

# Consumer Expenditure Survey Compared with Personal Consumption Expenditures

The U.S. Bureau of Labor Statistics (BLS) Consumer Expenditure Survey (CE) data have been compared with corresponding expenditure data and estimates from other sources to evaluate the soundness of the CE estimates at any point in time and the consistency of the estimates over time. The primary role of post-survey evaluation, including data comparisons, is to assess the cumulative effects of nonsampling errors on the quality of the data obtained from the CE and to help in developing methods to improve data quality. Since the start of the ongoing CE in 1980, such comparisons have been a regular part of the CE program.

The primary source of independent data for comparison over time has been the Bureau of Economic Analysis (BEA) Personal Consumption Expenditures (PCE) of the National Income and Product Accounts (NIPA). The PCE has strengths and weaknesses. The strength of the PCE for this comparison is that estimates of aggregate expenditures for an extensive list of commodities are available. However, no source is without error. As the CE expenditures are subject to errors inherent in household surveys, the PCE data are subject to their own measurement errors and to judgment errors in the estimation and allocation of sales to the personal sector and other sectors of the accounts.

Recent work by a team of researchers within BLS<sup>1</sup> suggests that earlier comparison methods needed to be reevaluated. The purpose of this article is to provide a quantitative comparison of the CE and PCE, and to qualify why differences exist between the two. Specifically, the article provides a description of CE and PCE methods, including purposes, populations covered, definitions of expenditures, and data collection for the CE and source data for the PCE; current comparison methodology developed and used by the CE based on type of expenditure (e.g., food, housing, or transportation) along with ratios of CE-to-PCE aggregate expenditures; and the reevaluated comparison methodology, whereby a different aggregation scheme was developed based on allocating detailed CE data, using Universal Classification Codes (UCCs), to PCE categories by major type of product (i.e., durables, non-durables, services), in contrast to expense type. In this reevaluated method, adjustments are also made to PCE and CE expenditures, to make the data from the two sources comparable.

<sup>1</sup>In April 2000, a team of researchers in the Divisions of Price and Index Number Research and of Consumer Expenditure Surveys was convened to compare the CE to the PCE.

For this analysis, CE-to-PCE comparisons are shown at 5-year intervals using 1992, 1997, and 2002 data. These are the three most recent PCE benchmark years, although the 2002 benchmarking has not been done yet. In addition, a brief comparison is done on 2003 data, since they were released prior to the completion of this analysis. Based on assessment of comparable items in the CE and PCE using the reevaluated methodology, CE aggregate expenditures were 88 percent of PCE aggregate expenditures in 1992. However, the ratio fell to 86 percent for 1997 and to 83 percent for 2002. When all items are used for comparison, CE aggregate expenditures were 67 percent of PCE in 1992. This ratio fell 2 percentage points by 1997 to 65 percent and 5 more to 60 percent, by the year 2002.

## Consumer Expenditure Survey Expenditures and Personal Consumption Expenditures

The CE and PCE are designed to represent similar expenditures, however, different methods of measurement are used. The CE collects its data through household surveys and aggregates to the population, and the PCE makes estimates based on industry production and sales. There are several distinct differences in the expenditures that the CE and the PCE collect and the populations and data sources used by each.

The CE collects data relating to consumer unit (CU) expenditures for goods and services used in day-to-day living. This is all that consumers spend, defined as transaction costs, and includes excise and sales taxes but excludes investments like mortgage principal payments. The CE is made up of two components to collect these data, a Diary Survey and an Interview Survey. Both of these surveys are administered by the U.S. Census Bureau. For the Diary Survey, respondents are asked to report all their purchases made each day for two consecutive 1-week periods. The Diary Survey is designed to obtain data on frequently purchased items, such as food or housekeeping supplies, which respondents are less likely to recall over time. For the Interview Survey, respondents report data to an interviewer. Each sample household is interviewed once per quarter, for five consecutive quarters. This survey is designed to collect data on major items of expense, such as property purchases or vehicle purchases, and those that occur on a regular basis, such as rent or utility payments, which respondents recall for up to 3 months. The Consumer Expenditure Survey includes all transactions paid for by the consumer including person-to-person transactions.

