

Strengths and Weaknesses of the Consumer Expenditure Survey from a BLS Perspective

Thesia I. Garner
Robert McClelland
William Passero

Bureau of Labor Statistics
U.S. Department of Labor
Washington, DC

*National Bureau of Economic Research, Summer Institute 2009
Conference on Research on Income and Wealth*

joint with

Aggregate Implications of Microeconomic Consumption Behavior Workshop

July 13, 2009

Cambridge, MA

ACKNOWLEDGMENTS

Thanks are extended to William Hawk and Aylin Kumcu for research assistance in preparing this document, and to Karen Goldenberg, Steve Henderson, Michael Horrigan, John Rogers, and Jay Ryan for comments on an earlier draft. All views expressed in this article are those of the authors and do not necessarily reflect the policies of the U.S. Bureau of Labor Statistics or the views of other staff members. The authors take full responsibility for any errors.

July10, 2009

I. Introduction

From the start of the ongoing Consumer Expenditure Survey (CE) in 1980, expenditure estimates from CE data have been compared regularly with corresponding expenditure estimates from other data sources to evaluate both the soundness of the CE estimates at any point in time and the consistency of the estimates over time. In 1987, Raymond Gieseman, the first economist at the Bureau of Labor Statistics (the Bureau, BLS) to conduct this work using the continuing survey data, anticipated that these comparisons would provide "...a sense of degree and direction of possible survey errors, rather than an exact measure of bias, because the specific estimates from other sources are not necessarily the 'true' values."¹ In conjunction with other evaluation tools, data comparisons are employed to assess the cumulative effects of non-sampling errors on the quality of data obtained from the CE and to develop methodological studies to improve that quality.²

Comparisons of CE and Personal Consumption Expenditure (PCE) data have been conducted by researchers both inside and outside the Bureau.³ Research over the last 20 years has used the CE and the PCE to assess economic growth and other economic trends.⁴ Other

¹ Raymond Gieseman, "The Consumer Expenditure Survey: quality control by comparative analysis," *Monthly Labor Review*, March 1987, pp. 8-14, quote from p. 9.

² The CE survey consists of two components: a weekly Diary Survey and a Quarterly Interview Survey. Simply put, in the former, respondents fill out two consecutive 1-week expenditure diaries. In the latter, respondents report expenditures via personal interview every three months. Each CE component is described more fully later in this article. Early methodological work has included the use of a supplementary Diary administered to respondents and interviewers to measure attitudes and behaviors associated with keeping the Diary, and the use of different formats for the Diary instrument. More recent work includes the testing of computer-assisted personal interviewing (CAPI) for the collection of Interview data. Findings of this latter study led to the use of a CAPI instrument to collect data in the Interview since April 1, 2003.

³ One of the earliest comparisons by outside researchers was conducted by Henrik S. Houthakker and Lester D. Taylor, and was published as *Consumer Demand in the United States: Analyses and Projections*, 2d ed. (Cambridge, MA, Harvard University Press, 1970). In this work, the authors compared 1960-61 CE data with PCE aggregate expenditures. (See also Slesnick, "Aggregate Consumption and Saving," who cites Houthakker and Taylor.)

⁴ For example, Attanasio and Weber, "Is Consumption Growth Consistent," and Jonathan A. Parker and Bruce Preston, "Precautionary Saving and Consumption Fluctuations," *American Economic Review*, September 2005, pp. 1119-1143, use CE data to focus on consumption growth; Barry Bosworth, Gary Burtless, and John Sabelhaus, "The Decline in Saving: Evidence from Household Surveys," *Brookings Papers on Economic Activity*, vol. 1991, no. 1

research has focused on the quality of CE data, compared with PCE data, as the former affects the CPI.⁵ But other datasets such as the American Community Survey (ACS), Current Population Survey (CPS), Health and Retirement Survey Consumption and Activities Mail Survey (HRS-CAMS), Panel Study of Income Dynamics (PSID), and Survey of Income and Program Participation (SIPP) have also been compared to the CE.

As part of an ongoing review of various programs, the BLS recently evaluated the CE program. While the review included many strengths of the CE program such as its dedication to ongoing research on challenges in the CE, and its outreach to customers, it also described some weaknesses. For example, although the CE Interview is designed to collect data using personal interviews, there has been an increasing reliance on telephone interviews to collect data with no guidelines for proper telephone interviewing established (McGrath, 2005; Safir and Goldenberg, 2008). In addition, in spite of analyses such as Dahlhamer et. al. (2003), which showed that the non-response rates for some important items were comparable or below those of other surveys, the assessment concluded that certain expenditure estimates are subject to bias caused by under-reporting in the form of item non-response.

The purpose of this article is to highlight some of the strengths and weaknesses of the CE data found in the internal BLS review of the CE Program and in recent research in which the data

(1991), pp. 183-241, examine CE and PCE data with regard to the decline in savings in the United States; and Jesús Fernandez-Villaverde and Dirk Krueger, "Consumption over the Life Cycle: Facts from Consumer Expenditure Survey Data," unpublished manuscript, University of Pennsylvania and University of Frankfurt, 2004, use CE data to examine consumption over the life cycle of consumer units using the reference person's age to identify cohorts.

⁵ For example, see Jack E. Triplett, "Measuring Consumption: The Post-1973 Slowdown and the Research Issues," *Federal Reserve Bank of St. Louis Review*, May-June 1997, pp. 9-42; Dennis Fixler and Ted Jaditz, "An Examination of the Difference Between the CPI and the PCE Deflator," Working Paper 361 (Bureau of Labor Statistics, 2002); David S. Johnson and John Greenlees, "Comparison of Movements in the CPI and PCE Price Indexes," paper presented to the Federal Economic Statistics Advisory Committee (FESAC) (Bureau of Labor Statistics, March 21, 2003); David E. Lebow and Jeremy B. Rudd, "Measurement Error in the Consumer Price Index: Where Do We Stand?" *Journal of Economic Literature*, March 2003, pp. 159-201; and Charles L. Schultze and Christopher Mackie, eds., *At What Price? Conceptualizing and Measuring Cost-of-Living and Price Indexes*,

have been used. In addition, it offers an update of the comparison of CE and the PCE found in Garner et al. (2006), with a discussion of differences between PCE and CE estimates and possible reasons for them.

II. Internal Review of the Consumer Expenditure Survey

As part of its ongoing attempts to maintain high standards of data quality, the BLS reviews the programs responsible for producing data. These reviews use subject matter experts from other programs in the BLS to examine issues such as finance, data collection and accessibility of the data. While the reviews describe the strengths of the program they also discuss some of the weaknesses and provide recommendations for improvement.

In November 2008 a two-year review of the Division of Consumer Expenditure Surveys was completed. A number of strengths were identified, including the production of public use data and associated workshops focused on CE data collection and data analysis, the production and planning tools used by the CE Division, the Division's customer service and the quality of the division's self-assessment.

Since the collection of the 1972-73 CE data, public use data have been made available to the public. These data have been used extensively by researchers outside the BLS. Examples of recent research using the CE public use data include work by Attanasio et al. (2006, 2007), Blisard and Stewart (2007), Charles et al. (2007), Hurd and Rohwedder (200?), Malloy et al. (2008), Meyer et al. (2009), Meyer and Sullivan (2008, 2009), Parker and Preston (2005), Parker and Vissing-Jorgensen (2009), Stewart et al. (2004). In addition, beginning in 2006 CE User Workshops have been held each summer at the BLS for both new and experienced users of the CE data. These workshops include presentations of the latest in CE data collection methods,

Panel on Conceptual, Measurement, and Other Statistical Issues in Developing Cost-of-Living Indexes (Washington,

processing and advances in research conducted with the data; the workshops are advertised widely and are free to attend. The workshops are not only venues to present research; they are also intended to provide support to novice users on issues such as top-coding and creating usable data sets from the CE files. More sophisticated topics such as using weights for estimation, and using multiply imputed variables are also covered.

The production and planning tools used by the CE Division include a project oversight team that has developed best practices and in-house training; a database housing all development, research and production project plans; and a web-based interface for project management and reporting. The web based reporting tool includes a summary report of all projects showing their status, end dates, and links to the project plans. The division uses innovative methods for tracking multiple production processes, such as a database to track testing progress and another database to track questionnaire revisions. During the final review, BLS management recommended that several of the underlying concepts and processes developed and used by the CE Division should be applied to other BLS programs.

As part of the division's self-assessment, staff members communicate with users of CE data. For example, staff members regularly meet with staff from the CPI division. These meetings are of particular importance because the expenditure weights from the CE are essential for the CPI. The user workshops also provide an important avenue of communication between the CE program and users of the data.

In addition, the CE division strives to improve data quality through focus groups with CE field interviewers. For example, as a result of focus group sessions, the division incorporated references to new payment systems, such as e-dollars and gift cards into the surveys.

DC, National Academy Press, 2002). Triplett also examined the relationship between the PCE deflator and the CPI.

The division has conducted research on important topics including declining response rates, under-reporting, and the increase in phone interviews versus in-person interviews (see Safir and Goldenberg, 2008). The problem of under-reporting has been carefully analyzed in papers such as Dahlhamer et al. (2003), Shields and To (2005), and Garner et al. (2006).

In spite of these strengths, the program review also identified a well known weakness: there is evidence that some CE expenditure estimates are biased due to item non-response and measurement error. Even though Dahlhamer et. al. (2003) suggests that for several important variables response rates in the CE compare well with those of other surveys, other items may suffer from more serious non-response problems.

Further, bias may be caused by more than simple item non-response. “Conditioned underreporting” would also create biases. This type of underreporting occurs when respondents falsely respond “no” to screening questions about a general category in order to speed up the interview. Shields and To (2005) examines this question and finds weak evidence that this is occurring in the Quarterly Interview Survey. Research by Tucker, Meekins, and others suggests that latent class analysis may be useful in exploring this type of underreporting. Safir and Goldenberg (2008) also reported that there is evidence of mode effect measurement error (specifically, fewer “yes” responses to “embedded screener” questions on the phone; and if the screener response is “no,” the whole question series gets skipped).

