips	802	1,456	1,073	6.1	4.7	[2]–4.75
Shelter and utilities	3,113	5,652	7,249	23.7	31.9	[2]9.88
Owned dwellings	353	641	1,326	2.7	5.8	[2]4.53
Rented dwellings	2,039	3,702	4,602	15.5	20.2	[2]5.99
Utilities	722	1,312	1,322	5.5	5.8	1.21
Apparel and services	821	1,490	757	6.2	3.3	[2]–8.84
Transportation	2,320	4,213	3,494	17.7	15.4	[2]–2.44
Cars and trucks (new)	606	1,100	457	4.6	2.0	[2]–4.74
Cars and trucks (used)	462	840	853	3.5	3.7	.32
Other vehicles	31	57	33	.2	.1	–1.10
Gasoline and motor oil	583	280	969	4.4	4.3	–.86
Maintenance and repair	304	1,058	398	2.3	1.7	[2]–2.37
Vehicle insurance	211	552	487	1.6	2.1	[2]3.40
Public transportation	49	383	76	.4	.3	–.62
Vehicle rental	74	89	223	.6	1.0	[2]3.10
Health care	256	466	478	2.0	2.1	.55
Entertainment	703	1,277	1,129	5.4	5.0	–.79
Travel and trips	631	1,146	668	4.8	2.9	[2]–5.47
Education	558	1,012	1,760	4.2	7.7	[2]2.55
All other outlays[1]	2,699	4,900	4,186	20.5	18.4	[2]–2.45

[1] Item or subcomponent computed with the use of adjusted values for food at home in 1984–85; see "Adjusting expenditures for food at home," in the appendix, pp. 40–43.

[2] Indicates statistically significant difference in shares when periods are compared.

NOTE: To convert to real 2004–05 dollars, nominal 1984–85 dollars are multiplied by 192.1 (the average CPI for 2004–05) and divided by 105.8 (the average CPI for 1984–85). Components may not add to aggregate values

percent in each period), the percentage reporting expenditures for food away from home fell nearly 5 percentage points (from 90.8 percent to 86.3 percent). This finding supports a diminution in economic well-being, given the smaller percentage of young singles who report expenditures for food away from home.

However supportive, by themselves these numbers do not conclusively indicate that the second group was worse off than the first. For example, an increased variety of frozen and prepared foods in the second period may mean that consumers can enjoy, at home, the convenience of food away from home at lower, grocery store prices. In addition, the consumer can make one trip to the grocery store each week and purchase all meals at once, rather than visiting a fast-food establishment every day, thus saving time. If all this is true, then the decreased share for food away from home may indicate an *increase* in well-being. Yet, if it is true, it is inconsistent with the fact that real expenditures for food at home fell between the two periods; that is, given that the price index for food at home rose between the two periods, purchasing more food at home and less food away from home should lead to *higher*, not lower, real-dollar expenditures for food at home in the second period. Still, this outcome is not implausible. The price index for food at home is based on what *all* consumers purchase, and not solely on what young singles purchase. If young singles are purchasing more food at home, and the prices of the foods they tend to purchase have increased less than the prices of other types of food at home, then the preceding findings are consistent with the hypothesis described here (that is, that young singles are substituting lower priced foods from grocery or other stores for food

from restaurants). In fact, the CPI for frozen and freeze-dried prepared foods increased less than 48 percent (from 103.8 to 153.2) from January 1984 to December 2005, substantially less than the 81-percent increase in prices already reported for food at home in general.[36] However, to investigate this hypothesis fully requires both further investigation into price increases for specific foods and an examination of data from the CE's Diary component, or Diary Survey, which, unlike the Interview Survey, is designed to collect detailed information on food expenditures. Such an investigation, while interesting for future work, is beyond the scope of this study.

Regardless, expenditures on other goods and services also are useful to examine. First, consider the case of shelter and utilities.[37] The share allocated to these outlays has increased substantially, from less than one-fourth to nearly one-third of total outlays. Again, it is possible that housing attributes account for this change. Now, if outlays for shelter and utilities have risen because young singles are purchasing or renting larger homes, the change in share may be due to an increase in their well-being. However, evidence to suggest such purchases is limited. For example, only the increase in number of bathrooms (see table 1) is statistically significant for both owners and renters. The changes in the numbers of bedrooms and half baths for renters, while statistically significant, are not necessarily economically significant. (For example, the number of bedrooms for those who rent increased from about 1.8 to about 2.1.) Neither homeowners nor renters experienced a statistically significant change in "rooms, other than bathrooms." Although other factors, not measured in the CE, also affect these outlays—for example, the quality of the neighborhood in which the housing exists—the substantial change in these shares, coupled with the considerable increase in housing prices noted in recent years, may be evidence of a diminution of well-being for this group, or at least that the increase in well-being from slightly larger dwellings is more than offset by the increase in outlays. However, these data do not tell the full story. The numbers of rooms, bedrooms, bathrooms, and half baths are all described for the *consumer unit*, yet many of the consumer units sampled actually reside in the same *household*. It is quite possible that numbers of rooms per consumer unit have not changed, but that the number of households in which these consumer units reside has changed; if the number has increased, it could indicate an increase in well-being. To illustrate, consider two young singles sharing a one-bedroom apartment (that is, two separate consumer units sharing one household). Suppose that each roommate is interviewed and reports that the apartment has one bedroom. Then the data would show two separate consumer units, each with one bedroom. Now suppose that one roommate moves into a new apartment, also containing one bedroom. Then, assuming that each of the former roommates still lives alone, the data still show two separate consumer units with one bedroom. Yet, if they prefer to live alone, the constant number of rooms per consumer unit would not reflect the hypothetical increase in their well-being. Fortunately, the data provide information that allows the analyst to distinguish these two cases. That is, it is possible to count the number of consumer units per household to see whether two roommates are sharing one household with one bedroom or two young singles live alone in separate households, each of which contains one bedroom. Analyzed in this way, the results tell a different story: first, in 1984–85, more than one-third (nearly 36 percent) of the young singles studied lived in a household with at least one other person;[38] then, in 2004–05, less than one-fourth (under 23 percent) did. (See table 3.)

Of course, some caution must be used in interpreting these numbers. The data are not edited for consistency, for example. Therefore, it is possible that, due to differences in the way respondents interpret their situations (for instance, one housemate reports the second bedroom, which is being used as a den, as a room other than a bedroom, while the other reports it as a second bedroom), data entry error, or another reason, different numbers of rooms or bedrooms are reported for the same household within or across interviews. Also, some of the information is missing due to nonresponse or some other reason. But assuming that these factors are random each year, the data obtained provide useful information to help measure changes in numbers of rooms available to young single adults. Analyzed in this way, the data show that, regardless of household composition—at least, whether one or more than one person lives in the household—the number of rooms per capita has increased over time. Although the increases are small, they are statistically significant in most cases. Especially because more young singles are the sole occupants of their households, it is more difficult to argue that the increased expenditures for housing noted at the consumer-unit level clearly indicate a diminution of well-being. Those who are the sole occupants of their households may value privacy enough to pay the extra dollars, and if they can afford to do so in larger numbers in the later period than in the earlier period, then they are arguably better off in the later period, or at least any diminution in well-being due to higher housing prices is offset at least partially by an increase in privacy or in the

Table 3. Housing attributes of young singles, households including at least one young single person, 1984–85 and 2004–05

Characteristic	Household includes only young single person			Household includes at least one other person		
	1984–85	2004–05	*t*-statistic[1]	1984–85	2004–05	*t*-statistic[1]
Sample size	1,252	1,401	…	701	410	…
Percent of households with at least one young single person	64.1	77.4	8.91	35.9	22.6	–8.91
Percent owners	10.5	21.1	7.42	([2])	([2])	...
Per capita number of: [3]						
Rooms, other than bedrooms	3.7	3.9	4.62	2.0	2.0	1.68
Bedrooms	1.4	1.7	8.31	.9	1.1	5.99
Bathrooms	1.1	1.2	10.96	.5	.6	4.64
Half baths	.1	.1	3.44	([4])	.1	1.60

[1] Based on test of proportions, where percentages are compared, and difference in means, where number of rooms are compared. (See "Measuring statistical significance: types and computations of *t*-statistics," in the appendix, pp. 43–44 (especially p. 44), for details.)

[2] Results are not computed for multiple-member households. The problem is that, within the household, there can be a mix of owners and renters. For example, the homeowner may rent a room or part of the house to at least one young single person. In addition, in this case the consumer unit that owns the home may be of any composition. That is, the owner may be a young, single person, as defined throughout this study, or may be of a different age or marital status.

[3] These households include at least one young single person as defined in this study who constitutes a unique consumer unit within the household. However, the remaining members may constitute any number of consumer units from one to the number of other members of the household. For example, if a husband and wife with two children rent a room to a young single, the household size is five, but the number of consumer units is two. In this case, the per-capita number of rooms is still computed to be the number of rooms in the household divided by the household size, whether or not the renter has full use of other rooms in the house.

[4] Less than .05.

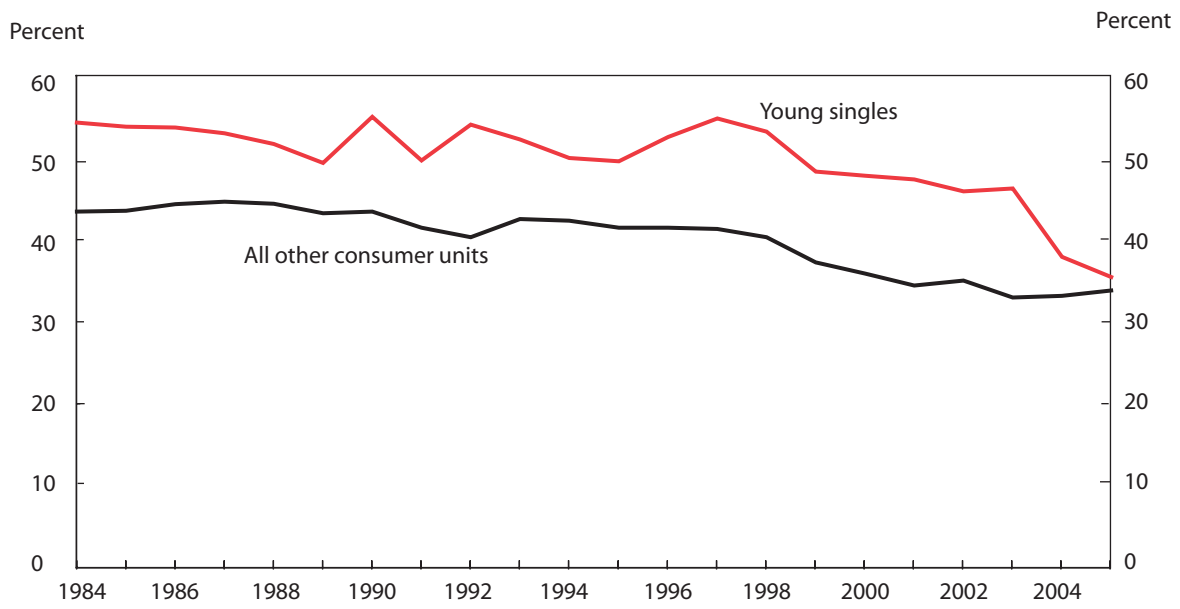
NOTE: Values presented are for the sample and are not weighted to reflect the population. Weights computed in the survey are designed for use with consumer units, not households.

number of bedrooms and bathrooms per capita.

In contrast to housing expenditures, which are necessary for at least a minimal level of economic well-being, travel expenditures are purely discretionary for most consumers. Therefore, an increase in the frequency of purchasing goods or services related to travel or in dollars allocated toward trips presumably indicates an increase in economic well-being. However, for young singles, the share of total outlays allocated to travel has fallen substantially, from 5 percent to 3 percent. At the same time, the percentage of respondents reporting travel expenditures has decreased sharply, from more than half (53 percent) to more than one-third (35 percent). The percentage reporting many of the components of travel expenditures (such as food, lodging, transportation, and entertainment on trips) also has declined. Therefore, the drop in share is not the result of decreased prices, nor is it likely that members of this group are making different lodging arrangements than before (for example, staying with friends or relatives instead of in hotels). Young singles simply appear to be traveling less. However, they are not unique in this regard: The percentage reporting travel expenditures (including the components previously described) has decreased for all other consumer units as well during the period examined. (See chart 1.) Accordingly, rather than decreased prices, *increased* prices may play a role.[39] In addition, these changes in travel expenditures may be explicable by changes in technology. For example, the percentage reporting travel expenditures decreased as e-mail, cellular telephones, and instant messaging became more available. Therefore, consumers in general (and young singles specifically) may be substituting new forms of communication for travel, which would indicate an increase in their economic well-being. That is, young singles in the later period enjoy choices not available to those in the earlier period.[40] However, there is still no perfect substitute for the personal visit. From this perspective, the availability of new technology mitigates the decrease in well-being resulting from less frequent travel, whatever its cause (for example, increased prices), but does not necessarily negate (or outweigh) the decrease entirely.