III. Comparisons of the CE Data to Data from Other Sources

A number of studies have provided evidence of comparable data from the CE surveys and other household surveys, while others suggest substantial differences between CE aggregates and Personal Consumption Expenditures (PCE). Yet in some comparisons, such as CE health care

expenditures and data from the National Health Expenditures Accounts (NHEA) and food expenditures from the Economic Research Service (ERS), the differences are smaller.

Household survey data have their strengths and weaknesses as do national account compilations of expenditures aggregates. An advantage of household survey data is that they are collected from individuals who make expenditures for themselves or on behalf of others in their families, households, or consumer units.⁶ These data are collected using computer-assisted personal interviews, face-to-face and by telephone, and record-keeping diaries. Representative samples of individuals, families or consumer units participate in the surveys. This same strength is also a weakness in that data are collected from samples and thus are subject to sampling errors. When surveys are used, non-response and underreporting are cited as sources of bias in survey estimates. In addition, non-sampling errors too can be introduced in processing the data for final use.

A strength of compilations of expenditure aggregates, like the PCE and NHEA, is that they provides estimates of aggregate expenditures for commodities purchased for consumption by and on behalf of households. The PCE provides the most extensive list of commodities while the NHEA focuses on health care only. A weakness of such aggregates is that they are subject to (1) measurement errors in the censuses and sampling and non-sampling errors in surveys upon which the compilations are based and (2) judgment errors by the staff members in the estimation and allocation of production or output to the personal sector and other sectors in constructing the national accountings.

⁶ A consumer unit comprises (1) all members of a particular household who are related by blood, marriage, adoption, or some other legal arrangement; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their income to make joint expenditure decisions. Financial independence is determined by the three major expense categories: housing, food, and other living

Typically, expenditures from the CE are compared with expenditures gathered from alternative household surveys such as the HRS-CAMS or the PSID. Comparing total expenditures and its component expenditures from one survey with those from another may provide only weak evidence that a problem exists. As noted by Meyer, Mok, and Sullivan (2009) in their comparison of data from the CE Interview Survey, CPS, PSID, and SIPP, even if the responses from different surveys are approximately equal then any bias in one dataset may exist in the other as well. Differences in CE aggregates and PCE aggregates have been traced to differences in population, the definitions of expenditures, as well as to sources of the underlying data (Garner et al., 2006; Meyer and Sullivan, 2009). In addition, PCE numbers "...are the product of a great deal of estimation and imputation that is subject to error" (Meyer and Sullivan, 2009, p. 13).

A. Health and Retirement Study

The Health and Retirement Study (HRS) is a longitudinal survey of respondents 51 years of age or older in the initial wave, and their households. Because it is more of a general purpose survey, it contains far less detail about household expenditures than is contained in the CE. In 2001 the Consumption and Activities Mail Survey (CAMS) was mailed to 5,000 households that participated in the year 2000 wave of the HRS. In October 2003 a second, modified, wave was mailed, with subsequent mailings in 2005 and 2007. The survey contains much less detail than is available in the CE. While the reduction in detail was meant to decrease respondent burden, it may lead to an underestimate of expenditures.

Hurd and Rohwedder (April 2008) examine HRS-CAMS in detail, and compare expenditures from the mail collection of these data to expenditures collected using the CE Diary

expenses. To be considered financially independent, at least two of the three major expense categories have to be

and Interview Surveys. Aggregate expenditures for various expenditure categories, collected in both the CE and HRS-CAMS, are approximately the same. However, in the HRS the implied savings rate calculated by subtracting expenditures from after-tax income is substantially higher than the savings rate calculated from the change in assets. The savings rate calculated from the difference between after-tax income and expenditures is higher than either savings rate calculated from the HRS. This suggests that either expenditures are too low in the CE or after-tax income in the CE is too high. In a subsequent study, Hurd and Rohwedder (November 2008) examined the impact of recall periods on the level of expenditures; as a result of this study they recommended a change in question wording for expenditures in the HRS-CAMS.

B. Population Study of Income Dynamics

The Panel Study of Income Dynamics (PSID) began in 1968 with approximately 5,000 families, including a low-income over-sample. Members of the families have been followed since that time; by 1997 the sample had grown to 10,000. Due to budget cuts the sample was trimmed to 6,500 families. When weighted, the sample is representative of the U.S. population. Since 1997 the sample has been interviewed biannually with 97 percent of the families interviewed by phone and the remaining in person. Since inception, the PSID has included expenditures questions. However, before 1999, questions were limited to a few expenditure types such as food, housing, and child care. In 1999, additional questions were added including those for health care, education and transportation. The full set of expenditure questions were asked also in 2001 and 2003.

In a study of consumption and intergenerational transmissions of well-being, Charles et al. (2007) examined PSID expenditures relative to CE Interview Survey expenditures. They

provided entirely or in part by the respondent.

compared expenditures for CE-PSID comparable commodity groups for the years 1999, 2001, and 2003. These researchers found that for all categories, PSID and CE spending aligned fairly closely. For 2001, total housing aligned exactly. Total food was 8 percent higher in the PSID than from the CE Interview (a wording change for the food away from home question in the CE Interview in 2007 quarter two should eliminate this difference). Total transportation spending in PSID was 6 percent lower than in the CE. Food, housing and transportation accounted for 86 percent of spending in the PSID. In 2003, PSID total spending was 1 percent higher than CE total spending for comparable categories. PSID spending was 10 percent higher than CE Interview spending for food, 13 percent higher for education, 26 percent higher for child care, and 14 percent higher for health care. CE Interview spending was 3 percent higher than PSID for housing and 7 percent higher for transportation.

C. Medical Expenditure Panel Survey (MEPS) and National Health Expenditures Accounts (NHEA)

The MEPS is a household-based survey that contains individual and household level data. The survey began in 1996 to collect data on health care expenditures and use, health insurance coverage, and a wide range of other health-related socioeconomic characteristics. Like the CE, the MEPS data are using an over-lapping panel design, introducing new households into the survey sample each year. Data are collected from individuals with additional verification from providers in select cases, for example, for physicians' services. In a current study, Foster (2009 forthcoming) compares the MEPS data to CE data for 1996 to 2006. Also in this study, she compares the CE data to the National Health Expenditures Accounts (NHEA). Foster notes differences in the CE, MEPS, and NHEA regarding scope and methods for the three data sources. Foster reports CE to MEPS ratios for total health care spending ranged from 0.68 to

0.93 over the time period with the highest ratios for hospital care and the lowest for prescription drugs. CE to NHEA ratios ranged from 0.72 to 0.86, with the highest ratios for prescription drugs and the lowest for physicians' services.

D. ACNielsen (ACN) Homescan Survey

The ACN Homescan Survey recruits about 55,000 households based on targeted demographics and geographic variables. Households stay in the quota sample for essentially as long as they would like. When a household drops out of the sample, a demographically similar household replaces the drop-out. The Homescan survey is conducted to collect information for marketing purposes. The majority of the data is for grocery store types items including those for food at home purchases. ACN Homescan sample survey household members are to scan barcodes on all purchased goods. When a barcode is not available, members use a book with ACN-created barcodes. Items without barcodes on packaging include items such as fresh produce, meats and deli items.

Duly et al. (2003) compared CE Diary Survey data to ACN Homescan data from 2000. The purpose of the study was to determine whether the Homescan data could be used in the place of the CE Diary or in conjunction with CE Diary data. The basic conclusion was that the Homescan survey does not collect adequate types or levels of expenditures for use by the BLS. Only 45 percent of CE Diary items were covered by the Homescan survey. The percentage of Diary food at home items covered by the Homescan data was 83 percent. The major categories best covered by the Homescan data, in terms of the number of detailed categories that could be mapped to the CE Diary variables were: food at home, alcoholic beverages at home, laundry and cleaning supplies, nonprescription drugs and vitamins, and personal care produces. Total expenditures (the sum of all expenditures reported by both surveys) from the Homescan data

were 57 percent of CE Diary expenditures. Homescan food at home expenditures were two-thirds those of CE expenditures. Homescan alcohol and tobacco expenditures were half those of CE Diary expenditures.

E. Income and Transfer Comparisons

While it is typically expenditure data from the CE survey that are compared with similar measures from other sources, income data from the CE survey have also been compared with income data from other sources. For example, Meyer and Sullivan (2007) compare the income of families headed by a single mother estimated from both the CE survey and the CPS. They find the two data sets produce similar changes in mean income between 1993-1995 and 1997-2000. They also note that the average levels of income from CE surveys before 2004 were well below comparable levels in the CPS because a large share of CPS income is imputed while income imputations in the CE Survey only started in 2004.

Meyer, Mok, and Sullivan (2009) focus their research specifically on transfers in the CE Interview and other household surveys including the PSID, SIPP, CPS and American Community Survey. Among the benefit programs considered were family assistance, food stamps, Supplemental Security Income, unemployment insurance payments, and workers compensation. Meyer et al. reported that the CE typically had the lowest reporting rates of transfer benefits and the SIPP had the highest rate for most programs. For 2006, Meyer et al. reported that 38 percent of administrative totals are represented by the CE Interview. In a separate analysis, we found that 47 percent of the administrative totals for 2006 were accounted for if Diary data were used.

Passero (2009) compares incomes from the CE Survey and CPS both before and after 2004. The first step was to select the appropriate consumer units in the CE so that income covers

a calendar year, as in the CPS. Replicating the method used to produce income estimates in the published tables comparing CE income and CPS income, he shows that for the years 2002 and 2003, income from the CE was about 75 percent of the income in the CPS. Imputations for income have had a dramatic effect. For the years 2004 through 2006 income from the CE averaged 94 percent of income in the CPS. Wages and salaries in the CE survey, which makes up the largest share of income, was about 78 percent of the CPS for 2002 and 2003, but rose to about 97 percent of the CPS for the years 2004 through 2006.