Of particular interest is the change in shares for educational expenses, which nearly doubled over the period examined. This change is challenging to interpret. The proportion of young single adults enrolled in college full time rose sharply—from just above one-fourth (26 percent) to more than one-third (36 percent); the proportion of part-time students remained unchanged at about

Chart 1. Percent reporting expenditures for travel, 1984–2005



7 percent, while the proportion not enrolled (including those not eligible) declined almost 11 percentage points. (See table 1.) However, those reporting educational expenditures actually dropped slightly—from 26 percent to 24 percent. Of course, not all of the expenditures included in the CE definition of educational expenditures are for college tuition; however, the tuition expenditure accounts for a substantial portion.[41] Although many of these students may be receiving scholarships, participating in deferred payment plans, or working for payment of tuition instead of working for other pay, or may be children of parents who pay their tuition directly to the school, it is likely that those who do make payments were paying much more for their education in 2004–05 than those who did in 1984–85, even after adjustment for general price changes. In support of this claim, recall the increase in college tuition and fees described earlier. The fact that more young adults are attending college either because of a greater opportunity to do so or because of the changing nature of the general economy probably reflects an improvement in economic well-being. However, the fact that the price of going to college has escalated so much means that the expected gains from a college education would have to rise substantially for current students to "break even" with their older counterparts.[42]

Demographic differences among young singles

So far, the analyses presented have focused on young single adults as a group. However, as noted earlier, there are demographic differences within this segment of the population that either may account for changes in the group overall or may be obscured when the group is examined as a whole. For example, an increase in total outlays may be observed because one group has "caught up" to another or because both subgroups have experienced an increase in total outlays but one group has experienced a larger increase than the other. To examine these outcomes, total outlays for selected demographic groups within the young singles sample are compared.

Table 4 shows that, consistent with the larger population of young single adults, no subgroup tested experienced a statistically significant change (increase or decrease) in real total outlays. However, within each subgroup, substantial differences appear in each period observed. For example, total outlays for single men substantially exceed total outlays for single women in each period. Although the gap is larger in 1984–85 (18.5 percent) than in 2004–05 (12.6 percent), the decrease is due to a decrease in total outlays for men, rather than an increase in outlays for women. Nevertheless, the decrease is not statistically significant and

Table 4. Real total outlays, by demographic group, 1984–85 and 2004–05

Demographic characteristic	Real total outlays, 1984–85	Standard error	Real total outlays, 2004–05	Standard error	Percent change in real total outlays	*t*-statistic (change in mean of real total outlays)
All young single adults	$23,866	663.03	$22,744	531.85	–4.7	–1.32
Men	25,585	844.92	23,838	722.68	–6.8	–1.57
Women	21,536	717.51	21,151	637.39	–1.8	–.40
Non-Hispanic:						
White	24,122	557.19	22,977	638.19	–4.7	–1.35
Black	23,416	1,975.59	21,644	1,456.91	–7.6	–.72
Hispanic	18,508	4,047.05	21,585	1,400.21	16.6	.72
High school or less	21,617	1,126.33	19,316	877.42	–10.6	–1.61
Some college	21,283	808.08	19,846	765.83	–6.8	–1.29
College graduate	28,685	1,209.18	27,962	848.94	–2.5	–.49

therefore reveals nothing about the change in relative well-being between young single men and women in this study.

Similarly, Hispanics appear to have the smallest total outlays, on average, in each period, but regardless of the interval studied, the difference in average total outlays is not statistically significant when Hispanics are compared with either group of non-Hispanics. The results—both within 1984–85 and across the time span examined—are more difficult to interpret, though, because of the relatively large variance of total outlays for Hispanics in the earlier period. At the same time, for non-Hispanics, the gap in real total outlays between Whites and Blacks nearly doubled from 1984–85 ($706) to 2004–05 ($1,333). In this case, both groups experienced decreases in average real total outlays, but the decrease for young Black singles ($1,772) was larger than the decrease for young White singles ($1,145). Nonetheless, neither the difference within, nor the difference across, periods was statistically significant for either of these groups.

By contrast, there are clear differences by education level: Those with a college degree have significantly—in both economic and statistical terms—higher total outlays in each period than those who have not earned a college degree. However, there are no statistically significant differences between the two groups of non-college graduates (that is, those with a high school diploma or less and those who attended, but did not graduate from, college).

Regression analysis. In the previous analysis, total outlays are compared for selected subgroups of young single adults, such as men and women. However, such comparisons are limited in usefulness, because it is not clear whether the total difference in real total outlays, if any, is explained simply by dividing the group into parts for comparison or whether other characteristics within the subgroup differ and it is the differences in these other characteristics that explain the differences in total outlays. For example, single men report larger real total outlays in each year than single women. But is the difference in a person's sex the reason for the difference in outlays, or are single men different from single women in other ways, such as educational attainment or working status, that also may explain differences in real total outlays? And if the latter is true, then to what extent, if any, does a person's sex explain differences in real total outlays? To investigate these issues, regression analysis is used to identify how specific characteristics are related to total outlays, *ceteris paribus* ("all else equal"—that is, when all other characteristics are held constant).

The specific method used in this analysis is called *two-stage least squares*. In the first stage, income data from selected young singles are regressed on independent variables and the results obtained are used to predict income for all young singles in the sample during each period. Then, in the second stage, this new variable is used as an independent variable to estimate total outlays. Reasons for using the two-stage least squares method, as well as a detailed description of the procedure—especially the first stage—are given in "Regression technique: omitted-variable bias and two-stage least squares," in the appendix, pp. 44–49.

Independent variables and control group. Regression analysis allows the researcher to identify whether differences in real total outlays still are expected to be observed when men and women of the same educational attainment,

working status, age, income, and other characteristics are compared. Generally, one set of variables is selected to represent the characteristics of a "typical" member of the group under study, and all others are compared with that "individual." This reference group is often called the *control group*. In the case of binary outcomes (for instance, male or female), the characteristic describing the larger portion of the population is usually selected as the control group characteristic. When more than two outcomes are possible (as in, say, region of residence), the characteristic representing the largest segment of the population is selected. For example, in 1984–85, 17 percent of the sample resided in the Northeast, 25 percent resided in the Midwest, 27 percent resided in the South, and 32 percent resided in the West. Similar percentages hold for the 2004–05 sample. (See table 5.) Therefore, residence in the West is chosen as a characteristic for the control group.

In addition to being regressed against region of residence, total outlays are regressed against several other characteristics, including age (21 to 24 years or 25 to 29 years); educational attainment (high school or less; some college; college graduate, with or without attending graduate school); student status (working and enrolled full time or part time; or not working, but either currently enrolled or reported "going to school" as the reason for not working during the past year); sex; ethnicity and race (Hispanic; Black, not Hispanic; or White and other, not Hispanic); working status (full time, full year; part time, full year; full time, part year; part time, part year; or not working during the past year for reason other than "going to school"); occupational status (self-employed; or working for a wage or a salary in a position as a manager or professional, technical worker or salesperson, service worker, construction worker, or operator); housing tenure (homeowner or renter); degree of urbanization of area of residence (urban or rural area); number of automobiles owned; number of

Table 5. Characteristics of young single adults, unweighted, as used in regressions

[In percent]

Characteristic	1984–85	2004–05
Age:		
21 to 24 years	51.3	54.4
25 to 29 years	48.7	45.6
Educational attainment:		
High school diploma or less	26.7	18.2
Attended college	39.5	46.2
College graduate	33.8	35.6
College enrollment status:		
Not in school	67.6	56.0
In school		
Full time and working	20.8	29.0
Part time and working	7.8	7.4
Not working	3.8	7.6
Sex:		
Male	56.3	58.2
Female	43.7	41.8
Race and ethnicity:		
White, not Hispanic	88.9	82.6
Black, not Hispanic	7.7	9.8
Hispanic	3.3	7.6
Working status:		
Full time,[1] full year[2]	51.7	49.4
Part time, full year	7.6	10.4
Full time, part year	23.9	16.5
Part time, part year	11.6	14.8
Not working, not in school	1.4	1.3
Occupational status:		
Self-employed	3.0	1.9
Occupational status—Continued:		
Working for wage or salary		
Technical or sales position	34.5	47.6
Manager or professional	27.7	21.0
Service worker	14.7	12.8
Construction worker	6.2	5.1
Operator or laborer	12.4	10.1
Housing tenure:		
Renter	91.9	85.0
Homeowner	8.1	15.0
Region of residence:		
Northeast	16.6	15.4
Midwest	24.5	28.1
South	27.3	27.9
West	31.6	28.6
Degree of urbanization:		
Urban	95.5	96.8
Rural	4.5	3.2
Sources of income received:		
Interest, dividends, rental or other property income	37.1	21.9
Unemployment and workers' compensation, veterans' benefits	6.0	1.8
Public assistance, supplemental security income, food stamps	6.4	1.7
Regular contributions of support	9.9	13.8
Other income	3.8	6.5
Average number of vehicles:		
Automobiles and trucks	.8	.6
Other vehicles	.3	.3

[1] At least 35 hours per week worked.

[2] At least 50 weeks per year worked.

other vehicles owned; and predicted current income.[43] Also, a binary variable indicating that the young adult was interviewed in 2004–05 is included. This last variable is interacted with (that is, multiplied by) the other variables ("main effect" variables) just listed, in order to ascertain whether the relationship between characteristics and total outlays has changed over time. The control group consists of persons interviewed in 1984–85 who were 21 to 24 years old; had attended college, but were not college graduates; were working full time, full year in a technical or sales position and were not currently enrolled in school; were renters living in urban areas of the West; and did not own any automobiles or other vehicles.[44]

Box-Cox transformation. When data are not normally distributed, they may exhibit heteroscedasticity, a condition in which the regression error is not constant and standard errors associated with parameter estimates may be biased. However, if the underlying distribution is known, it is possible to transform the variable so that it is—or at least approaches being—normally distributed. For example, if the data are lognormally distributed, then regressing the logarithm of the dependent variable on characteristics should result in unbiased ordinary least squares estimators. At each stage of the analysis, a program was run to find the appropriate Box-Cox transformation of the dependent variable. (See "Box-Cox transformations," in the appendix, p. 43, for details.) In the second stage, the parameter of transformation, λ, was found to be 1/4, indicating that the fourth root was an appropriate transformation of the data. (That is, before regressing, the square root of the square root of observation of total outlays was obtained, and it is this fourth root that is used in the regression.) In the first stage, λ was found to be 3/8.

When λ is found to be either zero or unity, the regression results have appealing attributes, in that the parameter estimates are easily interpreted. (See "Box-Cox transformations," in the appendix, p. 43.) Even so, in the regression performed, the value for λ for both total outlays and income is positive, but less than unity. Therefore, the coefficients of the independent variables do not have any intuitively appealing interpretation. However, in this study, the object is not necessarily to identify *how much* permanent income (for which total outlays is a proxy in the second stage of the regression) has changed for a particular subgroup, but rather to determine *whether* it has changed at all and, if so, *in what direction* (increased or decreased). Fortunately, the parameter estimates are easy to interpret in this way. For example, a positive, statistically significant coefficient for a main effect in the second stage indicates that, in 1984–85, the main-effect group had higher predicted total outlays than otherwise similar members of the control group. Then, to find out whether changes occurred over time, additional variables are included in which the main-effect variables are interacted with a binary variable indicating the year the interview took place. (See "Regression results," to follow.)

Weighting. Finally, the regressions are not weighted to reflect the population. The weighting structure in place when the 1984–85 data were collected had changed substantially by 2004–05.[45] Thus, separate regressions would have had to be run to obtain weighted results from 1984–85 and 2004–05. However, in that case, the standard errors of the parameter estimates would be different from what they are when the regression analysis is performed jointly in one model. Therefore, to be able to compare results, the data are pooled and the regressions for each stage are run unweighted.

Regression results. In considering changes over time in predicted real total outlays, it is useful to describe the outcome for the control group first. The key parameter estimates to consider are those for the intercept, the binary variable indicating the year the interview took place (with a value of 1 for 2004–05 and 0 for 1984–85), and the main and interaction terms for predicted transformed income. If the regression had been linear (that is, if no Box-Cox transformation had been performed), the coefficient of the intercept would represent a baseline value for outlays and the coefficient of income would describe the rate at which outlays are predicted to increase with income, a relationship known as the *marginal propensity to consume*. For example, if the coefficient of the intercept was $1,000 and the coefficient of income was 0.75, this would indicate that young single adults were predicted to spend a baseline value of $1,000, plus 75 cents of every dollar of income received. (That is, the marginal propensity to consume would be 0.75.) The coefficient of the binary variable indicating the year the interview took place would indicate whether there had been an increase (if it were positive and statistically significant) or decrease (if negative and statistically significant) over time in baseline predicted real outlays. The coefficient of the interaction term for income would indicate whether the marginal propensity to consume had increased or decreased over time (again, depending on the level of statistical significance). Although the Box-Cox transformation eliminates the possibility of directly interpreting the coefficients in this way, the actual strategy used in interpreting them is similar. In this case, the coefficients for the intercept and income are both highly significant statistically. However, neither the coefficient of the binary variable indicating the year the in-

terview took place nor the coefficient of the interaction of this binary variable with income is statistically significant. Therefore, there is no evidence to support the hypothesis that there has been a change in real total outlays over time for the control group. Nevertheless, it is interesting to note that the coefficient of the binary variable is negative, a finding that is consistent with the earlier one that real total outlays declined (by almost 5 percent) for all young singles, but that the decrease was not statistically significant.