F. Personal Consumption Expenditures (PCE) Comparison

There have been many comparisons of CE and PCE data over the years by researchers outside the Bureau of Labor Statistics and those within. The earliest comparisons were conducted by Houthakker and Taylor (1970) and Slesnick (1992, 1998), while more recent comparisons include Attanasio, Battistin, and Leicester (2006) and Meyer and Sullivan (2009). Since 1987, the BLS has been producing CE and PCE aggregate expenditure comparisons and made these available to the public. For this article, we focus on the more recent comparisons of CE and PCE, referring the reader to the earlier research of Houthakker and Taylor (1970) and Slesnick (1992, 1998).

Attanasio, Battistin, and Leicester (2006) examined U.K. and U.S. household survey data and aggregate national accounts expenditure data over a 20 to 30 year time span. The researchers use the national accounts data as a benchmark for the micro data based on the assumption that once the micro data are aggregated, they should follow the movements in the national accounts. One aim of the paper was to compare the household and national accounts data to stress that data quality is not invariant to different methods to construct the data. The authors suggest that improvements are needed in the quality of household data for both countries. The focus of the

comparison was expenditures on total non-durables and services. The ratios of Family Expenditure Survey (FES) expenditures on non-durables to national accounts consumption expenditures were fairly high, around 95 percent, from 1974 through the mid 1990s. However, by 2002 the ratio captured by the FES fell to below 80 percent. Attanasio et al. (2006) reported that about 70 percent of total consumption expenditure is accounted for by the CE, and that the ratio of the CE to PCE aggregates was declining continuously from 1984 through 2004. Data from the CE Diary and Interview were used for this study. These comparisons were based on all expenditures in both the CE and PCE for the U.S. without regard to differences underlying the two series.

Garner et al. (2006) and Meyer and Sullivan (2009) note that about half of the difference between the CE and PCE expenditure aggregates are due to differences in concepts and comprehensiveness. For example, CE and PCE numbers cover different populations and are defined differently. In addition, PCE numbers, "... are the product of a great deal of estimation and imputation that is subject to error" (Meyer and Sullivan, 2009, p.13). The PCE coverage is wider than that of the CE, including purchases by nonprofits, purchases by those abroad, on military bases and in institutions, free financial services, and employer-paid insurance. Also, as noted by both sets of authors, the BEA, in the creation of the PCE, derives estimates through a complex process that depends on input-output tables to input sales to final sector, wholesale and retail markups, and taxes. For most items, PCE expenditures are derived as residuals from government and business expenditures.

Both Garner et al. (2006) and Meyer and Sullivan (2009) use methods to identify and compare expenditures for the most comparable groups of commodities and services. Meyer and Sullivan restrict their analysis to data from the CE Interview Survey while Garner et al. focus on

data from the CE Diary and Interview combined. An advantage to using the combined data is that food at home and away from home expenditures are collected in detail in the Diary; in the Interview these are collected using global or summary questions.

Meyer and Sullivan (2009) examine data from select years from 1972 through 2004. As reported earlier, there has been a steady decline in the ratio of CE to PCE aggregate expenditures. However, for particular commodity groups, the ratios are high. For example, for food at home, on average the CE/PCE ratio is over 0.85 and for rent plus utilities the ratio is nearly 1.0. Meyer and Sullivan surmise that the CE understates consumption of the poor but not nearly as much as for other groups. There are several categories for which CE/PCE ratios are quite low, for example, clothing, tobacco, and alcoholic beverages. The authors note that under-reporting of these items reflect potential discretionary spending and irregular purchase.

They find that core consumption, defined as food at home, rent plus utilities, transportation, gasoline, the value of owner-occupied housing, rental assistance, and the value of owned vehicles, accounted for about 73 percent of total consumption but 80 percent of the consumption of those near the poverty line. Based on their comparison of CE to PCE, they concluded that components of core consumption are reported well in the CE Interview. The CE/PCE ratios are quite high and they show only a slow decline over time, with the exception of gasoline and motor oil. For 1972, the ratio of aggregate CE to PCE expenditures was 1.03; by 2004 the ratio had declined to 0.87.

Beginning in 2006, the BLS has compared the CE and PCE with a new methodology that accounts for more of the differences in the CE and PCE than was possible earlier. With the new methodology, many fewer item categories are considered comparable than in past comparisons. Because Garner et al. (2006) present and compare the historical and new methodologies, this

article focuses on updating the CE-PCE comparison using CE Diary and Interview data. We find that CE to PCE aggregate expenditures have been decreasing for most all categories of expenditures, and that CE and PCE aggregate estimates are becoming more disparate with time for select commodity groups. (See <http://stats.bls.gov/opub/mlr/2006/09/art3full.pdf> , for information regarding concepts and methods and a discussion of reasons for differences in CE and PCE aggregates.)

As noted in Garner et al. (2006), although CE aggregates for a particular year may change occasionally due to previously undiscovered errors in the data, it is more likely that the trend the aggregates exhibits spikes or disjoint shifts over time. These aberrations coincide with changes in sample design, data collection methods, and data processing in the CE survey. In contrast, changes in PCE aggregates are retrospective. When a new year's PCE aggregates are produced, the aggregates for previous years are often revised, due either to updated source data that the BEA has received in the interim or to the culmination of the benchmarking process.

Table 1 includes aggregate expenditures for eight years: 1992, 1997, and 2002 through 2007. All the aggregates in the table are based on 1997 PCE benchmark data, which include subsequent revisions by BEA. The PCE classifications applied for Table is based on type of product structure currently in effect currently; a new PCE classification system is to become effective the end of July 2009 with the 13th comprehensive, or benchmark, revision of the national income and product accounts (NIPAs).⁷ The three primary types of product are durable goods, nondurables goods, and services. A concordance was created to assign CE item codes to PCE product groups. Results are presented for all items in each group and for items that are deemed comparable based on definition and scope (See Garner et al. 2006, for details.) In some

⁷ See Kunze and McCulla (2008), McCully and Payson (2009), and McCully and Teensma (2008).

cases, such as healthcare, the category is within the scope of both the CE survey and the PCE, but the operational definitions are sufficiently different to result in estimates that are not comparable. The full costs of healthcare are included in the PCE, but only the expenditures made by consumer units, net of third-party payments, are included in the CE survey definition.

In addition to aggregates, CE/PCE ratios are also shown in Table 1. Within each type of grouping are total expenditures, expenditures of comparable items, the ratios of comparable items to all items covered in the CE and PCE separately, and the ratios of CE to PCE expenditures for comparables. In this paper, we focus on the CE/PCE ratios.

PCE expenditure that are covered and in-scope for the CE account for 57 percent of total PCE expenditures in 1992. By 2002, the ratio had dropped to 52 percent and has remained unchanged through 2007. This is consistent with the findings of Slesnick (1992); he noted that approximately one-half of the difference between aggregates expenditures reported in the CE and PCE could be accounted for by definitional differences, and stated that reporting errors by households in the CE and PCE estimation procedures are possible reasons for the remaining disparity. However, he cautioned that underreporting in the CE not be assigned full blame for the differences in the estimated levels of aggregate expenditures.⁸

Returning to Table 1, the sum of comparable total durables, non-durables and services, aggregate expenditures were 86 percent of PCE aggregates for 1992, 85 percent in 1997. From 2002 through 2007, the ratio varied between 81 to 82 percent, holding steady.

When all categories of items, both comparables and non-comparables, are included, CE aggregate expenditures are 67 percent of PCE aggregates in 1992 and 65 percent in 1997. By 2002, the ratio slips to 61 percent and varies between 59 and 61 percent for the remaining years.

⁸ Slesnick, "Aggregate Consumption and Saving," 1992, p. 594.

When PCE aggregates are adjusted to reflect differences in population coverage between the CE survey and the PCE, CE/PCE ratios are marginally higher for most years.⁹

CE aggregates are greater than PCE aggregates for comparable services, with the CE/PCE ratio ranging between 1.01 and 1.04 for all the years. The approximate parity between comparable CE and PCE services is driven largely by the category “Owner-occupied dwellings,” where the CE estimate is 23 to 30 percentage points higher than the PCE estimate. With the exception of 2007, the CE estimate is composed of two items - the annual rental equivalence estimate for owned homes plus ½ of the annual rental equivalence estimate for owned vacation homes. In April 2007, the CE Interview Survey instrument was changed such that the rental equivalence of owned vacation homes could be disaggregated into three items: rental equivalence of owned vacation homes available for rent, rental equivalence of owned vacation homes not available for rent, and rental equivalence of timeshares. (Sample units interviewed in January-March 2007 used the old instrument and thus reported rental equivalence for owned vacation homes in total.) The vacation home portion of the owner-occupied dwelling estimate for 2007 was thus recalculated as the full annual rental equivalence estimate of owned vacation homes not available for rent, ½ of the annual rental equivalence of owned vacation homes available for rent, and the monthly rental equivalence for timeshares. This procedure was followed to approximate PCE methods for valuing the services from vacation homes and time shares. Included in the PCE are the rental values for owned vacation homes including time; only ½ the imputed value of those are primarily rented are included in the estimates. For vacation

⁹ To adjust the PCE estimates so that they refer to the same population as the CE survey does (that is, encompassing the non-institutional population, those not living on a military base, and those not living overseas), the PCE aggregates would need to be multiplied by the following values (approximations): 0.967 for 1997, 0.973 for 2002, 0.991 for 2003, 0.99 for 2004 and 2005, 0.993 for 2006, and 0.995 for 2007. The multiplier is derived by finding the proportion of the total U.S. population covered by the CE survey to the total population covered by the PCE. (See *Statistical Abstract of the United States: 2009*, 128th edition (U.S. Census Bureau, 2008).

homes that are not rented, the full imputed value of the service from the vacation home property is included (see Garner et al., 2006). Difference in the handling of vacation properties is due to the fact that PCE data are property-based while the CE data are consumer unit-based. With the change in the CE collection of vacation home data, the CE/PCE ratio increased by 5 points from 2006 to 2007.

Now we turn to comparable durables. CE expenditures accounted for 88 percent of PCE aggregates in 1992 but dropped to 69 percent by 2007. There was an unexpected drop in 2004 driven by a sizable decline in reports of new car purchases. The effect of this drop resulted in a decline in the overall durables CE/PCE ratio by 10 percentage points. After the ratio rebounded to 75 percent in 2005, it resumed its decline in the following two years.