Some of the remaining results of the regression analysis are consistent with a priori expectations. For example, in each year, real total outlays increase with the number of automobiles and other vehicles owned. Even for vehicles that are not used frequently, one would expect their owners to incur other expenses, such as insurance, maintenance, and, in many cases, loan repayments, that a nonowner would not incur. In addition, there appears to be a relationship between educational attainment and real total outlays. The coefficient of "high school diploma or less" is negative, indicating that in 1984–85 members of this group had lower real total outlays than similar members of the control group (that is, those with some college experience), while the coefficient of "college graduate" is positive, indicating that in 1984–85 members of this group had higher real total outlays than similar members of the control group. However, each of these coefficients is statistically significant only at the 90-percent confidence level. For 2004–05, both coefficients are positive, but neither is statistically significant. Had they been, the positive coefficient would indicate that the positive difference in outlays between college graduates and those who attended college but did not graduate is even larger in 2004–05 than in 1984–85. For those with no college experience, the positive coefficient, which is larger in magnitude than the negative coefficient for the main effect, would indicate that those with lower levels of education in 2004–05 now have real outlays similar to those with at least some college experience. However, because neither of these coefficients is statistically significant, they offer no clear evidence of a change over time in the relationship between real total outlays and educational attainment.

At least one other set of parameter estimates is also worth noting: first, the parameter estimate for Hispanics shows that real total outlays for that group were significantly less than those for non-Hispanics in 1984–85; second, the parameter estimate for 2004–05, while positive, is not statistically significant. Therefore, it cannot be stated with certainty that young single Hispanic adults have seen their real total outlays increase over time. At the same time, however, an *F*-test shows that, although negative (–0.120), the sum of the parameter estimates for the main effect and its interaction term for Hispanics is not significantly different from zero,[46] indicating that real total outlays for Hispanic young singles are not necessarily lower than those for non-Hispanics, *ceteris paribus*. In other words, there is strong support (due to statistical significance) for the hypothesis that Hispanic young adults had lower real total outlays in 1984–85 than non-Hispanics (due to the negative coefficient). The evidence is less strong in 2004–05. (The sum of the coefficients is still negative, but not statistically significant.) Nevertheless, because the coefficient of the interaction term is not statistically significant, it cannot be stated with confidence that an increase has taken place, because any evidence of increase may be due to variability in the data. Some of this variability may be due to the changing composition of the Hispanic population in the United States over time;[47] however, a definitive answer requires further investigation. At any rate, although the evidence to suggest that Hispanic young adults in the later period are better off than they were in the earlier period is not conclusive, there is no evidence that they are worse off, on the basis of these results.

Of the remaining parameter estimates, only a few are statistically significant in either period. This finding in itself is worth noting, because it means that even though there are differences when averages of real total outlays are compared for different groups, the differences are observed for reasons other than inherent differences in the groups compared. For example, as described earlier, single women have substantially smaller real total outlays, on average, than do single men in each year. This finding is difficult to explain in some ways, because single women have many characteristics that are associated with larger total outlays. For example, more young single women graduated from college in each period than did young single men (38 percent, compared with 31 percent, in 1984–85; 40 percent, compared with 34 percent, in 2004–05), and more own at least one automobile (69 percent, as opposed to 63 percent, in 1984–85; 55 percent, as opposed to 47 percent, in 2004–05). However, for those who reported values for all sources of income that they reported receiving, single women reported substantially lower incomes before taxes—about 20 percent less than men in each period. The regression results indicate that the differences observed in real total outlays for single men and for single women within each year are presumably due to these other differences in demographic characteristics, rather than to inherent differences (such as tastes or preferences) between single men and single women. In addition, the fact that few parameter estimates change in a statistically

significant way over time supports the hypothesis that, although young single adults in the later period may not be better off than those in the earlier period, they do not appear to be any worse off, at least when real total outlays are used as a measure of well-being.[48]

BOTH DEMOGRAPHIC AND SPENDING PATTERNS changed for young, never-married adults from 1984–85 to 2004–05. Whether these changes indicate an increase or decrease in economic status is unclear. By some measures, such as the rate of economic growth and unemployment rates, the more recent group is at least as well off—if not better off—than the earlier group. The more recent group also enjoys higher educational attainment and higher rates of homeownership, both of which are generally considered positive attributes.

However, other results indicate that there has been little discernible change over time. When average real total outlays for subgroups of young single adults, such as men and women, are compared, differences across groups within each period are apparent, but changes within groups across time are not generally observed. These findings are confirmed with regression analysis, which estimates changes in real total outlays over time when demographic differences are held constant. Although it may be interesting to perform Engel or some other, similar analysis on the demographic subgroups, this task is left for future work.

Finally, the evidence that young singles are worse off today is inconclusive. For example, young singles experienced a decrease in real total outlays from 1984–85 to 2004–05, while other singles experienced an increase during that time. However, neither change was statistically significant. In addition, young singles today allocate smaller shares of total outlays to food away from home and to travel, and larger shares to food at home and to housing. Each of these changes would appear to indicate a diminution in economic well-being, yet they are consistent with increased economic well-being as described earlier: the increased share for food at home may be due to the greater availability of convenience foods, allowing young singles to save time and money by "stocking up" rather than frequenting restaurants; and the housing share may have increased because more young singles are living alone, presumably by choice, and also because they are more likely to be homeowners.

Taken together, the results described in this study do not indicate that young singles were clearly better off in the second period than the first, a finding that is consistent with the belief among young adults that it is harder for them to gain economically than it was for their parents.[49] Still, the results do not provide strong evidence that young singles are *worse* off than their predecessors, as has been found in previous work.[50] Given that previous work compared young adults in the mid-1990s with those in the mid-1980s and found a decrease in economic well-being, the current results may indicate that the fortunes of young adults are improving after a period of decline. This finding suggests that future work examining trends in outlays and other measures of well-being for young adults would be useful in order to provide a fuller perspective on what changes have occurred and when they did so. In the meantime, it is valuable to continue to monitor expenditure patterns for young singles to better understand the challenges they face and how such challenges may affect them and others in the future. □

Notes

[1] According to data from the 1998 Current Population Survey (CPS), 36 percent of 21-year-olds reported graduating from high school as the highest level of education attained, while 7 percent reported completing an associate's degree or higher. Eight years later, in 2006, the CPS indicated that 28 percent of 29-year-olds reported graduating from high school as the highest level of education attained, while 41 percent reported completing an associate's degree or higher level of education. In comparison, that same year, 31 percent of 21-year-olds reported graduating from high school as the highest level of education attained, while 9 percent reported completing an associate's degree or higher level of education. (See "Table 2. Educational Attainment of the Population 15 Years and Over, by Single Years of Age, Sex, Race, and Hispanic Origin: 2006," on the Internet at **www.census.gov/population/socdemo/education/cps2006/tab02–01.xls** (visited May 20, 2008); and "Table 2. Educational Attainment of Persons 15 Years Old and Over, By Single Year of Age, Sex, Race, and Hispanic Origin: March 1998," from "Educational Attainment in the United States: March 1998 (Update)" (U.S. Census Bureau, report P20–513, issued October 1998), on the Internet at **www.census.gov/prod/3/98pubs/p20–513u.pdf** (visited May 20, 2008). Note that 2006 is the last year for which tables showing educational attainment by exact age were produced.)

[2] For an example of these changing beliefs, see Melinda Crowley, "Generation X Speaks Out on Civic Engagement and the Decennial Census: An Ethnographic Approach," *Census 2000 Ethnographic Study*, June 17, 2003, especially page 2, on the Internet at **www.census.gov/pred/www/rpts/Generation%20X%20Final%20Report.pdf** (visited Sept. 26, 2007). For an example of the changing economic status of young single adults, see Geoffrey Paulin and Brian Riordon, "Making it on their own: the baby boom meets Generation X," *Monthly Labor Review*, February 1998, pp. 10–21; on the Internet at **www.bls.gov/opub/mlr/1998/02/art2full.pdf**.

[3] For additional information, see *BLS Handbook of Methods* (Bureau of Labor Statistics, April 2007), Chapter 16, "Consumer Expenditures and Income," especially pp. 2–3; on the Internet at **www.bls.gov/opub/hom/pdf/homch16.pdf** (visited Apr. 10, 2008).

[4] *Ibid*., p. 5.

[5] See "BLS Information: Glossary," on the Internet at **www.bls.gov/bls/glossary.htm#E**, or "Consumer Expenditure Survey: Glossary," on the Internet at **www.bls.gov/cex/csxgloss.htm#expn**, both visited Jan. 30, 2007.

[6] *Ibid*. See also "2004 Consumer Expenditure Interview Survey Public Use Microdata Documentation," Oct. 18, 2006, p. 103, on the Internet at **www.bls.gov/cex/2004/cex/csxintvw.pdf** (visited Sept. 8, 2008).

[7] In addition to automobiles, major items include other vehicles used primarily for transportation (for example, trucks, vans, and motorcycles) or entertainment and recreation (such as boats and campers). For other items (for instance, apparel) that have been financed by other means (say, by credit card), the expenditures approach applies. That is, the full purchase price is recorded in the reference period during which the purchase was made, even if the balance is not paid immediately. Payments for interest accruing to the balance also are collected during each interview, but the proportion of the total interest accruing to any particular purchase (apparel in the present example) that is included in the total balance, which may also include amounts from other purchases in addition to the amount for the particular purchase, is neither collected nor estimated.

[8] This criterion applies to *all* mortgage principal payments, whether for the home of residence, a vacation home, or some other property. However, regardless of the kind of computation—of expenditures or outlays—mortgage interest, but not the full purchase price, paid for the owned home is included. Nevertheless, information on "purchase price of property (owned home)" is collected, and is included as a component of "net change in total assets" in published tables.

[9] However, actual values for assets and liabilities are not examined here. (See section titled "Limitations of the Data" for more information.)

[10] Excluded from the analysis are cases in which two or more single, never-married adults who share living quarters are either financially interdependent or sharing responsibility for major expenses (or both). By definition, these consumer units consist of at least two members who may be described either as "unrelated persons" (1984–85 and 2004–05) or "unmarried partners" (2004–05), unless they are related by blood or some legal arrangement. Such consumer units are in contrast to single, never-married persons who share living quarters, but who are financially independent and who do not share responsibility for more than one major expense. These consumer units constitute single-member consumer units within the same housing unit. (For more information, see the definition of "consumer unit" in "2004 Public Use Microdata Documentation," p. 299.)

[11] Publications of the 2005 CE data use information from consumer units that were selected for interview under a sample design different from that of consumer units selected for interview in 2004. For technical reasons, only consumer units participating from February through December 2005 were eligible to be selected for interview under the new sample design. Therefore, only information from these consumer units is used in this article when results from 2005 are described. To ensure a proper computation of population counts, the weight of each consumer unit interviewed in 2005 is multiplied by 12/11 before any additional computation is performed. The reason is that 11 months of sample are used to represent 12 months of population. This adjustment does not affect the means or variances of outlays or other characteristics that would have been obtained from the sample of interviews occurring in 2005 and that are used in this study had the adjustment not been made. However, it corrects the population counts, thereby changing the weight of the 2005 interviews in the total sample (that is, interviews occurring in 2004 and 2005) when the means and variances for the 2-year period are computed. For interviews occurring in 2004, no additional adjustment is necessary. Although the sample design used to select consumer units for interview in 2004 is different from the one used in 2005, the same design is used consistently from January through December 2004. Therefore, no adjustment to weights is necessary for consumer units interviewed anytime during that period.

[12] Paulin and Riordon, "Making it on their own," pp. 16, 18.

[13] In 2004, school loans began to be cited as an example when the respondent is asked to report the amount owed for "other credit, such as school loans, personal loans or loans from retirement plans." (See "Consumer Expenditure Survey: Section 21, Part A.1—Credit Liability—Credit Balances—Second Quarter Only" (Bureau of Labor Statistics, Nov. 20, 2005), on the Internet at **www.bls.gov/cex/capi/2004/csxsection21a1.htm** (visited Apr. 9, 2008).) Nevertheless, the proportion of the total amount owed for any of these types of credit separately is neither collected nor estimated.

[14] See "Consumer Expenditure Survey: Frequently Asked Questions (FAQ's)" (Bureau of Labor Statistics, Mar. 4, 2008), on the Internet at **www.bls.gov/cex/csxfaqs.htm#q8** (visited Mar. 25, 2008).