In 1992, CE expenditures for nondurable comparables accounted for 69 percent of PCE expenditures for comparables. The CE/PCE ratio declined to 67 percent in 1997 and 63 percent by 2002. Since 2002, the CE/PCE ratio has ranged from 61 to 64 percent, with the lowest ratio in 2007.

Table 2 presents a detailed comparison of CE and PCE estimates for 2007, the most recent year for which CE data are available. Expenditures again are arranged by durables, non-durables, and services. Unlike in Table 1, all PCE and CE expenditure items are considered regardless of comparability. Those that are comparable for the two data series are noted in Table 2 and can be found in Table 1 as well.

The item category of durable goods consists of motor vehicles and parts, furniture and household equipment, and other durable goods. Among the comparable durable-goods categories, the only category for which CE estimates are higher than PCE estimates is kitchen and other household appliances; the CE/PCE ratio is 1.12 in 2007. CE aggregate expenditures for

motor vehicles and parts are similar for the CE and PCE with the ratio equal to 0.97. For the comparable category of new automobiles, the CE-to-PCE ratio is 0.96 while the net purchase or used automobiles is 1.70. As reported in the earlier article, none of the corresponding subgroups in “other durable goods” are considered comparable.

Nondurable goods are grouped into four major categories: food; clothing and shoes; gasoline, fuel oil, and other energy goods; and other nondurable goods. Food, clothing and the energy groups are the most conceptually similar for the CE survey and the PCE. The ratio for the fuel oil, and other energy goods, 0.83, is quite high, holding constant since 2002. The ratio for food home consumption (off-premise consumption) is 0.58, and for purchased meals and beverages, 0.68. Unlike the PCE, the CE does not include expenditures that reflect the value of Federal Women’s, Infants’, and Children’s (WIC) program benefits. Thus, the CE/PCE ratio is lower than it would be if these were included in the CE.

In contrast to the CE to PCE comparison, when CE food expenditures (not including alcoholic beverages) are compared to food expenditures from the USDA Economic Research Service (ERS) series for the years 2002 through 2007, the ratio of CE to ERS aggregate expenditures averages about 0.79.¹⁰ This is more than 10 percentage points higher than the CE/PCE ratio for 2007. The ERS aggregates do not include food purchases with food stamps and WIC (Women, Infants, and Children program) vouchers; the CE data include food at home and

¹⁰ ERS aggregates are from the ERS Briefing Rooms, “Food CPI and Expenditures: Measuring the ERS Food Expenditure Series,” Table 5. Food expenditures by source of funds, available on the internet at www.ers.usda.gov/briefing, 2009. The primary data source for the ERS series is the Economic Census conducted by the U.S. Census Bureau; the Census is conducted once every 5 years. Between census years, data require projection techniques developed by ERS to obtain annual estimates. The ERS notes that the food expenditures that they post differ from those in the PCE series although the trends are similar. The ERS series shows lower levels of spending for food than does the PCE, particularly for food purchases at grocery stores and other retail outlets for consumption at home. The ERS estimates of at-home expenditures are lower partly because they exclude pet food, ice, and prepared feeds, which are included in the PCE estimates. ERS estimates also deduct more from grocery store sales for nonfoods, such as drugs and branded supplies, in estimating food purchases for at-home consumption (ERS, 2009).

food away from home from the Diary Survey and food on trips, board, catered affairs, and school lunches from the Interview Survey. All CE estimates have been adjusted for food stamps but not WIC. Data are not available in the CE for WIC.

The category of “other nondurable goods” comprises a mix of disparate item groups, such as: tobacco products; toilet articles and preparations; and flowers, seeds, and potted plants. The CE/PCE ratio for the category is only 0.34, reflecting in some measure the non-comparability of many of the subgroups. Tobacco products make up one of the two comparable subgroups, yet the CE/PCE ratio, 0.41, is fairly low. Purchases of tobacco products are considered “sensitive” because they likely carry a negative connotation among many consumers. Thus, respondents of the CE survey are assumed to be more likely to either omit or underreport tobacco expenditures compared with other types of spending.

The major expenditure categories in services are housing and household operations, transportation, medical care, recreation, personal care, personal business, education and research, religious and welfare activities, and a PCE adjustment for net foreign travel. This analysis shows that no major category is considered completely comparable for the two surveys. The “housing and household operations” category is composed of the following subgroups: owner-occupied dwellings; rent and utilities, excluding telephone; other lodging; telephone and telegraph; domestic service; and other household operations. The ratio of CE/PCE ratio for rent including utilities is 0.98 for 2007. With rental equivalence used as a proxy for the space rent of owner-occupied dwellings, the CE/PCE ratio is 1.30.

Expenditures for medical care include expenditures for services provided by healthcare professionals and healthcare facilities, and for health insurance premiums. The CE/PCE ratios are extremely low, with the exception of medical care and hospitalization health insurance,

which has a ratio of 1.46. One reason for the low ratios is that the operating expenses of nonprofits serving households are included in the PCE estimate, but not in the CE aggregates. The low ratios also reflect the fact that the CE survey counts only out-of-pocket outlays net of payments by third parties payers. Medical care expenditures for the PCE represent the full costs of care.

Personal business comprises a broad set of services, the largest three of which, in dollar terms, are not comparable due to conceptual or operational differences between the CE survey and the PCE. Over a third of the PCE estimate for personal business is accounted for by “services furnished without payment by financial intermediaries except life insurance carriers.” By definition, the PCE expenditure estimate is an imputation that represents checking, bookkeeping, and investment services received by consumers for which they do not pay through explicit service charges. These services are not included in CE survey expenditures; only actual service charges paid by consumers are included.

The category of education and research includes higher education, nursery, elementary and secondary schools, and other. For the most part, the category of education and research is similar to medical care in the PCE in that much of the education portion of the expenditure estimate comes from nonprofit institutions serving households. The CE survey includes out-of-pocket expenses for tuition and other educational expenses (excluding room and board) in its estimate for education. Also, there is nothing collected in the CE instruments comparable to the foundations and nonprofit research portion of the PCE estimate. These differences render the category non-comparable between the CE and the PCE.

The high CE/PCE ratio of 2.40 for the nursery schools item (in the nursery, elementary, and secondary schools subgroup) stands out; the ratio for the total group is 1.02. As opposed to

expenses for other schools, consumers are more likely to pay the full costs of nursery schools. In the CE survey, education expenditures for nursery schools are combined into item code with similar expenditures for preschools and child daycare centers. The PCE, in contrast, derives its estimate by allocating one-third of the expenses for child daycare services reported by private providers to nursery schools. The remaining two-thirds are assigned to the childcare component of the social welfare subgroup in the “religious and welfare activities” category (see Garner et al., 2006).

G. Future Personal Consumption Expenditures (PCE) Comparisons

The BEA is planning to introduce a new classification system for PCE in July 2009 (McCully and Payson, 2009). Changes in definitions and statistical changes are being introduced and are expected to affect future CE/PCE comparisons. Among the statistical improvements is the use of new retail point-of-sale scanner data from a trade source for consumer electronics PCE estimates. Another change is that the BEA will use annual data from the CE in the estimation of the imputed space rental value of owner-occupied permanent-site non-farm housing.

IV. Conclusions

Although the BLS program that produces the CE is noted for the quality of its customer outreach, planning tools and its willingness to critically assess its products, studies conducted inside and outside of the BLS indicate that underreporting remains a problem for some categories of expenditures. Updated comparisons with the PCE indicate that expenditures as measured in the CE are still less than similar expenditures in the PCE. The CE program is actively working to address underreporting problems. For example, the underreporting problem with income essentially was solved through the use of imputation. Other research on methods to reduce underreporting and non-response is discussed in Goldenberg and Ryan (2009).

V. References

- Amble, Nathan and Kenneth J. Stewart (1994), "Experimental Price Index for Elderly Consumers," *Monthly Labor Review*, May, pp. 11-16.
- Atkinson, A. B., J. Gomulka and Nicholas Stern (1990), "Spending on Alcohol: Evidence from the Family Expenditure Survey 1970-1983," *Economic Journal*, Vol.100, Issue 402, pp. 808-827.
- Attanasio, Orazio P., Erich Battistin and Andrew Leicester (2006), "From Micro to Macro, from Poor to Rich: Consumption and Income in the UK and the US," paper presented at National Poverty Center conference "Consumption, Income, and the Well-Being of Families and Children," Washington, D.C., April 20, 2006.
- Attanasio, Orazio P., Pinelopi Koujianou Goldberg and Ekaterini Kyriazidou (2007), "Credit Constraints in the Market for Consumer Durables: Evidence from Micro Data on Car Loans" *International Economic Review*, Vol. 49, Issue 2. pp. 401-436.
- Attanasio, Orazio P. and Guglielmo Weber (1995), "Is Consumption Growth Consistent with Intertemporal Optimization? Evidence from the Consumer Expenditure Survey," *The Journal of Political Economy*, Vol. 103, No. 6 (Dec.), pp. 1121-1157.
- Battistin, Erich (2002), "Errors in Survey Reports of Consumption Expenditures," Institute for Fiscal Studies, London, England.
- Battistin, Erich, Raffaele Miniaci and Guglielmo Weber (2003), "What do we Learn from Recall Consumption Data?," Temi di discussione (Economic working papers) 466, Bank of Italy, Economic Research Department, Rome, Italy.
- Battistin, Erich and Mario Padula (2009), "Survey Instruments and the Reports of Consumption Expenditures: Evidence from the Consumer Expenditure Surveys," paper presented at The Econometric Society conference, "2009 North American Summer Meeting," Boston, Massachusetts, June 4-7, 2009.
- Blisard, Noel and Hayden Stewart (2007), "Food Spending in American Households, 2003-04," Economic Information Bulletin Number 23, Economic Research Service, U.S. Department of Agriculture, U.S. Government Printing Office, Washington, D.C., March.
- Bosworth, Barry, Gary Burtless, and John Sabelhaus (1991), "The Decline in Saving: Evidence from Household Surveys," *Brookings Papers on Economic Activity*, Vol. 1991, Issue 1, pp. 183-241.
- Branch, Raphael (1987), "Comparing Medical Care Expenditures of Two Diverse U.S. Data Sources," *Monthly Labor Review*, March, pp.15-18.
- Branch, Raphael (1994), "The Consumer Expenditure Survey: A Comparative Analysis," *Monthly Labor Review*, December, pp. 46-55.

Bureau of the Census, Economics and Statistics Administration (1994), 1990 Census of Housing Residential Finance, 1990 CH-4-1, U.S. Department of Commerce, U. S. Government Printing Office, Washington, D.C.

Bureau of the Census (2001), Residential Finance Survey website, July 31.

Bureau of the Census (2003), *Statistical Abstract of the United States: 2003* (123rd Edition). Washington, D.C., 2003, pp. 8.

Bureau of Economic Analysis (1990), Personal Consumption Expenditures, Methodology Paper Series MP-6: U.S. National Income and Product Accounts, U.S. Department of Commerce, U.S. Government Printing Office, Washington, D.C., June.

Bureau of Economic Analysis (1994). "Reconciliation of PCE and Consumer Expenditure Survey Estimates of Consumer Spending", Preliminary Draft, Bureau of Economic Analysis, September 7, 1994.

Bureau of Economic Analysis (2002), "NIWD PCE Bridge to 1992 Input-Output Table," unpublished data, sent by Greg Key to William D. Passero of BLS on March 19.

Bureau of Economic Analysis (2003), "1997 Benchmark I-O Accounts," CD, data for BLS internal use only, February 5.

Bureau of Labor Statistics (1997a), *BLS Handbook of Methods*, Bulletin 2490, U.S. Department of Labor, U.S. Government Printing Office, Washington, D.C., April.

Bureau of Labor Statistics (1995), *Consumer Expenditure Survey 1992-93*, Bulletin 2462, U.S. Department of Labor, U.S. Government Printing Office, Washington, D.C., September.

Bureau of Labor Statistics, (1997b), *Consumer Expenditure Survey 1994-95*, Bulletin 2492, U.S. Department of Labor, U.S. Government Printing Office, Washington, D.C., December.

Bureau of Labor Statistics (1999), *Consumer Expenditure Survey 1996-97*, Report 935, U.S. Department of Labor, U.S. Government Printing Office, Washington, D.C., September.

Bureau of Labor Statistics (2001a), *Consumer Expenditure Survey 1998-99*, Report 955, U.S. Department of Labor, U.S. Government Printing Office, Washington, D.C., November.

Bureau of Labor Statistics (2003), *Consumer Expenditure Survey 2001-02*, Report 969, U.S. Department of Labor, U.S. Government Printing Office, Washington, D.C., September.

Bureau of Labor Statistics (2008), "Consumer Expenditure Survey Compared with Personal Consumption Expenditures," *Consumer Expenditure Survey, 2004-2005*, Report 1008, October 2008, pp. 6-11.

Bureau of Labor Statistics (2005), "Consumer Expenditure Survey Comparisons with National Health Expenditures and the Current Population Survey," *BLS 2004-2005 Biennial Report*, pp. 12-14, Bureau of Labor Statistics, Washington, D.C.

Bureau of Labor Statistics (2000a), Consumer Price Index, Table 1 (1999-2000 Weights). Relative Importance of Components in the Consumer Price Indexes: U.S. City Average, December 2002. BLS web site, August.

Bureau of Labor Statistics (2000b), Issues in Measuring Price Change and Consumption Conference, Washington, D.C., June 5-8.

Bureau of Labor Statistics (1991), Quarterly Interview Survey 1991 Forms, Consumer Expenditure Survey, CE-300(P91), 4-1-91.

Bureau of Labor Statistics (2001b), Quarterly Interview Survey 2001 Forms, Consumer Expenditure Survey, CE-300/302, 4-1-2001.

Busch, Susan H., Tracy A. Fabla, Mireia Jofre-Bonet and Jody L. Sindelar (2004), "Tobacco Spending and its Crowd-Out of Other Goods" National Bureau of Economic Research Working Paper No. 10974, Cambridge, Massachusetts.

Butrica, Barbara A., Joshua H. Goldwyn, Richard W. Johnson (2005), "Understanding Expenditure Patterns in Retirement," The Urban Institute, Washington, D.C.

Carson, Carol S. (1987), "GNP: An Overview of Source Data and Estimating Methods," *Survey of Current Business*, Vol. 67, pp. 103-127.

Charles, Kerwin Kofi, Sheldon Danziger, Geng Li and Robert F. Schoeni (2007), "Studying Consumption with the Panel Study of Income Dynamics: Comparisons with the Consumer Expenditure Survey and an Application to the Intergenerational Transmission of Well-Being" FEDS Working Paper No. 2007-16, Federal Reserve, Washington, D.C.

Council of Professional Associations on Federal Statistics (2000), Statistical Policy Seminar: "Integrating Federal Statistical Information Processes," Washington, D.C., November.

Dahlhamer, James, John Dixon, Pat Doyle, Judy Eargle, Deborah Griffin and Pamela McGovern (2003), "Quality at the Item Level: Terms, Methods, and Guidelines for Cross-Survey Comparisons," unpublished manuscript, available from the BLS, Washington, DC.

Danziger, Sheldon H., Lloyd Grieger, and Robert F. Schoeni (2008), "Estimating and Benchmarking the Trend in the Poverty Rate from the Panel Study of Income Dynamics," PSC Research Report No. 08-633, Population Studies Center, Ann Arbor, Michigan.

Duly, Abby, Thesia Garner, Eric Keil, Sally Reyes-Morales and Cassandra Wirth (2003), “The Consumer Expenditure Survey and AC Nielsen Survey: A Data Comparison Study,” unpublished internal document, available from the BLS, Washington, DC.

Economic Research Service (2009), “Briefing Room, Food CPI and Expenditures: Three Types of Food Expenditures Series,” U.S. Department of Agriculture, Washington, DC, www.ers.usda.gov/Briefing/CPIFoodAndExpenditures/threetypesoffoodexpendituresseries.html

Fernandez-Villaverde, Jesus and Dirk Krueger (2004), “Consumption over the Life Cycle: Facts from Consumer Expenditure Survey Data,” unpublished manuscript, University of Pennsylvania and University of Frankfurt.

Fisher, Jonathan and David S. Johnson (2004), “Consumption Mobility in the United States: Evidence from Two Panel Data Sets,” unpublished manuscript, BLS, Washington, D.C.

Fixler, Dennis and Ted Jadtz (2002), “An Examination of the Difference Between the CPI and the PCE Deflator,” Bureau of Labor Statistics Working Paper 361, BLS, Washington, D.C.

Foster, Ann (2009), “Health Care Expenditures: A Comparison,” *Monthly Labor Review*, forthcoming.

Foster, Susan E., Roger D. Vaughan, William H. Foster and Joseph A. Califano, Jr. (2003), “Alcohol Consumption and Expenditures for Underage Drinking and Adult Excessive Drinking,” *The Journal of the American Medical Association*, 289(8), pp. 989-995.

Garner, Thesia I., George Janini, William Passero, Laura Paszkiewicz, and Mark Vendemia (2006), “The CE and the PCE: a comparison,” *Monthly Labor Review*, Vol. 129, No. 9, September, pp. 20-46 (available at: <http://stats.bls.gov/opub/mlr/2006/09/art3full.pdf>).

Garner, Thesia I. and Bill Passero (2001), “Out-of-Pocket Expenditures for Private Health Insurance: An Analysis of Consumer Expenditure Survey and Medical Expenditure Panel Survey Data,” mimeo, available from the BLS, Washington, D.C., June 1.

Garner, Thesia I. and Kathleen Short (2001), “Owner-Occupied Shelter in Experimental Poverty Measurement with a ‘Look’ at Inequality and Poverty Rates,” paper presented at the Annual Meeting of the Southern Economics Association, Tampa, Florida, November.

Garner, Thesia I. and Kenneth J. Stewart (2002), “Consumer Price Index and COLAs” in David J. Ekerdt, ed., *Encyclopedia of Aging, Macmillan Reference USA*, an Imprint of the Gale Group, New York.

General Accounting Office (1996), “Alternative Poverty Measures,” GAO/GGD-96-183R, Washington, D.C., Government Printing Office.

Ghosh, Dhiren and Andrew Vogt (2004), “Feasibility of Splitting the Consumer Expenditure Survey Questionnaire and Administering each Part to a Subsample,” unpublished manuscript, available from the BLS, Washington, DC.

Gieseeman, Raymond (1987), “The Consumer Expenditure Survey: Quality Control by Comparative Analysis,” *Monthly Labor Review*, March, pp.8-14.

Goldenberg, Karen and Jay Ryan (2009), “Evolution and Change in the Consumer Expenditure Surveys: Adapting Methodologies to Meet Changing Needs,” National Bureau of Economic Research, Conference on Research in Income and Wealth, Summer Institute 2009, July 13-14, Cambridge MA.

Houthakker, Henrik S., and Lester D. Taylor (1970), *Consumer Demand in the United States: Analyses and Projections*, 2nd edition, Harvard University Press, Cambridge, Massachusetts.

Hurd, Michael and Susann Rohwedder (2006), “Consumption and Economic Well-Being at Older Ages: Income- and Consumption- Based Poverty Measures in the HRS,” University of Michigan Retirement Research Center Working Paper 2006-110, University of Michigan Retirement Research Center, Ann Arbor, Michigan.

Hurd, Michael and Susann Rohwedder (2008b), “Methodological Innovations in Collecting Spending Data: The HRS Consumption and Activities Mail Survey,” RAND Working Paper WR646, RAND Corporation, Arlington, Virginia.

Hurd, Michael and Susann Rohwedder (2008a), “The Retirement-Consumption Puzzle: Actual Spending Change in Panel Data,” RAND Working Paper WR563, RAND Corporation, Arlington, Virginia.