[15] Like asset and liability data, income data are collected less frequently than expenditure data. However, in contrast to asset and liability data, income data are collected not only during the fifth interview, but also during the second interview (or during the earliest interview, in the event that either no respondent was available in time to complete the second interview or the consumer unit originally at the address visited has been replaced by a new consumer unit). Income information from the second (or the earliest) interview is then carried forward to subsequent interviews until it is replaced with information collected during the fifth interview. However, values for assets and liabilities are considered validly blank for records pertaining to all but the fifth interview; that is, no attempt is made to carry the information backward to records pertaining to earlier interviews. Therefore, although information on income is at least potentially available for each consumer unit in the sample, regardless of which particular interview is under consideration (even for those who participate only once), information on assets and liabilities is available only for consumer units participating in the fifth interview, thus limiting its contribution to the analyses conducted herein.

[16] Indeed, the following tabulation from the U.S. Census Bureau shows that the median age at first marriage has risen by about 2 years from 1984–85 to 2004–05 for both men (25 to 27 years) and women (23 to 25 years):

Year	*Men*	*Women*
1984	25.4	23.0
1985	25.5	23.3
2004	27.4	25.3
2005	27.1	25.3

(SOURCE: Table MS-2, "Estimated Median Age at First Marriage, by Sex: 1890 to the Present" (U.S. Census Bureau, Mar. 27, 2007), on the Internet at **www.census.gov/population/socdemo/hh-fam/ms2.xls** (visited May 21, 2008.).)

[17] In the 1984–85 data, educational attainment is described by the highest grade attended and whether or not that grade was completed. For the data from this period, college graduates are defined as those who reported completing the fourth year of college or its equivalent and those who reported attending at least 1 year of graduate school. Those who reported attending, but not completing, 4 years of college are defined as having attended college, as are those who reported attending for 1 to 3 years, even if they reported completing the final year they attended. In the 2004–05 data, educational attainment is described by degree received, including associate's degree (occupational/vocational or academic), bachelor's degree, master's degree, professional school degree, and doctoral degree. For consistency with the 1984–85 data, those who reported receiving a bachelor's degree or higher are defined as college graduates in the 2004–05 data. In addition, those who reported receiving an associate's degree, or attending college but not receiving any degree, are defined in the 2004–05 data as having attended college.

[18] Data from the CPS also show increased levels of educational attainment for young adults. In 1985, 41.4 percent of those aged 20 to 24 years and 43.7 percent of those aged 25 to 29 years had completed at least 1 year of college. In 2005, 55.3 percent of those aged 20 to 24 years and 56.8 percent of those aged 25 to 29 years had completed at least some college. Note that CPS data underwent a change in the definition of educational attainment similar to the change undergone by CE data. In 1985, data are shown by highest level of grade or year of school completed. In 2005, for those who attended college, data are shown for some college but no degree, and for degree received: associate's degree, oc-

cupational/vocational or academic degree, bachelor's degree, master's degree, professional school degree, and doctoral degree. (Sources of data are as follows: "Educational Attainment in the United States: March 1982 to 1985 (P20–415) Issued November 1987: Table 2, Years of School Completed by Persons 15 Years Old and Over, by Single Years of Age, Sex, Race, and Spanish Origin: March 1985" (U.S. Census Bureau, November 1987), on the Internet at **www.census.gov/population/socdemo/education/p20-415/tab-02.pdf** (visited May 20, 2008); Table 1, "Educational Attainment of the Population 15 Years and Over, by Age, Sex, Race, and Hispanic Origin: 2005" (U.S. Census Bureau, Oct. 26, 2006), on the Internet at **www.census.gov/population/socdemo/education/cps2005/tab01–01.xls** (visited May 20, 2008).

[19] Although not measuring an identical sample, data from the National Center for Education Statistics show that college enrollment has increased over time for students graduating from high school. In 1984, 55.2 percent of high school completers were enrolled in college in the October immediately following high school completion. By 2005, the figure had increased to 68.6 percent. Note that these data do not separate enrollment rates for full- and part-time students, nor do they take age into account—presumably, most high school completers in this group are younger than 21, and some are older than 29. Nevertheless, these data are consistent with the findings presented in table 1, namely, that college enrollment has increased for young adults over time. (Source of data is "Student Effort and Educational Progress, Table 25–1, Percentage of high school completers who were enrolled in college the October immediately following high school completion, by family income and race/ethnicity: 1972–2005" (National Center for Education Statistics, 2006), on the Internet at **nces.ed.gov/programs/coe/2007/section3/table.asp?tableID=702** (visited May 21, 2008).)

[20] Data are from tables that were created with online tools ("Create Customized Tables"), on the Internet at **www.bls.gov/cpi/home.htm** (visited Dec. 5, 2006). Data are for "All Urban Consumers (Current Series)" and are not seasonally adjusted.

[21] See "Echoboomerang—number of adult children moving back home—Statistical Data Included," *American Demographics*, June 1, 2001, on the Internet at **www.findarticles.com/p/articles/mi_m4021/is_2001_June_1/ai_76579415** (visited July 17, 2007).

[22] The reference person is the first person mentioned when the respondent in the survey is asked to identify the person who is responsible for owning or renting the home.

[23] Data from the U.S. Census Bureau are consistent with these findings. Specifically, one Census Bureau table shows separately the percentages of men and women 18 to 24 years old, presumably of any marital status, who are classified as "child of householder" in various years. For women aged 18 to 24 years, there is not much change between 1984 (47 percent) and 2005 (46 percent). However, men in that age group exhibit a decline from 62 percent to 53 percent. The reason for this decline is not clear. One possibility is that young men used to live at home during their college years and then moved out after graduation, whereas now they move to campus for their college years and return home after graduation. Whatever the cause, a thorough investigation is beyond the scope of this article. (SOURCE: Table CH-1, "Young Adults Living At Home: 1960 to Present" (U.S. Census Bureau, Mar. 27, 2007), on the Internet at **www.census.gov/population/socdemo/hh-fam/ad1.xls** (visited May 21, 2008).)

[24] See the Bureau of Economic Analysis (BEA) glossary at **bea.gov/bea/glossary/glossary.cfm?key_word=GDP&letter=G#GDP** (visited Jan. 30, 2007).

[25] Growth rates for real GDP were derived from data listed in the Excel file titled "Current-dollar and 'real' GDP" (Bureau of Economic Analysis, Oct. 31, 2007), on the Internet at **bea.gov/national/index.htm#gdp** (visited Nov. 8, 2007).

[26] *Ibid.*

[27] Percentages are derived from *Statistical Abstract of the United States: 2007*, 126th ed. (U.S. Census Bureau, 2006), table 2, "Population: 1960 to 2005."

[28] For definitions of the unemployment rate and the labor force, visit **www.bls.gov/bls/glossary.htm** (visited Jan. 30, 2007).

[29] These data are from computations that were made with annual data obtained with the use of online tools ("Create Customized Tables") that were found on the Internet at **www.bls.gov/cps/home.htm** (visited Jan. 30, 2007).

[30] These statistics exclude marginally attached workers—those who are available and willing to work and who have sought employment in the past 12 months, but not during the past 4 weeks. (For a precise definition of *marginally attached workers*, visit the Web site **www.bls.gov/bls/glossary.htm#M** (visited Nov. 6, 2007).) The statistics also exclude discouraged workers, a subset of marginally attached workers—namely, those who have looked for work in the past 12 months, but are not currently looking because they believe that there are no jobs available for which they qualify. (For a precise definition of discouraged workers, visit the Web site **www.bls.gov/bls/glossary.htm#D** (visited Nov. 6, 2007).) However, no data on either marginally attached or discouraged workers were found for any age group prior to 1994 when the BLS Web site (**www.bls.gov/cps/home.htm**) was last visited (Nov. 6, 2007).

[31] In 1975, the annual unemployment rate for the entire civilian noninstitutional population (that is, a population not limited to young single adults) peaked at 8.5 percent, the highest annual unemployment rate between 1970 and 1979. In 1982, the annual unemployment rate reached 9.7 percent. By contrast, in 1990–91 annual unemployment rose to only 6.8 percent (in 1991), and it was 4.7 percent in 2001. These figures were obtained with online tools ("Create Customized Tables"), on the Internet at **www.bls.gov/cps/home.htm** (visited July 17, 2007).

[32] This is especially true for the group in the earlier period. Many of those aged 21 to 29 years in 1984 would have been members of the labor force in 1981. In July 1981, the seasonally adjusted civilian unemployment rate fell to its lowest point for that year: 7.2 percent. One year later, it reached 9.8 percent. In November and December 1982, it peaked at 10.8 percent. The rate did not return to its 1981 minimum until almost 3 years later, in June 1984. (See "Most Requested Statistics: Labor Force Statistics from the Current Population Survey: Unemployment Rate—Civilian Labor Force—LNS14000000," on the Internet at **data.bls.gov/cgi-bin/surveymost?ln** (Bureau of Labor Statistics, no date) (visited Nov. 29, 2007).) Although the actual rates are different for 20- to 24-year-olds and 25- to 29-year-olds during these periods, the patterns they follow are similar to those for the labor force as a whole. (See "Labor Force Statistics from the Current Population Survey" (Bureau of Labor Statistics, no date), on the Internet at **data.bls.gov/PDQ/outside.jsp?survey=ln** (visited Nov. 29, 2007), accessible by using "One-screen data search" for the database named "Labor Force Statistics including the National Unemployment Rate (Current Population Survey—CPS)" at **www.bls.gov/cps/home.htm#data** (visited Sept. 18, 2008). Seasonally adjusted rates for the 25- to 29-year-old group are not available at this link, but unadjusted rates are.) For many of the younger members of this group (that is, the 20- to 24-year-olds), who, as shown in the tabulation on this page, have higher unemployment rates than the older members of the group (that is, the 25- to 29-year-olds), finding a first job was presumably quite difficult; even for those older members who held jobs prior to 1981, the situation was likely precarious. Undoubtedly, many of them lost jobs due to the recession or had difficulty changing jobs if they desired to. Those who were unemployed not only lacked the ability to add to their savings from the wages or salaries they earned, but also may have had to use their savings to pay for basic goods and services, such as food and housing. By contrast, during the analogous timeframe for the second group, the unemployment rate for the entire civilian labor force was lowest in January and February 2001 (4.2 percent) and eventually peaked in June 2003 (at 6.3 percent). Although never matching the 2001 minimum during the second period, the rate declined from March 2004 (5.8 percent) through December 2005 (4.8 percent). Again, these figures support the hypothesis that young adults in the later period were economically better off than those in the earlier period both during and immediately prior to the years under study.

[33] Milton Friedman, *A Theory of the Consumption Function* (Princeton, NJ, Princeton University Press for National Bureau of Economic Research, 1957); on the Internet at **www.nber.org/books/frie57-1** (visited Aug. 6, 2008).

[34] Starting with the publication of data collected in 2004, multiple imputation began to be used to fill in blanks for income. It will be interesting to use the data obtained therefrom for future cross-generational analyses.

[35] Louis Phlips, *Applied Consumption Analysis* (Amsterdam, Elsevier Science

Publishers B.V., rev. ed., 1983; distributed in the U.S. and Canada by Elsevier Science Publishing Company, Inc., of New York, NY), p. 103.

[36] To better understand this chain of reasoning, suppose that young singles purchase only frozen and freeze-dried prepared foods in both periods, while other consumers purchase different foods. Then adjusting food-at-home expenditures for young singles will overestimate their real expenditures for food at home purchased in 1984–85. If the overestimate is large enough, it will make it appear that young singles had lower expenditures for food at home in 2004–05 than they did in 1984–85. Now, as seen from the values presented in table 2, real expenditures for food at home decrease for young singles when the CPI for all food at home is used to adjust these expenditures. But if young single consumers really did purchase only frozen and freeze-dried prepared foods in each period, then the $1,241 nominal expenditure shown in that table should be adjusted to $1,832 [1,241 × (153.2/103.8)]. Then, because $1,832 is less than the value reported in 2004–05 ($1,950), it follows that young singles actually purchased more food at home in the second period than the first, and they may have done so because they purchased less food away from home, just as the hypothesis purports.

[37] Because rent includes utilities in some cases, comparing only expenditures for rent with outlays for a mortgage does not provide an accurate comparison of basic housing costs.

[38] The other person or persons could be roommates, the landlord, or anyone else not related by blood, marriage, or some other legal arrangement and from whom the young single is financially independent. If any of these conditions is violated, the young single would no longer constitute a single-member consumer unit.

[39] The CPIs for at least three categories of goods and services directly related to travel are readily available on the Internet (**data.bls.gov/PDQ/outside.jsp?survey=cu** (visited Dec. 5, 2007), accessible by using "One-screen data search" for the database named "All Urban Consumers (Current Series) (Consumer Price Index—CPI)" at **www.bls.gov/cpi/home.htm#data** (visited Sept. 18, 2008)). In each case, the increase in the CPI for these categories is higher than the increase in the CPI for all goods and services from 1984 to 2005 (88 percent). The categories are "other lodging away from home, including hotels and motels" (157 percent); "gasoline (all types)" (99 percent); and "airline fare" (243 percent). Changes in annual indexes are compared in this case, instead of changes from January 1984 to December 2005, in order to reduce the effects of intrayear volatility. Prices for each of these travel expenditure categories presumably vary by season if not by month, so comparing values for different months across years, rather than comparing average annual values, may either mitigate or exacerbate differences in price changes computed. In addition, seasonally adjusted indexes are not available for airline fares in years prior to 1989.

[40] Evidence supporting the hypothesis that consumers substitute new forms of communication for travel is seen in the CE results. The trend line for the percentage of those reporting total travel expenditures is much steeper downward from 1997 to 2005 than it is from 1984 to 1996, a pivotal year that coincides with a period of rapid increase in usage of these technologies. For example, the U.S. Census Bureau reports that in 1997 less than three-eighths (36.6 percent) of all households owned a computer and that about half of these households (18.0 percent of all households) had Internet access. By 2003, nearly five-eighths (61.8 percent) of all households owned a computer and nearly eight-ninths of these households (54.7 percent of all households) had Internet access. (See Jennifer Cheeseman Day, Alex Janus, and Jessica Davis, "Computer and Internet Use in the United States: 2003," *Current Population Reports*, P23–208, October 2005, pp. 1–14, especially p. 1, on the Internet at **www.census.gov/population/www/socdemo/computer.html**, item 1, CPS, October 2003, "Report" (visited Dec. 5, 2007).

[41] For all consumer units, college tuition accounted for 58 percent of educational expenditures in 1984–85 and 64 percent in 2004–05.

[42] The increase in education expenditures presumably also affects the allocation of shares for those who pay them. That is, given the same amount of funds available for spending, the person who allocates more to education has less to allocate to food, housing, and all other goods and services. However, separating out those who make these expenditures from those who do not and comparing the differences in their share allocations, both within and across various periods, is beyond the scope of this discussion.

[43] See "Regression technique: omitted-variable bias and two-stage least squares," in the appendix, pp. 44–49, for variables used to predict income and for other details about the first stage of the regression.

[44] In 1984–85, more than half—almost 59 percent—of young, single adults who were sampled reported ownership of (exactly) one automobile. However, in 2004–05, the figure dropped to 48 percent, which was equal to the percentage reporting no automobile owned. For convenience, the control group consists of those owning no automobiles. In this way, changes in the parameter estimate for number of automobiles owned need not be taken into account in describing changes in predicted real outlays over time for the control group.

[45] The weighting method used in CE publications is *balanced repeated replication*, a technique in which means and variances are estimated several times with the use of weighted half-samples. In 1984–85, only 20 replicate weights were available to compute such estimates. By 2004–05, 44 replicate weights were available.

[46] F-value = 0.74; p-value = 0.3892.

[47] For details, see Geoffrey D. Paulin, "A changing market: expenditures by Hispanic consumers, revisited," *Monthly Labor Review*, August 2003, pp. 12–35, especially pp. 12–16; on the Internet at **www.bls.gov/opub/mlr/2003/08/art2full.pdf**.

[48] As mentioned, in this study total outlays are regressed on many characteristics, including predicted income. Therefore, many variables may lack statistically significant coefficients because, given the same income, members of the groups associated with these variables have average outlays that are similar to those of the control group. However, as with single women, perhaps current income differs for the groups under study, and this difference, rather than the demographic differences of interest, influences the outcome for total outlays. In some cases, in fact, coefficients used to predict current income are statistically significant for both the main and interaction effects. For example, the coefficient for single women is negative and statistically significant in the current income regression. However, the interaction term for women and the variable indicating interviews that took place in 2004–05 is positive and statistically significant. The sum of these values (–1.718) is still negative and is statistically significantly different from zero (F-value = 12.59; p-value = 0.0004). The positive statistically significant coefficient for the interaction term indicates that women have experienced increases in predicted income over time. However, the negative statistically significant sum indicates that women are still predicted to have lower incomes than single men in the later period, at least for those who provide values for all sources of income that they reported receiving. (For the complete set of regression results used to obtain predicted income, see table A-3, in the appendix, pp. 45–46.)

[49] Crowley, "Generation X Speaks Out," p. 2; based on interviews conducted in 2000–01 of young adults born from 1968 to 1979.

[50] Paulin and Riordon, "Making it on their own," especially p. 18.

APPENDIX: Notes on methodology

Accounting for intertemporal changes

Analyzing shares. In analyzing shares, the allocations of total outlays for two different groups are compared to find out which group is better off. To understand this idea, consider two single persons, each of whom purchases the same amount of food each week for $20. Suppose the first person has the lower income and spends $100 per week on all purchases; the second person spends $200 per week. Then the share of expenditures allocated to food is 20 percent for the first person, but only 10 percent for the sec-

ond, even though the same amount of food is purchased. Even if the second person buys more, or higher quality, food for $30, the share increases only to 15 percent. In each case, the second person has a larger portion of spendable dollars left over to purchase goods and services other than food than does the first person; therefore, the second person is considered to be better off.

Although analyzing shares is particularly useful for comparing groups within the same period, there are some caveats to consider in analyzing changes in shares over time. For example, important information can be masked by price changes. To see this effect, consider a person who enjoys apples as an occasional snack and budgets $10 per month for their purchase. If the price of apples is $1 per pound, this person can afford 10 pounds per month. If the price rises to $2 per pound, the person can afford only 5 pounds per month. If no other prices change, and the person's expenditure pattern remains the same in all other respects, then the share of total outlays allocated to apple purchases remains the same each period, yet the person is enjoying fewer pounds of apples.

If, then, the change in the price of apples is known, expenditures can be adjusted, and it becomes clear that the person is purchasing fewer pounds of apples. In the current example, the price of apples has doubled. Therefore, if the person bought the apples in the first period at the price of the second period, then the expenditure in the first period would be double the value observed. (That is, 10 pounds of apples purchased at the price of the second period would cost $20, not $10.) Because the price-adjusted outlay for the first period ($20) is larger than the observed outlay for the second one ($10), it is clear that the number of pounds of apples purchased has declined in the second period. This relationship (higher price-adjusted expenditures mean a larger quantity purchased) holds even when the actual number of pounds of apples (or quantity of other goods and services) purchased is unknown, as it is for the values shown in table 2 in the text.[1]

In addition, the allocation of total outlays changes with tastes and preferences, which in turn can change over time for individuals or groups. In cases such as these, in which both kinds of change occur, changes in shares are not so easy to interpret. For example, as discussed in the text, the share for food away from home has been decreasing over time, while the share allocated to food at home has been increasing. Assuming that food away from home is preferred to food at home, this outcome reflects a decrease in well-being. However, if young adults in the second period have a higher preference for education than they did in the first period, they may forego some of the expenditures for food away from home in order to purchase education, even if the costs of education remain stable. In that case, if the increase in well-being due to purchasing more education is larger than the decrease due to purchasing less food away from home, then young adults in the second period are better off than they would be if they did not make such a tradeoff.

Finally, changes in technology and in the availability of products can influence the allocation of total outlays. As noted in the text, the availability of new types of food at home may lead to changes in purchases such that the increased share for food at home and decreased share for food away from home reflect an increase in well-being. Similarly, changes in technology or in the availability of products may lead less directly to changes in certain shares. For example, young adults in the first period may have purchased food away from home in conjunction with entertainment away from home (as when they go out for dinner and a movie). Although they still may do so in the second period, new products or services may have been developed that allow young adults to enjoy similar forms of entertainment at home (for instance, joining a movie-by-mail rental club or viewing movies over the Internet). In this case, the share for food away from home could decrease while both the share for food at home and well-being increase, because young adults in the second period could still choose to purchase the same amount of food and entertainment away from home as those in the first period did, but they also are able to choose an allocation that was not available in the first period.

Because no data on tastes, preferences, technological change, or the availability of products are collected directly in the CE, it is impossible to identify precisely how these factors change and how expenditure patterns change as a result. Nevertheless, despite these caveats, analyzing shares in a historical context is useful as long as the assumptions underlying the analysis are reasonable and explicitly stated as needed.

Real or nominal expenditures? In performing economic comparisons across time, it is essential to control for changes in prices. To demonstrate, consider a person who spends $10 for apples in the first period and $20 in the second. It may be that the person purchased twice as many pounds of apples in the second period. But it also may be that the price changed (rose or fell) and the person purchased a different amount each period. For example, if the price of apples is $1 per pound in the first period, but $4 per pound in the second, it is clear that the person bought a greater amount of apples (10 pounds) in the first period than in the second (5 pounds). Usually, expenditures can be adjusted to reflect these changes by converting nominal expenditures to real expenditures through the mechanism of a price index. After adjustment, real expenditures can be compared to provide a better idea of whether changes in expenditures are due to changes in quantities purchased or changes in prices.

Price indexes are computed by comparing changes in price for a standard market basket of goods. In this case, the basket consists only of apples. Once the basket is defined, the index is computed by dividing the price of the basket in the period of interest by the price of the basket in the base period and multiplying the result by 100.0. In the base period, the period of interest and the base period are the same. Therefore, the index in the base period is always 100.0. However, if prices are different in the period of interest, the index will take on a higher or lower value, depending on the direction of the price change. For example, if the first period is selected as the base period and the

basket is defined as consisting of 1 pound of apples, then the base-period index is computed to be ($1/$1) × 100.0 = 100.0. The index for the second period is ($4/$1) × 100, or 400.0.

Once the indexes are computed, they can be used to convert nominal expenditures to real expenditures. In the current case, suppose the analyst wants to convert the nominal value of expenditures reported in the first period to real-dollar values for comparison with expenditures occurring in the second period. In other words, the analyst wants to know how much the market basket purchased in the first period would have cost if it had been purchased in the second period. The result is obtained by dividing the price index for the second period by the price index for the first period and multiplying the result by the expenditures reported in the first period. In this example, then, the equation is (400.0/100.0) × $10 = $40. In other words, in the second period it costs $40 to purchase the same amount of apples that was purchased in the first period. Even if the quantity of apples purchased is unknown to the analyst, it is clear that the purchaser must have purchased fewer pounds of apples in the second period than in the first, because the value of real expenditures reported in the first period (that is, $40) exceeds the value of real expenditures reported in the second period (that is, $20).[2]

Note that this adjustment works because expenditures are defined as price (P) times quantity purchased (Q). Therefore, if P_1Q_1 (that is, the expenditure in the first period) differs from P_2Q_2, it is not clear whether the difference is a result of changes in P or in Q. However, adjusting first-period expenditures in the manner just described has the effect of comparing P_2Q_1 with P_2Q_2. Therefore, any difference in expenditure is due to a change in quantity.

However, the comparison is not always so precise. In this case, the analyst is literally comparing apples with apples. Suppose, however, the consumer purchases both apples and oranges. This purchase leads to a potential comparison of two different baskets of fruit. That is, suppose that the initial basket consists of 1 pound of apples and 1 pound of oranges. Suppose also that the price of apples remains unchanged, but the price of oranges rises. Then the price index for fruit will rise, because it reflects the change in the total price of a basket of fruit consisting of 1 pound of apples and 1 pound of oranges. However, in response to the price change, the consumer may choose to purchase fewer pounds of oranges and continue to purchase 1 pound of apples. Alternatively, the consumer may substitute apples for oranges (that is, purchase more than 1 pound of apples and less than 1 pound of oranges) or may indeed purchase less than 1 pound of each fruit. Only if the consumer continues to purchase 1 pound of apples and 1 pound of oranges after the price change will the index perfectly adjust nominal expenditures in the first period to values that are to be compared with those observed in the second period.[3]

Nevertheless, using the price index to convert nominal expenditures to real expenditures is important. Although the results may not provide a perfect adjustment to the first-period expenditures for comparison over time, they still provide better information for analysis than a comparison of unadjusted values. Like any tool, a price index has to be used cautiously and correctly, and the analyst has to be aware of both its uses and its limitations before drawing analytical conclusions.

Statistical procedures

Adjusting expenditures for food at home. In the Interview component, or Interview Survey, of the CE, data on expenditures for food at home are collected by means of two questions. Prior to 1988, the first question asked about monthly expenditures for food at grocery stores and the second asked about monthly expenditures for food at other stores, such as convenience stores. In 1988, each question was changed to ask about weekly expenditures for these items. From 1987 to 1988, average expenditures for food at home for young single adults rose 44.8 percent. By contrast, from 1984 to 1987 the average annual increase (2.5 percent) was similar to the average annual increase from 1988 to 2005 (1.9 percent).[4] Because the change in these expenditures in any single year other than from 1987 to 1988 ranged from –9.8 percent (from 1992 to 1993) to 8.6 percent (from 2003 to 2004), the large change from 1987 to 1988 is presumably due to the change in the two questions.