Johnson, David S. and John Greenlees (2003), presentation before FESAC on a “Comparison of Movements in the CPI and PCE Price Indexes,” Bureau of Labor Statistics, U.S. Department of Labor, March 21.

Johnson, David S., Jonathan A. Parker and Nicholas S. Souleles (2006), “Household Expenditure and the Income Tax Rebates of 2001.” *American Economic Review*, 96(5), pp.1589-1610.

Johnson, David S., Timothy Smeeding, and Barbara Boyle Torrey (2005), “Economic Inequality through the Prisms of Income and Consumption,” *Monthly Labor Review*, April, pp. 11-24.

Kearney, Melissa Schettini (2005), “State Lotteries and Consumer Behavior,” *Journal of Public Economics*, Vol. 89, December, pp. 2269-2299.

Keil, Eric (2003), unpublished aggregate expenditures based on AC Nielsen household scanner data for alcoholic beverages and tobacco and tobacco accessories, BLS, Washington, D.C., March 11.

Kerr, William C. and Thomas K. Greenfield (2007), "Distribution of Alcohol Consumption and Expenditures and the Impact of Improved Measurement on Coverage of Alcohol Sales in the 2000 National Alcohol Survey," *Alcoholism: Clinical and Experimental Research*, Vol. 31, Issue. 10, pp. 1714-1722.

Kunze, Kurt and Stephanie H. McCulla (2008), "Preview of Revised NIPA Estimates for 2002: Effects of Incorporating the 2002 Benchmark I-O Accounts Proposed Definition and Statistical Changes," *Survey of Current Business*, March pp. 10-17.

Landefeld, J. Steven S. (2000), comments during the BLS "Issues in Measuring Price Change and Consumption Conference," Washington, D.C., June 5-8.

Lebow, David (2000), email communication with John Greenlees, BLS, concerning CPI weights based on the CE, February 8.

Lebow, David E. and Jeremy B. Rudd (2003), "Measurement Error in the Consumer Price Index: Where Do We Stand?" *Journal of Economic Literature*, Vol. 41, Issue 1, March, pp.159-201.

Malloy, Christopher, Tobias Moskowitz, and Annette Vissing-Jorgensen (2008), "Long-Run Stockholder Consumption Risk and Asset Returns," *Journal of Finance*.

McCully, Clint (2000) of the Bureau of Economic Analysis, "Presentation on PCE to the CE Staff," Bureau of Economic Analysis, Washington, D.C., April 19.

McCully, Clinton P., Brian C. Moore, and Kenneth J. Stewart (2007), "A Reconciliation between the Consumer Price Index and the Personal Consumption Expenditures Price Index," Bureau of Economic Analysis and Bureau of Labor Statistics, Washington, D.C.

McCully, Clinton P. and Steven Payson (2009), "Preview of the 2009 Comprehensive Revision of the NIPAs: Statistical Changes," *Survey of Current Business*, May, pp.6-16.

McCully, Clinton P. and Teresita D. Teensma (2008), "Preview of the 2009 Comprehensive Revision of the National Income and Product Accounts: New Classifications for Personal Consumption Expenditures," *Survey of Current Business*, May, pp. 6-17.

Mead, Charles Ian (2002), "Separate Recognition of Income and Outlays of Nonprofit Institutions Serving Households," mimeo available from the Bureau of Economic Analysis, U.S. Department of Commerce, Washington, D.C.

Mead, Charles Ian, Clinton P. McCully, and Marshall B. Reinsdorf (2003), "Income and Outlays of Households and of Nonprofit Institutions Serving Households", *Survey of Current Business*, April, pp.13-17.

Meyer, Bruce D., Wallace K.C. Mok and James X. Sullivan (2009), "The Under-Reporting of Transfers in Household Surveys: Its Nature and Consequences," The Harris School of Public Policy Studies Working Paper No. 09.03, The University of Chicago, Chicago, IL.

Meyer, Bruce D., James X. Sullivan (2008), "Changes in the Consumption, income, and Well-Being of Single Mother Headed Families," *American Economic Review*

Meyer, Bruce D., James X. Sullivan (2009), "Five Years of Consumption and Income Poverty" National Bureau of Economic Research Working Paper No. 14827, Cambridge, Massachusetts.

Meyer, Bruce D. and James X. Sullivan (2003), "Measuring The Well-Being Of The Poor Using Income And Consumption," *Journal of Human Resources*, Vol. 38 (Supplement), pp. 1180-1220.

National Bureau of Economic Research (2002), Conference on Research in Income and Wealth (CRIW) Consumer Expenditure Survey Research summer workshop, presentations by Thesia I. Garner, David S. Johnson, William D. Passero, and Mary McCarthy, Cambridge, Massachusetts, July 22-23.

National Research Council (2002), *At What Price? Conceptualizing and Measuring Cost-of-Living and Price Indexes*, Panel on Conceptual, Measurement, and Other Statistical Issues in Developing Cost-of-Living Indexes, Charles, L. Schultze and Christopher Mackie , editors, Committee on National Statistics, Division of Behavioral and Social Sciences and Education, Washington, D.C., National Academy Press.

Parker, Jonathan A. and Christian Julliard (2005), "Consumption Risk and Cross-Sectional Returns," *Journal of Political Economy*, Vol. 113, No. 1 (February), pp. 185-222.

Parker, Jonathan A. and Bruce Preston (2005), "Precautionary Saving and Consumption Fluctuations," *American Economic Review*, 95(4), September, pp. 1119-1143.

Parker, Jonathan A. and Annette Vissing-Jorgensen (2009), "Who Bears Aggregate Fluctuations and How?" National Bureau of Economic Research Working Paper No. 14665, Cambridge, Massachusetts.

Parker, Robert (2000), comments presented during the Panel Discussion on "The role of household expenditure surveys in measuring consumption," during the BLS "Issues in Measuring Price Change and Consumption Conference," June 5-8.

Passero, William (2001, "Comparison of Estimates from the U.S. Consumer Expenditure Survey and the National Accounts Personal Consumption Expenditures: Footwear," unpublished paper, November 19.

Pollard, Thomas (2000), "CE to PCE Comparison Methodology," mimeo available from the BLS, Washington, D.C., July 10.

Princeton University (1998), Current and Future Developments in the Consumer Expenditure Survey Conference, Princeton, New Jersey, May 19-20, 1998.

Safir, Adam and Karen Goldenberg (2008), "Mode Effects in a Survey of Consumer Expenditures. Alexandria, VA: Proceedings of the American Statistical Association, Section on Survey Research Methods, pp. 4436-4343. <http://www.amstat.org/sections/SRMS/Proceedings/>

Savage, Howard (2003), telephone communication regarding 1991 Residential Finance Survey sample, Bureau of Census, Washington, D.C.

Schultze, Charles L. and Christopher Mackie, eds., *At What Price? Conceptualizing and Measuring Cost-of-Living and Price Indexes*, Panel on Conceptual, Measurement, and Other Statistical Issues in Developing Cost-of-Living Indexes (Washington, DC, National Academy Press, 2002).

Shields, Jennifer and Nhien To (2005), "Learning to Say No: Conditioned Underreporting in an Expenditure Survey," *Proceedings of the Section on Survey Methods Research, American Statistical Association*.

Slesnick, Daniel T. (1992), "Aggregate Consumption and Saving in the Postwar United States," *The Review of Economics and Statistics*, Vol. 74, Issue 4 (Nov.), pp. 585-597.

Slesnick, Daniel T. (1998), "Are Our Data Relevant to the Theory? The Case of Aggregate Consumption," *Journal of Business and Economic Statistics*, January, Vol. 16, No. 1, pp. 52-61.

Slesnick, Daniel T. (2000), *Consumption and Social Welfare: Living Standards and their Distribution in the United States*, Cambridge University Press, Cambridge.

Smith, George, email communication regarding Personal Consumption Expenditure estimates of owners' imputed rent for the National Accounts, July 31-August 14, 2001.

Smith, George, oral communication regarding Personal Consumption Expenditure estimates of owner-occupied non-farm dwellings and the rental value of farm dwellings, February 10, 2003.

Stewart, Hayden, Noel Blisard, Sanjib Bhuyan and Rodolfo M. Nayga, Jr. (2004), "The Demand for Food Away From Home Full-Service or Fast Food?" Agricultural Economic Report Number 829, Economic Research Service, U.S. Department of Agriculture, U.S. Government Printing Office, Washington, D.C., January.

Stewart, Ricky, Jessica Brede Stone and Mary L. Streitwieser (2007), "U.S. Benchmark Input-Output Accounts, 2002," *Survey of Current Business*, October, pp. 19-48.

Triplett, Jack E. (1997), "Measuring Consumption: The Post-1973 Slowdown and the Research Issues," *Federal Reserve Bank of St. Louis Review*, May/June, 79(3), pp. 9-42.

Tucker, Clyde, Paul Biemer and Brian Meekins (2005), "Estimating the Level of Underreporting of Expenditures among Expenditure Reporters: A Micro-Level Latent Class Analysis." BLS Statistical Survey Papers, Bureau of Labor Statistics, Washington, D.C.

U.S. Department of Commerce (Commerce) and U.S. Department of Housing and Urban Development (1993), *American Housing Survey for the United States in 1991*, Current Housing Reports, H150/91, Bureau of the Census, U.S. Government Printing Office, Washington, D.C.

Wilcox, David W. (1992), "The Construction of U.S. Consumption Data: Some Facts and Their Implications for Empirical Work," *American Economic Review*, Vol. 82, Issue 4 (September), pp. 922-941.

Wilcox, Ernie (2000) of the Bureau of Economic Analysis, email communication November 2 with Thesia I. Garner, BLS, Washington, D.C.

Winter, K. Joachim (2002), "Design Effects in Survey-Based Measures of Household Consumption," Paper No. 02-34, Mannheim Research Institute for the Economics of Aging, Mannheim, Germany.

Table 1a. Summary comparison of aggregate Consumer Expenditures and Personal Consumption Expenditures based for 1992, 1997, and 2002-2007 and restricted to the most comparable categories on the basis of concepts involved and comprehensiveness

[In millions of dollars]

PCE category	1992			1997			2002			2003		
	PCE	CE	CE-to-PCE ratio	PCE	CE	CE-to-PCE ratio	PCE	CE	CE-to-PCE ratio	PCE	CE	CE-to-PCE ratio
Total durables, nondurables, and services												
Total	\$4,235,263	\$2,856,482	.67	\$5,544,512	\$3,589,914	.65	\$7,350,722	\$4,457,246	.61	\$7,703,630	\$4,637,379	.60
Comparable items	2,421,707	2,085,336	.86	3,027,956	2,563,644	.85	3,809,915	3,125,581	.82	3,984,471	3,240,961	.81
Ratio of comparable items to total	.57	.73		.55	.71		.52	.70		.52	.70	
Comparable items (adjusted for population)	2,357,166	2,085,336	.88	2,928,412	2,563,644	.88	3,705,224	3,125,581	.84	3,949,535	3,240,961	.82
Durable goods												
Total durable goods	483,588	430,076	.89	689,767	561,031	.81	923,940	693,653	.75	942,662	731,483	.78
Comparable durable goods	201,265	176,476	.88	257,516	205,466	.80	322,614	242,895	.75	323,243	254,382	.79
Ratio of comparable durables to total durables	.42	.41		.37	.37		.35	.35		.34	.35	
New autos	78,016	88,202	1.13	82,326	84,636	1.03	101,703	111,924	1.10	97,175	119,911	1.23
Furniture, including mattresses and bedsprings	38,957	31,922	.82	56,467	42,012	.74	68,913	46,171	.67	70,187	47,692	.68
Kitchen and other household appliances	24,287	23,204	.96	26,383	28,391	1.08	31,988	33,666	1.05	32,786	35,140	1.07
Video and audio goods, including musical instruments, and computer goods	60,005	33,148	.55	92,340	50,427	.55	120,010	51,134	.43	123,095	51,639	.42
Nondurable goods												
Total nondurable goods	1,330,504	866,976	.65	1,618,967	1,026,129	.63	2,079,632	1,212,863	.58	2,190,200	1,231,571	.56
Comparable nondurable goods	1,167,003	808,815	.69	1,382,788	925,321	.67	1,722,427	1,083,624	.63	1,809,209	1,111,681	.61
Ratio of comparable nondurables to total nondurables	.88	.93		.85	.90		.83	.89		.83	.90	
Food purchased for off-premise consumption	415,693	299,635	.72	492,521	337,499	.69	612,237	389,640	.64	636,020	407,852	.64
Alcoholic beverages purchased for off-premise consumption	48,853	16,388	.34	61,162	18,972	.31	75,283	25,497	.34	78,491	27,642	.35
Purchased meals and beverages	245,954	179,103	.73	294,942	218,288	.74	379,461	267,770	.71	399,019	268,497	.67
Alcoholic beverages in purchased meals	33,694	13,801	.41	32,170	13,604	.42	40,728	16,487	.40	42,790	17,386	.41
Shoes	32,903	23,124	.70	40,732	33,126	.81	49,526	34,960	.71	50,333	33,823	.67
Women's and children's (girls' and infants') clothing and accessories, except shoes	115,711	75,828	.66	127,456	79,788	.63	149,993	87,889	.59	153,689	82,418	.54
Men's and boys' clothing and accessories, except shoes	63,645	45,018	.71	80,594	42,883	.53	92,874	45,769	.49	95,256	42,800	.45
Gasoline, fuel oil, and other energy goods	124,639	107,384	.86	147,739	127,847	.87	178,768	148,800	.83	209,606	166,716	.80
Tobacco products	48,008	27,266	.57	53,848	27,565	.51	89,156	35,668	.40	88,033	33,255	.38
Toilet articles and preparations	37,903	21,268	.56	51,624	25,749	.50	54,401	31,144	.57	55,972	31,292	.56
Services												
Total services	2,421,171	1,559,430	.64	3,235,778	2,002,754	.62	4,347,150	2,550,730	.59	4,570,768	2,674,325	.59
Comparable services	1,053,439	1,100,045	1.04	1,387,652	1,432,857	1.03	1,764,874	1,799,062	1.02	1,852,019	1,874,898	1.01
Ratio of comparable services to total services	.44	.71		.43	.72		.41	.71		.41	.70	
Owner-occupied dwellings	462,286	567,986	1.23	597,957	751,763	1.26	809,035	1,014,126	1.25	858,559	1,079,220	1.26
Rent and utilities, excluding telephone	302,733	300,749	.99	374,363	366,184	.98	455,358	424,634	.93	470,397	451,468	.96
Other lodging	32,615	22,657	.69	45,699	30,842	.67	54,627	37,333	.68	57,961	33,992	.59
Domestic service	11,356	7,937	.70	14,688	7,954	.54	16,732	8,958	.54	18,474	10,743	.58
Transportation	157,664	158,353	1.00	245,666	225,711	.92	288,430	252,818	.88	297,306	244,558	.82
Admissions to all events	16,614	12,658	.76	24,984	18,595	.74	34,777	21,888	.63	36,032	21,312	.59
Radio and television repair	2,977	1,092	.37	3,900	775	.20	4,089	360	.09	4,109	401	.10
Cleaning, storage, and repair of clothing and shoes	11,365	12,722	1.12	13,646	7,966	.58	15,797	13,501	.85	15,169	12,570	.83
Legal services	44,860	9,180	.20	53,748	14,336	.27	71,249	14,910	.21	78,127	12,469	.16
Funeral and burial expenses	10,969	6,711	.61	13,001	8,731	.67	14,780	10,534	.71	15,885	8,165	.51

Table 1b. Summary comparison of aggregate Consumer Expenditures and Personal Consumption Expenditures based for 1992, 1997, and 2002-2007 and restricted to the most comparable categories on the basis of concepts involved and comprehensiveness

[In millions of dollars]

PCE category	2004			2005			2006			2007		
	PCE	CE	CE-to-PCE ratio	PCE	CE	CE-to-PCE ratio	PCE	CE	CE-to-PCE ratio	PCE	CE	CE-to-PCE ratio
Total durables, nondurables, and services												
Total	\$8,195,862	\$4,933,389	.60	\$8,694,113	\$5,267,364	.61	\$9,207,207	\$5,538,182	.60	\$9,710,168	\$5,743,199	.59
Comparable items	4,227,737	3,454,955	.82	4,520,356	3,698,803	.82	4,817,706	3,951,561	.82	5,066,446	4,104,543	.81
Ratio of comparable items to total	.52	.70		.52	.70		.52	.71		.52	.71	
Comparable items (adjusted for population)	4,185,922	3,458,802	.83	4,475,523	3,698,803	.83	4,784,700	3,951,561	.83	5,039,314	4,104,543	.81
Durable goods												
Total durable goods	983,851	725,420	.74	1,020,760	779,874	.76	1,052,050	752,256	.72	1,082,798	739,338	.68
Comparable durable goods	340,926	233,684	.69	361,719	270,156	.75	382,442	280,780	.73	387,043	266,161	.69
Ratio of comparable durables to total durables	.35	.32		.35	.35		.36	.37		.36	.36	
New autos	97,652	91,625	.94	103,121	109,714	1.06	106,478	115,930	1.09	102,046	97,486	.96
Furniture, including mattresses and bedsprings	75,260	49,807	.66	79,402	56,021	.71	83,254	56,129	.67	84,964	54,656	.64
Kitchen and other household appliances	34,745	38,946	1.12	36,810	40,853	1.11	38,613	43,796	1.13	39,214	43,788	1.12
Video and audio goods, including musical instruments, and computer goods	133,269	53,306	.40	142,386	63,568	.45	154,097	64,925	.42	160,819	70,231	.44
Nondurable goods												
Total nondurable goods	2,343,696	1,378,620	.59	2,514,120	1,462,228	.58	2,685,238	1,548,629	.58	2,833,002	1,577,184	.56
Comparable nondurable goods	1,940,973	1,247,588	.64	2,092,024	1,326,789	.63	2,234,709	1,413,064	.63	2,367,688	1,438,955	.61
Ratio of comparable nondurables to total nondurables	.83	.90		.83	.91		.83	.91		.84	.91	
Food purchased for off-premise consumption	677,206	444,202	.66	719,660	438,800	.61	762,742	464,119	.61	809,826	472,404	.58
Alcoholic beverages purchased for off-premise consumption	86,080	32,306	.38	93,556	25,901	.28	103,277	31,292	.30	110,957	28,975	.26
Purchased meals and beverages	424,498	299,575	.71	449,225	328,110	.73	480,287	343,523	.72	504,030	342,452	.68
Alcoholic beverages in purchased meals	44,735	20,986	.47	46,882	24,080	.51	50,695	27,689	.55	54,413	25,874	.48
Shoes	51,938	38,138	.73	54,882	37,536	.68	58,089	36,058	.62	59,150	39,288	.66
Women's and children's (girls' and infants') clothing and accessories, except shoes	161,365	94,829	.59	169,507	98,009	.58	179,098	100,484	.56	186,809	97,538	.52
Men's and boys' clothing and accessories, except shoes	99,671	47,147	.47	104,570	51,561	.49	109,614	52,640	.48	113,858	51,940	.46
Gasoline, fuel oil, and other energy goods	249,691	200,124	.80	304,594	253,297	.83	336,223	281,553	.84	366,891	305,061	.83
Tobacco products	87,514	33,270	.38	88,268	37,163	.42	89,824	38,589	.43	93,374	38,667	.41
Toilet articles and preparations	58,275	37,011	.64	60,880	32,332	.53	64,860	37,117	.57	68,380	36,756	.54
Services												
Total services	4,868,315	2,829,349	.58	5,159,233	3,025,261	.59	5,469,919	3,237,296	.59	5,794,368	3,426,676	.59
Comparable services	1,945,838	1,973,683	1.01	2,066,613	2,101,858	1.02	2,200,555	2,257,717	1.03	2,311,715	2,399,427	1.04
Ratio of comparable services to total services	.40	.70		.40	.69		.40	.70		.40	.70	
Owner-occupied dwellings	910,977	1,135,957	1.25	965,100	1,215,065	1.26	1,034,818	1,294,288	1.25	1,078,519	1,405,195	1.30
Rent and utilities, excluding telephone	487,840	466,251	.96	525,197	507,666	.97	555,635	559,067	1.01	590,779	577,154	.98
Other lodging	63,984	39,027	.61	70,778	41,720	.59	76,702	45,474	.59	83,262	48,530	.58
Domestic service	19,544	10,332	.53	19,945	10,813	.54	21,199	13,584	.64	22,448	14,211	.63
Transportation	308,199	262,908	.85	324,300	263,838	.81	341,241	277,584	.81	357,008	285,363	.80
Admissions to all events	37,643	22,389	.59	38,371	25,566	.67	41,193	25,639	.62	43,646	26,962	.62
Radio and television repair	4,585	459	.10	4,563	446	.10	4,793	722	.15	4,975	636	.13
Cleaning, storage, and repair of clothing and shoes	15,547	12,317	.79	16,063	12,786	.80	17,065	13,333	.78	17,203	13,705	.80
Legal services	81,950	14,826	.18	86,122	14,637	.17	91,913	18,893	.21	97,705	18,818	.19
Funeral and burial expenses	15,569	9,217	.59	16,174	9,321	.58	15,996	9,133	.57	16,170	8,853	.55