Some of the change may be due to the way in which respondents think about the questions, as well as the way in which the processing of the data changed starting in 1988. When asked to report monthly expenditures, respondents may have thought about weekly expenditures, which they then multiplied by 4 before reporting. For example, a respondent with $50 in usual weekly expenditures would have reported $200 per month. During processing, these monthly reported expenditures were multiplied by 3 to produce quarterly estimates, because there are 3 months per quarter. In this example, $600 would be the resulting quarterly expenditure estimate. However, when weekly expenditures are collected directly, they are multiplied by 13 to obtain quarterly estimates, because there are 13 weeks per quarter. Thus, the quarterly estimate would be $650, not $600. However, if the hypothesis presented here is correct, then quarterly expenditures are expected to rise about 8 percent due to the change in the questionnaire, because, essentially, reported expenditures are being increased by about one-twelfth. (That is, when monthly expenditures are multiplied by 3, only 12 weeks of expenditures compose the quarterly estimate, whereas, since 1988, an extra week is included in the composition of the quarterly estimate). Of course, even if this hypothesis is correct, expenditures for 1988 could increase by more or less than 8 percent, due to changes in prices or other exogenous factors that contribute to the natural variation in expenditures for food at home from year to year. Still, the increase of nearly 45 percent strongly reduces the credibility of the aforementioned hypothesis, especially because data on expenditures for food at home (excluding food prepared by the consumer unit on out-of-town trips) published in standard tables, which are derived from the Diary component, or Diary Survey, of the CE, do not show

such a change from 1987 to 1988.[5] Therefore, to account for the change—whatever its cause—requires an adjustment more complicated than adding 8 percent to reported expenditures in order to make expenditures in 1984–85 more comparable to those reported in 2004–05.

To start, it is important to note that in the Interview Survey, as mentioned, information on expenditures for food at home excluding food prepared on trips consists of data collected from two questions: one on food purchased from grocery stores, the other on food purchased from other stores, such as convenience stores. Both questions changed in 1988 to request usual weekly, rather than monthly, expenditures. Each question was affected by the change in the magnitude of the response to it: for those reporting expenditures at grocery stores, the expenditure increased more than one-third (37 percent); however, for those reporting expenditures at other stores, the expenditure more than doubled (rising almost 104 percent). Nevertheless, the change in the questions does not appear to have affected the *rate* of response to them: from 1986 to 1989 (that is, the last 2 years of the monthly question and the first 2 years of the weekly question), the percentage of respondents reporting purchases at grocery stores ranged from 95.9 percent (1986) to 96.8 percent (1989), while the percentage reporting purchases at other stores ranged from 40.4 percent (1988) to 42.0 percent (1987).

The next step is to estimate the values that would have been reported in 1984 and 1985 had the questions asked about usual weekly, rather than monthly, expenditures. One method is simply to adjust the 1984 and 1985 expenditures by the percent change reported from 1987 to 1988. Consider, for example, expenditures at grocery stores. As mentioned earlier, the change in the mean for young singles who report these expenditures was 37 percent. Therefore, multiplying these expenditures, as reported in 1984 and 1985, by 1.37 would increase them by the appropriate amount. However, this method is too simplistic, for when the 1987–88 change is omitted, the percent change in expenditures at grocery stores ranges from –9.8 percent (from 1992 to 1993) to 9.1 percent (from 1991 to 1992). Even excluding this period of volatility (from 1991 to 1993), the percent change ranges from –2.8 percent (from 1988 to 1989) to 7.5 percent (from 1999 to 2000). Therefore, it is difficult to say how much of the 37-percent change is due to the change in the questionnaire and how much is due to natural variation in reported expenditures. Simply multiplying expenditures reported in 1984 and 1985 by 1.37 may substantially over- or underestimate the values that would have been reported if usual weekly expenditures had been collected then.

Instead, regression is used to estimate the adjustment factor. In each regression (run separately for grocery store expenditures and other store expenditures), for those reporting expenditures in each year, the natural logarithm of the mean value of their expenditures is regressed on certain variables (described subsequently), the values of which depend on the period. The purpose of this logarithmic model is to use a formula that is well known in finance, namely, $A_t = A_0 e^{rt}$, where A_0 is the initial amount invested in an account, r is the rate of growth (for example, the interest rate) of the investment, t is the number of periods, e is a transcendental number equivalent to approximately 2.718, and A_t is the amount in the account in the final period. In the study of expenditures, r is the average annual rate of change of expenditures and can be calculated when other variables in the equation have known values. In the present case, the mean value for young singles who reported grocery store expenditures in 1984 was $A_0 \approx \$216$. In 1987, the value was $A_t \approx \$229$. Accordingly, by what rate would expenditures have to have increased each year to meet these conditions? To find out, the natural logarithm of both sides of the earlier equation is taken, or $\ln(A_t) = \ln(A_0) + rt$. From this point forward, r can be found with standard algebra, given that t is 3 (because the initial $216 grew for 3 years after 1984—that is, from 1984 to 1985, from 1985 to 1986, and from 1986 to 1987).

Although this method describes the average annual growth rate necessary to move from the values observed in 1984 to those observed in 1987, the rate obtained may be affected by random variation in the data. That is, suppose that a drought or some other event caused prices, and therefore expenditures, to be higher than usual in 1984, but that they returned to their expected level in 1987. Then the average annual growth rate computed in this way would underestimate the actual underlying long-term growth rate, because expenditures in 1984 would have started at a higher level than expected and therefore would need to increase less swiftly each year to reach the expected 1987 level than they would have had observed values equaled expected values in both years. To estimate both the initial expected starting value and the underlying long-term growth rate, then, regression is used. Note that when the natural logarithm of expenditures is regressed on time values, the intercept of the equation estimates $\ln(A_0)$—the logarithm of the expected value of expenditures when t equals zero—and the coefficient of t is the estimated average annual growth rate for the long-term trend.

Before performing the regression, it is important to note that the change in question may have affected not only the intercept of the equation, but also the rate at which reported expenditures change over time. To find out, a single regression is run so that the coefficients of the intercept and slope for the 1984–87 equation can be compared with those for the 1988–2005 equation. The equation for the regression is

$$\ln(A_t) = c_1 B_1 + c_2 B_2 + r_1 B_1 t + r_2 B_2 t + u.$$

In this regression, binary variables are used for convenience in place of the traditional intercept. The first binary variable (B_1) equals unity for the years 1984 through 1987 and zero for 1988 through 2005. The second binary variable (B_2) equals zero for the initial years (1984 through 1987) and unity for the later years (1988 through 2005). Next, each year is assigned a value t for the period it represents. For 1984, t equals zero; for 2005, t equals 21. This time variable is not included separately in the

model; however, it is multiplied by each of the binary variables just described, and these interaction terms are included in the model. The coefficients c_1 and c_2 of the binary variables provide the estimated intercept for each of the periods, while the coefficients r_1 and r_2 of the interaction terms provide the estimated long-term growth rates for each model. (The final term, u, is the error term.) As expected, the difference of the coefficients of the binary variables is statistically significant, indicating that there was a change in reported values when the new question was introduced. However, the difference of the coefficients of the interaction terms is not statistically significant, as shown by an F test.[6] Therefore, the hypothesis that the question had no effect on the underlying trend is reasonable on the basis of the evidence.

With the regression results computed (see table A-1), the coefficients of the binary variables are used to calculate the adjustment factor. Note that the coefficient of the second binary variable provides an estimate of what the natural logarithm of reported expenditures would have been in 1984 had the weekly, rather than monthly, question been asked then. To find out the estimated value that actually would have been reported, this coefficient is exponentiated, yielding $212.42. Similarly, the coefficient of the first binary variable is exponentiated, yielding the estimated value ($282.01) for expenditures in 1984 in the absence of random variation that removed reported values from their underlying trend line. The ratio of these two values is about 1.3276; that is, the change in the question is estimated to have raised expenditures by about 32.8 percent. Therefore, this ratio is used as the adjustment factor for food purchased at grocery stores in 1984 and 1985. A similar analysis shows that the estimated factor for food purchased at other stores is about 1.6825. (See table A-2 for regression results.)

Once found, expenditures for each type of purchase are multiplied by their adjustment factor, and food at home expenditures in 1984–85 are computed from these adjusted values. To test the adjustment, the unadjusted change in average expenditures for food at home from 1987 to 1988 is compared with the adjusted value. As noted in the text, prior to adjustment, expenditures for food at home excluding food prepared on trips rise nearly 45 percent from 1987 to 1988. However, after the adjustment, the percent change is 5.9 percent, a value that is within the range (from –2.8 percent to 7.5 percent) for changes in observed (that is, preadjusted) values, even when observations from the most volatile period (1991 to 1993) are excluded. Perhaps more important, after adjustment, the components also demonstrate reasonable changes in the mean for those reporting from 1987 to 1988.[7] Given that this finding is reasonable, the adjustment factors are accepted. Finally, as noted in the text, other values, such as total food expenditures, total outlays, and "all other outlays" (that is, total outlays less food, shelter and utilities, and other items listed in table 2 in the text), are then computed from these adjusted values.

An alternative method to that just described is to exponentiate the intercepts as described, subtract the 1984–87 value from the 1988–2005 value, and add the resulting difference to each of the observations in the data set before computing results for food at home. Either method would result in the same mean for expenditures for food at home excluding food prepared on trips. However, in the alternative method, the variance of each component that would be computed prior to

Table A-1. Regression results for computing adjustment factors for expenditures for food purchased at grocery stores[1]

Variable	DF	Parameter estimate	Standard error	*t* value	Pr > |*t*|
Year 1984–87 (B_1)	1	5.35857	0.02370	226.06	<.0001
Time 1984–87 (B_1t)	1	0.01858	0.01267	1.47	0.1599
Year 1988–2005 (B_2)	1	5.64193	0.01742	323.87	<.0001
Time 1988–2005 (B_2t)	1	0.02360	0.00129	18.34	<.0001

Computation of factor: (exp(5.64193))/(exp(5.35857)) = 1.327583.

[1] Dependent variable: Natural logarithm of mean expenditures for food purchased at grocery stores.

Table A-2. Regression results for computing adjustment factors for expenditures for food purchased at other stores[1]

Variable	DF	Parameter estimate	Standard error	*t* value	Pr > |*t*|
Year 1984–87 (B_1)	1	4.19795	0.06290	66.74	<.0001
Time 1984–87 (B_1t)	1	–0.01903	0.03362	–0.57	0.5784
Year 1988–2005 (B_2)	1	4.71821	0.04622	102.07	<.0001
Time 1988–2005 (B_2t)	1	0.02188	0.00342	6.41	<.0001

Computation of factor: (exp(4.71821))/(exp(4.19795)) = 1.682465.

[1] Dependent variable: Natural logarithm of mean expenditures for food purchased at other stores.

the adjustment would be unchanged after the adjustment. The result would be a larger mean with the same standard error of the mean for each component, thus increasing the likelihood that differences over time for the aggregate expenditure (that is, food at home excluding food prepared on trips) would be statistically significant.

In contrast, using the percentage adjustment factor allows the variance of each component to increase in proportion to the increase in the mean of each component. That is, if the mean for food purchased at grocery stores rises by 37 percent, so will the standard error of the mean for that component. Similarly, adjusting separately each of the components of expenditures for food at home excluding food prepared on trips allows for a larger variance in the recomputed aggregate expenditure than performing the regression directly on mean expenditures for food at home excluding food prepared on trips. The reason is that some respondents report expenditures only for food at grocery stores, some report expenditures only for food at other stores, and some report both. Because the adjustment factors differ for each of the components, the percent increase in total expenditures for food at home excluding food prepared on trips will differ for each type of respondent, which in turn will increase the variance among respondents. As noted, the larger variance makes the analysis of change more conservative. That is, the threshold for finding a statistically significant difference is higher when the variance is higher, and therefore the analyst can be more confident in accepting the results. This conservative approach is especially important given that the data have undergone adjustments which are themselves based on estimates rather than reported values.

Box-Cox transformations. Expenditure data are not often normally distributed, a situation that can cause bias in regression results.[8] However, expenditure data can be transformed so that they are *approximately* normally distributed. One method that has been used is the Box-Cox transformation.[9] Perhaps the most frequently cited version is

$$Y^* = (Y^\lambda - 1)/\lambda, \qquad (1)$$

where Y^* is the transformed version of the variable, Y denotes expenditures for a specific good or service (for example, food at home or apparel), and λ is a parameter. This version of the equation is most useful in demonstrating two special cases for the value of λ:

1. If λ is equal to unity, then no transformation of the independent variable is necessary. (The net result is that Y^* equals $Y - 1$, and subtracting a constant from each observation of Y will not affect the distribution.)
2. If λ approaches zero, then Y^* is approximately equal to the natural logarithm of Y.

Although this specification is useful for deriving the value of Y^* when λ approaches zero, it does not yield an intuitive interpretation when λ takes on any other value.[10] However, in their original article, Box and Cox point out that equation (1) can be simplified to

$$Y^* = Y_\lambda.$$

This equation leads to a simple interpretation of both λ and the equation as a whole. In the current study, λ is found to be 1/4 for total outlays, indicating that the transformed variable is then simply the fourth root of Y. For income before taxes, λ is found to be 3/8, or the eighth root of the cubed income before taxes.[11]

The Box-Cox transformation is particularly useful in two special cases: when the results confirm that no transformation is required (that is, when λ, the transformation factor, equals unity) and when a logarithmic transformation is appropriate (that is, when λ equals zero). In these cases, the parameter estimates are intuitively interpretable. For example, if untransformed outlays are regressed on binary variables, the parameter estimates of those variables show how much more (or less) the group defined by the variable spends than a similar member of the control group. For example, if the coefficient of *rural* is 0.05, then rural residents spend 5 cents more, on average, than urban residents, *ceteris paribus*. If untransformed outlays are regressed on untransformed income, then the parameter estimate on income is equal to the marginal propensity to consume, which is the portion of each additional dollar that is expected to be allocated to total outlays, at least in the current study. (That is, if the parameter estimate of income is 0.05, then total outlays are predicted to increase 5 cents each time income increases by 1 dollar.) Similarly, if logarithmically transformed outlays are regressed on untransformed income and other variables, then the coefficient, if small, describes the percent change in outcome, given the group change. (As an example, if the coefficient of *rural* is 0.05, then those in a rural area spend 5 percent more than those in an urban area. If the coefficient of untransformed income is 0.05, then each dollar increase in income is predicted to lead to a 5-percent increase in total outlays.) Finally, if logarithmically transformed outlays are regressed on logarithmically transformed income, then the parameter estimate of income is an estimate of income elasticity—that is, the predicted percent change in total outlays, given a 1-percent change in income.

The obvious question raised is how the value of λ is found. Conventionally, this is done by trial and error. Several values for λ are used, and whichever yields the model with the lowest mean square error is the selected value. However, this method is extremely time consuming, especially because two variables (total outlays and predicted current income) are being transformed. In this study, λ is estimated through a maximum-likelihood procedure used by Stuart Scott and Daniel J. Rope in their 1993 study of Consumer Expenditure Survey data.[12]

Measuring statistical significance: types and computations of t*-statistics.* As noted in the text, a difference in two parameters, such as means, is considered to be statistically significant if it is not likely to be due to chance alone. A common statistic used

to measure the probability that a difference is due to chance alone (and thus is, or is not, statistically significant) is the t-*statistic*. When samples are large, a *t*-statistic greater than 1.96 in absolute value indicates that the probability that a difference in parameters is due to chance alone is less than 5 percent.

The formula for computing the *t*-statistic depends on what type of comparison is being performed. Perhaps the most common use of the *t*-statistic is for comparing means. In the text, for example, average annualized real total outlays are compared for young singles in two different periods. The samples are therefore independent and are assumed to have different variances. In this case, the formula for computing the *t*-statistic is

$$\frac{x_2 - x_1}{\sqrt{\mathrm{SE}_2^2 + \mathrm{SE}_1^2}},$$

where x_i is average annualized real total outlays in period i (1984–85 or 2004–05) and SE_i is the standard error of the mean in period i.

In table 4 in the text, average annualized real total outlays for all young singles is shown to be $23,866 in 1984–85 and $22,744 in 2004–05. The standard errors associated with these means are 663.03 and 531.85, respectively. Therefore, the *t*-statistic is computed to be

$$\frac{22,744 - 23,866}{\sqrt{531.85^2 + 663.03^2}} = -1.32.$$

Because the absolute value of the *t*-statistic (1.32) is less than the critical value (1.96), the probability that the difference in means (a decrease of $1,122) is due to sampling error or other random events is greater than 5 percent; therefore, the difference is not statistically significant at the 95-percent confidence level.

However, testing differences in means is not the only use for *t*-statistics: they also can be used to detect statistically significant differences in *proportions*. For example, table 3 in the text shows that, in 1984–85, 64 percent of all households with *at least* one young single person were households with *only* that young single person. (That is, 36 percent of these households included at least one other person, regardless of age or marital status.) In 2004–05, that proportion increased to 77 percent. The critical value to test whether these proportions reflect a change in the composition of households is still 1.96; however, the formula for computing the *t*-statistic changes to

$$\frac{p_1 - p_2}{\sqrt{p_3(1 - p_3)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}},$$

where p_1 is the proportion of households with exactly one young single person in 1984–85 (that is, 1,252/1,953); p_2 is the proportion of households with exactly one young single person in 2004–05 (that is, 1,401/1,811); p_3 is the "pooled" proportion (that is, [1,252 + 1,401]/[1,953 + 1,811]); n_1 is the sample size in 1984–85 (that is, 1,953); and n_2 is the sample size in 2004–05 (that is, 1,811). The outcome of this test is similar to that of a chi-square test; in fact, the *t*-statistic equals the square root of the chi-square statistic computed by means of a chi-square test.

In addition, there is a special formula for comparing differences in *shares* across groups. A special formula is needed for this type of comparison because the value being measured is a ratio of two other variables that not only have their own means and standard errors, but also are not independent of each other. For example, because food at home is a component of total outlays, the covariance of mean expenditures for food at home and total outlays is expected to be positive. That is, as expenditures for food at home rise, so do total outlays, assuming that all other outlays are held constant. Accordingly, in this case, before computing the *t*-statistic, it is necessary to compute the variance of the share for each year. The formula for the variance of the share in a particular year is[13]

$$V(S) = \left(\frac{1}{n}\right)\left[\frac{F^2}{T^4}V(T) - 2\left(\frac{F}{T^3}\right)\mathrm{cov}_{F,T} + \left(\frac{1}{T^2}\right)V(F)\right],$$

where n is the sample size (2,359 for 1984–85 and 2,158 for 2004–05); F is the average expenditure for food at home; T is the average of total outlays (including food at home); $V(i)$ is the sample variance of the expenditure or outlay; and $\mathrm{cov}_{F,T}$ is the covariance of food at home and total outlays.

Note that $V(i)$ is the variance of the observations in the sample, not the variance of the mean obtained from the sample. That is, $V(i)$ measures how the observations vary around the mean of the sample, rather than estimating how means of similarly sized samples drawn from the same population would vary around the population mean. In other words, $V(i)$ is the square of the sample standard deviation, and $V(i)/n$ is equal to $(\mathrm{SE}_i)^2$. Therefore, the previous formula can be rewritten as

$$V(S) = \left[\frac{F^2}{T^4}(\mathrm{SE}_T)^2 - 2\left(\frac{1}{n}\right)\left(\frac{F}{T^3}\right)\mathrm{cov}_{F,T} + \left(\frac{1}{T^2}\right)(\mathrm{SE}_F)^2\right].$$

For convenience, this equation simplifies to

$$V(S) = \left(\frac{1}{T^2}\right)\left[\left(\left(\frac{F}{T}\right)\mathrm{SE}_T\right)^2 - 2\left(\frac{1}{n}\right)\left(\frac{F}{T}\right)\mathrm{cov}_{F,T} + (\mathrm{SE}_F)^2\right],$$

where F/T is the value of the share (that is, the ratio of the averages) undergoing testing.

Because $V(S)$ equals the squared standard error of the share (and not the squared standard deviation of the share), the formula for the *t*-statistic is now

$$\frac{S_2 - S_1}{\sqrt{V(S_2) + V(S_1)}},$$

where $S_i = F_i/T_i$. Once again, the critical value in this case is 1.96.

Regression technique: omitted-variable bias and two-stage least squares. Income data in household surveys are subject to nonresponse. That is, a person may not know or may not report the value of a particular source of income received, even when the income is reported as having been received. Starting with the publication of the 2004 data, the CE has used multiple imputa-

tion to fill in missing values. However, prior to that time, other methods were used to adjust for nonresponse.[14] Starting with the publication of the 1972–73 survey results, consumer units were classified as either "complete" or "incomplete" reporters of income. In general, complete reporters provided a value for at least one major source of income, such as wages and salaries, self-employment, or Social Security. However, even complete income reporters did not always provide a full accounting of income from all sources.

Using income information just from complete income reporters is problematic. First, the fact that some of the respondents provide only partial information (for example, the respondent may report a value for wages and salaries, but may not know the value of interest income, which also is reported as having been

Table A-3. First-stage parameter estimates: finding transformed predicted income before taxes

Variable	Degrees of freedom	Estimate	Standard error	*t*-value	Pr > |*t*|
Intercept	1	44.83685	0.69138	64.85	<.0001
Age (21 to 24 years):					
25 to 29 years	1	4.07534	.42637	9.56	<.0001
Educational attainment (attended college):					
High school diploma or less	1	–.38170	.55591	–.69	.4924
College graduate	1	2.25042	.50513	4.46	<.0001
College enrollment status (not enrolled):					
Full time and working	1	–6.78360	.61463	–11.04	<.0001
Part time and working	1	–.89302	.72419	–1.23	.2176
Not working	1	–20.27647	1.32363	–15.32	<.0001
Female	1	–3.07555	.40355	–7.62	<.0001
Race and ethnicity (White, not Hispanic):					
Black, not Hispanic	1	–.51585	.74119	–.70	.4865
Hispanic	1	–2.85858	1.03030	–2.77	.0056
Working status (full time, full year):					
Part time, full year	1	–8.81356	.75273	–11.71	<.0001
Full time, part year	1	–8.72973	.52654	–16.58	<.0001
Part time, part year	1	–14.43290	.72592	–19.88	<.0001
Occupational status (wage or salary worker, technical or sales position):					
Self-employed	1	–.11224	1.18164	–.09	.9243
Working for wage or salary:					
Manager or professional	1	.76609	.50680	1.51	.1307
Service worker	1	–1.53400	.62622	– 2.45	.0144
Construction worker	1	–.20153	.85395	–.24	.8134
Operator or laborer	1	–1.49054	.69148	–2.16	.0312
Not working, not a student	1	–23.74494	1.89464	–12.53	<.0001
Housing tenure (renter):					
Homeowner	1	3.68873	.73446	5.02	<.0001
Region of residence (West):					
Northeast	1	.11371	.61719	.18	.8538
Midwest	1	–1.32749	.52756	–2.52	.0119
South	1	1.08596	.50654	2.14	.0321
Degree of urbanization (urban):					
Rural	1	–3.09185	.96167	–3.22	.0013
Income sources received:					
Interest, dividends, rental or other property income	1	3.14055	.41046	7.65	<.0001
Unemployment and workers' compensation, veterans' benefits	1	11.50882	3.13601	3.67	.0002
Public assistance, supplemental security income, food stamps	1	–8.16817	3.07402	–2.66	.0079

Table A-3. Continued—First-stage parameter estimates: finding transformed predicted income before taxes

Variable	Degrees of freedom	Estimate	Standard error	*t*-value	Pr > |*t*|
Regular contributions of support	1	3.32100	.73093	4.54	<.0001
Other income	1	5.13518	1.01332	5.07	<.0001
Interviewed in 2004–05	1	1.13994	1.04037	1.10	.2733
Interaction terms (main effect × interviewed in 2004–05):					
Age, 2004–05 (21 to 24 years)					
25 to 29 years	1	–.19642	.67560	–.29	.7713
Educational attainment, 2004–05 (attended college):					
High school diploma or less	1	–2.73833	.91664	–2.99	.0028
College graduate	1	–.12090	.79648	–.15	.8794
College enrollment status, 2004–05 (not enrolled):					
Full time and working	1	–.90283	.93243	–.97	.3330
Part time and working	1	–.32735	1.10748	–.30	.7676
Not working	1	–6.69818	1.85069	–3.62	.0003
Female, interviewed in 2004–05	1	1.35791	.63030	2.15	.0313
Race and ethnicity, 2004–05 (White, not Hispanic):					
Black, not Hispanic	1	–.93589	1.09759	–.85	.3939
Hispanic	1	.78776	1.33284	.59	.5545
Working status, 2004–05 (full time, full year):					
Part time, full year	1	–.02673	1.14194	–.02	.9813
Full time, part year	1	1.21578	.86423	1.41	.1596
Part time, part year	1	.33444	1.08504	.31	.7579
Occupational status, 2004–05 (wage or salary worker, technical or sales position):					
Self-employed	1	–4.30790	2.81172	–1.53	.1256
Working for wage or salary:					
Manager or professional	1	.58195	.82064	.71	.4783
Service worker	1	–1.73644	.97061	–1.79	.0737
Construction worker	1	–.65803	1.39112	–.47	.6362
Operator or laborer	1	.25725	1.05960	.24	.8082
Not working, not a student	1	4.15742	2.89671	1.44	.1513
Housing tenure, 2004–05 (renter):					
Homeowner	1	.17637	.98356	.18	.8577
Region of residence, 2004–05 (West):					
Northeast	1	2.77112	.97875	2.83	.0047
Midwest	1	.53115	.79069	.67	.5018
South	1	–1.63887	.79176	–2.07	.0385
Degree of urbanization, 2004–05 (urban):					
Rural	1	–1.13222	1.60083	–.71	.4794
Income sources received, 2004–05:					
Interest, dividends, rental or other property income	1	–.94547	.71348	–1.33	.1852
Unemployment and workers' compensation, veterans' benefits	1	–8.36648	3.51013	–2.38	.0172
Public assistance, supplemental security income, food stamps	1	4.23402	3.53861	1.20	.2316
Regular contributions of support	1	–.05836	1.05079	–.06	.9557
Other income	1	–2.56298	1.39317	–1.84	.0659