Table 2. Comparison of 2007 Aggregate Consumer Expenditures with Personal Consumption Expenditures Based on 1997 PCE Benchmark (not adjusted for population differences)

[In millions of dollars]

PCE Categories	Raw Aggregates			
	PCE	CE	Ratio	
Total durables, nondurables, and services	\$9,710,168	\$5,743,199	0.59	
Durable goods	1,082,798	739,338	.68	
Motor vehicles and parts	440,441	425,097	0.97	
New autos ¹	102,046	97,486	0.96	
Net purchases of used autos	56,471	96,142	1.70	
Other motor vehicles	219,087	210,743	.96	
	Trucks, new and net used	202,939	193,612	.95
	Recreational vehicles	16,147	17,131	1.06
Tires, tubes, accessories and other parts	62,838	20,727	.33	
Furniture and household equipment	415,343	225,307	.54	
Furniture, including mattresses and bedsprings ¹	84,964	54,656	.64	
Kitchen and other household appliances ¹	39,214	43,788	1.12	
China, glassware, tableware, and utensils	40,680	8,462	.21	
Video and audio goods, including musical instruments, and computer goods ¹	160,819	70,231	.44	
	Video and audio goods, including musical instruments ¹	97,483	49,143	.50
	Computers, peripherals, and software ¹	63,336	21,087	.33
Other durable house furnishings (for example, floor coverings, clocks, lamps, and furnishings; blinds, rods, and other; writing equipment, handtools, tools, hardware, and supplies)	89,665	48,170	.54	
Other durable goods	227,014	88,934	.39	
Ophthalmic products and orthopedic appliances	28,270	9,538	.34	
Wheel goods (including bicycles and motorcycles), sports (also includes guns) and photographic equipment, boats, and pleasure aircraft	86,951	47,648	.55	
Jewelry and watches	65,494	17,582	.27	
Books and maps	46,298	14,165	.31	

Table 2 (continued). Comparison of 2007 Aggregate Consumer Expenditures with Personal Consumption Expenditures Based on 1997 PCE Benchmark (not adjusted for population differences)

Nondurable goods		2,833,002	1,577,184	.56
Food		1,329,137	818,723	.62
Food purchased for off-premise consumption ¹		809,826	472,404	.58
Alcoholic beverages purchased for off-premise consumption ¹		110,957	28,975	.26
Purchased meals and beverages ¹		504,030	342,452	.68
Alcoholic beverages in purchased meals ¹		54,413	25,874	.48
Food supplied to employees: civilians		11,774	2,563	.22
Food supplied to employees: military		2,909		
Food produced and consumed on farms		597		
Clothing and shoes		374,026	191,122	.51
Shoes ¹		59,150	39,288	.66
Women's and children's (girls' and infants') clothing and accessories, except shoes ¹		186,809	97,538	.52
Men's and boys' clothing and accessories, except shoes ¹		113,858	51,940	.46
Standard clothing issued to military personnel		428		
Sewing good for males and females		8,056	1,612	.20
Luggage for males and females		5,726	744	.13
Gasoline, fuel oil, and other energy goods ¹		366,891	305,061	.83
Other nondurable goods		762,948	262,278	.34
Tobacco products ¹		93,374	38,667	.41
Toilet articles and preparations ¹		68,380	36,756	.54
Semidurable house furnishings		46,836	18,404	.39
Cleaning and polishing preparations, and miscellaneous household supplies and paper products		84,275	58,757	.70
Drug preparations and sundries		298,653	62,313	.21
Nondurable toys and sport supplies		74,338	15,632	.21
Stationery and writing supplies		21,892	17,241	.79
Net foreign remittances		6,059		
Magazines, newspapers, and sheet music		48,577	7,421	.15
Flowers, seeds, and potted plants		20,564	7,087	.34

Table 2 (continued). Comparison of 2007 Aggregate Consumer Expenditures with Personal Consumption Expenditures Based on 1997 PCE Benchmark (not adjusted for population differences)

Services		5,794,368	3,426,676	.59
Housing and household operations		1,986,535	2,253,016	1.13
Owner-occupied dwellings ¹		1,078,519	1,405,195	1.30
Rent and utilities, excluding telephone ¹		590,779	577,154	.98
	Tenant-occupied nonfarm dwellings	299,099	310,746	1.04
	Electricity	153,810	156,566	1.02
	Gas	64,986	57,729	.89
	Water and other sanitary services	72,884	52,113	.72
Other lodging ¹		83,262	48,530	.58
Telephone and telegraph		141,662	133,353	.94
Domestic service ¹		22,448	14,211	.63
Other household operations (for example, moving and storage, household insurance, rug and furniture cleaning, electrical repair, reupholstery and furniture repair, postage, household operation services not elsewhere classified)				
		69,865	74,573	1.07
Transportation ¹		357,008	285,363	.80
Repair, greasing, washing, parking storage, rental, and leasing		224,184	112,333	.50
Bridge, tunnel, ferry tolls		7,351	2,391	.33
Insurance		59,409	105,523	1.78
Mass transit systems		11,875	8,850	.75
Taxicab		4,533	2,887	.64
Railway		715	2,494	3.49
Bus		2,010	1,260	.63
Airline		36,675	43,227	1.18
Other (including water passenger; passenger transportation arrangement; limousine service; other local transportation; part of Amtrak passenger, trucking, and courier services, except air)				
		10,256	6,397	.62
Medical care		1,681,060	271,135	.16
Physicians		387,466	20,562	.05
Dentists		95,789	29,402	.31
Other professional services		261,531	19,959	.08
Hospitals		661,548	13,691	.02
Nursing homes		121,524	1,877	.02
Health insurance				
	Medical care and hospitalization health insurance	127,299	185,645	1.46
	Income loss insurance	3,023		
	Workers' compensation	22,882		

Table 2 (continued). Comparison of 2007 Aggregate Consumer Expenditures with Personal Consumption Expenditures Based on 1997 PCE Benchmark (not adjusted for population differences)

Recreation			403,412	212,945	.53
	Admissions to all events ¹		43,646	26,962	.62
		Motion picture theaters, theatre, opera, and entertainment	25,181	19,148	.76
		Spectator sports	18,465	7,814	.42
	Radio and television repair ¹		4,975	636	.13
	Clubs and fraternal organizations		26,268	14,838	.56
	Commercial participant amusements		119,976	26,131	.22
	Parimutuel net receipts		6,253	8,896	1.42
	Other (including pets and pet services, excluding vets; veterinarians; cable TV; film developing; photo studios; sporting and recreational camps; high school recreation; lotteries; videocassette rental; commercial amusements not elsewhere classified)		202,296	135,483	.67
Personal care			124,350	49,251	.40
	Cleaning, storage, and repair of clothing and shoes ¹		17,203	13,705	.80
	Barbershops, beauty parlors, and health clubs		51,986	33,972	.65
	Other (including watch, clock, and jewelry repair; miscellaneous personal services)		55,161	1,549	.03
Personal business			740,962	45,086	.06
	Brokerage charges and investment counseling		114,540		
	Bank service charges, trust services, and safe deposit box rental		115,916	3,106	.03
	Services furnished without payment by financial intermediaries except life insurance carriers		227,640		
	Expense of handling life insurance and pension plans		117,670		
	Legal services ¹		97,705	18,818	.19
	Funeral and burial expenses ¹		16,170	8,853	.55
	Other personal business (including labor union expenses, professional association expenses, employment agency expenses, money orders, classified ads, tax return preparation services, personal business services not elsewhere classified)		51,320	14,309	.28
Education and research			257,269	130,315	.51
	Higher education		142,984	75,471	.53
	Nursery, elementary, and secondary schools		49,453	50,573	1.02
		Elementary and secondary schools	36,054	18,408	.51
		Nursery schools	13,399	32,165	2.40
	Other education and research		64,832	4,271	.07
		Commercial and vocational schools	44,593		
		Foundations and nonprofit research	20,239		

Table 2 (continued). Comparison of 2007 Aggregate Consumer Expenditures with Personal Consumption Expenditures Based on 1997 PCE Benchmark (not adjusted for population differences)

Religious and welfare activities	252,716	179,564	.71
All contributions, including religion (CE)		161,803	
Political organizations	902		
Museums and libraries	10,535		
Foundations to religion and welfare	16,541		
Social welfare	161,094	17,761	.11
Childcare	39,719	10,323	.26
Social welfare (including membership organizations, job training and vocational rehabilitation services, residential care, individual and family services, social services not elsewhere classified, civic-social-fraternal associations)	121,375	7,438	.06
Religion	63,644		
Net foreign travel	-8,947		

¹ Comparable CE and PCE categories.