Table A-4. Second-stage parameter estimates: finding transformed predicted annualized total outlays

Variable	Degrees of freedom	Estimate	Standard error	*t*-value	Pr > |*t*|
Intercept	1	8.03039	0.67458	11.90	<.0001
Age (21 to 24 years):					
25 to 29 years	1	–.05596	.09249	–.61	.5452
Educational attainment (attended college):					
High school diploma or less	1	–.15892	.09373	–1.70	.0901
College graduate	1	.17416	.09081	1.92	.0552
College enrollment status (not enrolled):					
Full time and working	1	.02253	.13350	.17	.8660
Part time and working	1	.07269	.12338	.59	.5558
Not working	1	.55379	.32756	1.69	.0910
Female	1	–.08919	.08189	–1.09	.2762
Race and ethnicity (white, not Hispanic):					
Black, not Hispanic	1	–.04084	.12436	–.33	.7427
Hispanic	1	–.47492	.18687	–2.54	.0111
Working status, (full time, full year):					
Part time, full year	1	.19196	.18302	1.05	.2943
Full time, part year	1	.13654	.14258	.96	.3383
Part time, part year	1	.08636	.22704	.38	.7037
Occupational status (wage or salary worker, technical or sales position):					
Self-employed	1	.23083	.19580	1.18	.2385
Working for wage or salary:					
Manager or professional	1	.19952	.08676	2.30	.0215
Service worker	1	–.22049	.10636	–2.07	.0382
Construction worker	1	–.23205	.14730	–1.58	.1153
Operator or laborer	1	–.38350	.11559	–3.32	.0009
Not working, not a student	1	–.21648	.42960	–.50	.6144
Housing tenure (renter):					
Homeowner	1	.23613	.13128	1.80	.0721
Region of residence (West):					
Northeast	1	–.02154	.09927	–.22	.8282
Midwest	1	–.24903	.09034	–2.76	.0059
South	1	–.10234	.08784	–1.17	.2441
Degree of urbanization (urban):					
Rural	1	–.11064	.16816	–.66	.5106
Vehicles owned:					
Cars and trucks	1	.57731	.05330	10.83	<.0001
Other vehicles	1	.35879	.04844	7.41	<.0001
Predicted real income, transformed	1	.08654	.01415	6.12	<.0001
Interviewed in 2004–05	1	–.72480	1.17356	–.62	.5369
Interaction terms (main effect interviewed in 2004–05):					
Age, 2004–05 (21 to 24 years):					
25 to 29 years	1	.24306	.14090	1.73	.0846
Educational attainment, 2004–05 (attended college):					
High school diploma or less	1	.23101	.15896	1.45	.1462
College graduate	1	.20538	.13662	1.50	.1328

Table A-4. Continued—Second-stage parameter estimates: finding transformed predicted annualized total outlays

Variable	Degrees of freedom	Estimate	Standard error	*t*-value	Pr > |*t*|
College enrollment status, 2004–05 (not enrolled):					
Full time, and working	1	.37666	.22153	1.70	.0891
Part time, and working	1	.41639	.18367	2.27	.0234
Not working	1	1.06220	.63370	1.68	.0938
Female, interviewed in 2004–05	1	.10382	.11524	.90	.3677
Race and ethnicity, 2004–05 (White, not Hispanic):					
Black, not Hispanic	1	.11724	.17705	.66	.5079
Hispanic	1	.35454	.23336	1.52	.1288
Working status, 2004–05 (full time, full year):					
Part time, full year	1	.01636	.28468	.06	.9542
Full time, part year	1	.15451	.22681	.68	.4958
Part time, part year	1	.38287	.37219	1.03	.3037
Occupational status, 2004–05 (wage or salary worker, technical or sales position):					
Self-employed	1	.04207	.32763	.13	.8978
Working for wage or salary:					
Manager or professional	1	–.25852	.13482	–1.92	.0552
Service worker	1	.25946	.16759	1.55	.1216
Construction worker	1	.00431	.22150	.02	.9845
Operator or laborer	1	.04722	.17196	.27	.7836
Not working, not a student	1	–.11896	.65656	–.18	.8562
Housing tenure, 2004–05 (renter):					
Homeowner	1	–.12362	.18322	-.67	.4999
Region of residence, 2004–05 (West):					
Northeast	1	–.43526	.15845	–2.75	.0060
Midwest	1	–.09593	.12878	–.74	.4564
South	1	–.14080	.12736	–1.11	.2690
Degree of urbanization, 2004–05 (urban):					
Rural	1	–.33694	.26937	–1.25	.2110
Vehicles owned, 2004–05:					
Cars and trucks	1	–.12515	.07936	–1.58	.1149
Other vehicles	1	.23272	.07823	2.97	.0029
Predicted real income, transformed, 2004–05	1	.00825	.02477	.33	.7392

received) introduces measurement error into the regression. Even if the sample is reduced just to respondents who reported values for each source of income that they reported as having been received (call them "nonmissing" income reporters for the purposes of this discussion), mean income and parameter estimates obtained from this sample are biased, unless the reduced sample is a random subset of the population.[15] Unfortunately, the assumption that the reduced sample is drawn randomly from the population is not realistic either generally or for young single adults, the group under study in this article. For example, in 2004–05, 31 percent of all young singles in the sample were missing values for at least one source of income, but only 28 percent of single men were, compared with 35 percent of single women.[16]

In most of the analysis presented in this text, total outlays are used as a proxy for permanent income. However, in this section, the purpose is to estimate total outlays while controlling for demographic differences, so that demographic subgroups can be compared. Clearly, current income (measured in the CE by income before taxes) is expected to be an important predictor of permanent income. Therefore, leaving it out of the right-hand side of the regression equation would cause omitted-variable bias. Yet, as noted, including an estimate of current income that is subject to nonresponse also will cause bias in regression parameters. The parameter estimate for income will be biased upward[17] and, especially given that income is correlated with other right-hand-side variables, may bias their parameter estimates in ways that are undeterminable a priori. Consequently, to solve this problem, a two-stage least squares procedure is performed. In the first stage, a regression is run using Box-Cox transformed observations only from nonmissing income reporters who re-

port no losses for income from any source.[18] The parameter estimates from this regression are then used to predict transformed current income for all young single adults, whether or not they reported a value. This predicted value is then utilized as an instrumental variable in the second stage of the regression. That is, total outlays are regressed on predicted current income and other characteristics in order to ascertain whether there is evidence to suggest that subgroups of young single adults have experienced an increase or a decrease in economic well-being as measured through predicted permanent income.

Most of the independent variables used to predict current income are the same as those used to predict total outlays. However, some variables are excluded from this model, while others are included. The numbers of automobiles and other vehicles are excluded from the income model because their importance in predicting income is not apparent a priori. Instead, added to the model are several variables describing the type of income received, such as income from investment sources (interest, dividends, rental income, other property income, or pensions and annuities). Most of these categories are taken from those published in standard CE tables, but there are some modifications. The category "Social Security, private and government retirement" is not included in the table. Instead, its components are moved to other categories. Social Security, for example, is moved to "public assistance, supplemental security income, and food stamps" because young adults are not eligible for Social Security, except in cases of disability or survivors' benefits. The component for pensions and annuities is included with interest, dividends, and rental and other property income to form "investment income," because it is likely that anyone in this age group who correctly reports having received that type of income is receiving income from investment in an annuity, rather than pension income. Finally, these categories include only money income, so meals and rent as pay are excluded from "other" income.

Table A-3 shows the regression results utilized to predict current income, which is the variable used in the second stage of the two-stage least squares procedure. Table A-4 shows the results of the second-stage analysis, in which real total outlays are predicted.

Notes to the appendix

[1] In general, the Consumer Expenditure Survey (CE) collects information on expenditures made, but not on amounts or quantities purchased. For example, a person may report having spent $20 for movie tickets in the past 3 months, but data on whether that person went to the movies twice and spent $10 each time or went 10 times to a discount movie theater are not collected.

[2] Note that similar comparisons can be made even when neither period of interest is the base year for the index. For example, suppose that the analyst wants to compare expenditures that took place before the base year with those in the second period. Suppose also that the price index for the pre-base-year period in question is 80.0 and the expenditures for that period are $3. To convert these expenditures to second-period values, the analyst once again multiplies the expenditures from the pre-base-year period by the ratio of the second-period index to the index for the pre-base-year period (that is, [400.0/80.0] × $3 = $15). The result shows that real expenditures in the pre-base-year period are less than the value of expenditures reported in the second period. Therefore, the purchaser must have purchased more pounds of apples in the second period than in the pre-base-year period, even though the price of apples has increased.

[3] These comments pertain to the Laspeyres index, upon which the Consumer Price Index (CPI) is based. (See BLS *Handbook of Methods* (Bureau of Labor Statistics, June 2007), Chapter 17, "The Consumer Price Index," especially p. 3, on the Internet at **www.bls.gov/opub/hom/pdf/homch17.pdf** (visited Mar. 25, 2008).) Although other price indexes exist that attempt to adjust for these kinds of substitutions, a complete discussion is beyond the scope of this article.

[4] The food-at-home figure is computed by comparing the value in the final year of interest with the value in the first year of interest and computing the percentage by which expenditures would have to increase each year to reach the value in the final year. The formula is described subsequently in this section of the appendix.

[5] For all consumer units, average annual expenditures reported in the Diary Survey for food at home excluding food prepared by the consumer unit on out-of-town trips increased by 1.8 percent from 1987 to 1988; at the same time, these expenditures increased by 16.2 percent according to results from the Interview Survey.

[6] F statistic = 0.16; p-value = 0.6977.

[7] The adjusted mean for grocery store expenditures rises a modest 3.4 percent during this period. The mean for expenditures at other stores rises 21.1 percent from 1987 to 1988 after adjustment, but this percent change is not out of line with figures for other years. The largest percent change, from 1995 to 1996, is 28.0 percent.

[8] Stuart Scott and Daniel J. Rope, "Distributions and Transformations for Family Expenditures," *Proceedings of the Section on Social Statistics* (Alexandria, VA, American Statistical Association, 1993), pp. 741–46.

[9] George E. P. Box and David R. Cox, "An Analysis of Transformations," *Journal of the Royal Statistical Society,* Series B, 1964, pp. 211–43, especially p. 214.

[10] Even if λ is identical to unity, it is hard to imagine why Y would be transformed to $Y - 1$.

[11] This is the same value that Paulin and Sweet found for wage and salary income, also using the Scott and Rope technique. (See Geoffrey D. Paulin and Elizabeth M. Sweet, "Modeling Income in the U.S. Consumer Expenditure Survey," *Journal of Official Statistics*, December 1996, pp. 403–19, especially p. 410.)

[12] Scott and Rope, "Distributions and Transformations."

[13] Adapted from SAS online manual, Chapter 10, "The MIANALYZE Procedure," p. 216, on the Internet at **support.sas.com/rnd/app/papers/mianalyzev802.pdf** (visited Nov. 6, 2007); and J. L. Schafer, *Analysis of Incomplete Multivariate Data* (London, Chapman & Hall, 1997), p. 196.

[14] For a brief description of methods used prior to 1972–73, see Geoffrey D. Paulin and David L. Ferraro, "Imputing income in the Consumer Expenditure Survey," *Monthly Labor Review*, December 1994, pp. 23–31, especially pp. 23–24; on the Internet at **www.bls.gov/opub/mlr/1994/12/art3full.pdf**.

[15] *Ibid*.; page 31 gives an example of how nonrandom nonresponse affects the mean for income.

[16] Interestingly, in 1984–85, there was greater similarity in reporting: 13 percent of young singles (12 percent of men and 15 percent of women) were missing at least one income value. Nonetheless, the p-value for the chi-square statistic of the (unweighted) sample is 0.065, indicating that the results are statistically significant at the 10-percent level.

[17] This claim is based on the assumption that most missing income is positive; therefore, total outlays for a consumer unit with missing income will correspond to a smaller income than the consumer unit actually receives. For some sources, such as self-employment or rental income, it is possible to report a loss. If the amount is missing, however, then the reported income associated with total outlays will be larger than the income the consumer unit actually received. However, losses are reported infrequently, so the assumption that missing incomes are positive is expected to hold in most cases.

[18] Losses can occur for self-employment and property sources of income. However, the Box-Cox transformation does not accept losses in those cases, because the value for λ (3/8) is an even number. The even root (for example, the square root, or the eighth root elevated to the third power in this case) does not exist for negative numbers. Although, for total income before taxes, losses of components of income can be offset by other values (for instance, a $500 loss is offset by a $2,000 wage or salary), income losses even in these cases are infrequent, will serve mainly to increase the variance of predicted income, and may bias the parameters used to predict income. Because the purpose of the regression is to obtain reasonable predicted values for use in the second stage, rather than to provide precise measures of relationships between outlays and actual income, it is reasonable to use the most typical cases (that is, those without losses) as observations for the first-stage regression.