Text table 4. Comparison of 2002 aggregate Consumer Expenditures to Personal Consumption Expenditures (PCE) (in millions of dollars), based on 1997 PCE benchmark—Continued

PCE categories		Aggregates		CE/PCE	
		PCE	CE	ratio	
Services—Continued	Personal business	Other personal business including union expenses, professional association expenses, employment agency expenses, money orders, classified ads, tax return services, personal business services n.e.c.	36,603	10,926	0.30
	Education and research	Higher education	190,736	93,658	.49
		Nursery, elementary, and secondary schools	103,853	52,716	.51
		Elementary and secondary schools	38,310	38,080	.99
		Nursery schools	28,188	14,455	.51
		Other education and research	10,122	23,625	2.33
		Commercial and vocational schools	48,573	2,862	.06
		Foundations and nonprofit research	33,259	0	.00
	Religious and welfare activities	Foundations and nonprofit research	15,314	0	.00
		All contributions including religion (CE)	202,882	124,384	.61
		Political organizations	0	110,900	.00
		Museums and libraries	4,149	0	.00
		Foundations to religion and welfare	8,524	0	.00
		Social welfare	11,842	0	.00
		Child care	30,319	7,107	.23
		Social welfare including membership organizations, job training, residential care, individual and family services, social services n.e.c., and civic-social-fraternal associations	148,049	6,377	.04

<sup>1</sup> Indicates comparable CE and PCE items.

n.e.c.=Not elsewhere classified.

Text table 5. Summary comparison of aggregate Consumer Expenditures vs. Personal Consumption Expenditures for 1992, 1997, and 2002 (in millions of dollars), restricted to most comparable, based on concepts and comprehensiveness

	1992			1997			2002		
	PCE	CE	CE/PCE ratio	PCE	CE	CE/PCE ratio	PCE	CE	CE/PCE ratio
Total durables, nondurables, and services (comparable).....	2,496,189	2,188,292	0.88	3,152,888	2,704,515	0.86	4,000,730	3,306,901	0.83
All items (including those not comparable) .....	4,235,263	2,856,482	.67	5,544,512	3,589,914	.65	7,376,059	4,457,246	.60
Ratio of most comparable to all items .....	.59	.77		.57	.75		.54	.74	
Durable goods									
Total comparable .....	231,357	198,117	.86	302,299	239,308	.79	381,095	286,871	.75
All durables (including those not comparable) .....	483,588	430,076	.89	689,767	561,031	.81	916,170	693,653	.76
Ratio of most comparable to all durables .....	.48	.46		.44	.43		.42	.41	
New autos .....	78,016	88,202	1.13	82,326	84,636	1.03	101,649	111,924	1.10
Furniture, including mattresses and bedsprings ...	38,957	31,922	.82	56,467	42,012	.74	68,288	46,171	.68
Kitchen and other household appliances .....	24,287	23,204	.96	26,383	28,391	1.08	31,537	33,666	1.07
Video and audio good, including musical instruments, and computer goods .....	60,005	33,148	.55	92,340	50,427	.55	119,062	51,134	.43
Wheel goods (including bicycles and motorcycles), sports (also includes guns) and photographic equipment, boats, and pleasure aircraft .....	30,092	21,641	.72	44,783	33,842	.76	60,559	43,976	.73
Nondurable goods									
Total comparable .....	1,167,003	808,815	.69	1,382,788	925,321	.67	1,723,492	1,083,624	.63
All nondurables (including those not comparable) .....	1,330,504	866,976	.65	1,618,967	1,026,129	.63	2,080,101	1,212,863	.58
Ratio of most comparable to all nondurables .....	.88	.93		.85	.90		.83	.89	
Food purchased for off-premise consumption .....	415,693	299,635	.72	492,521	337,499	.69	615,604	389,640	.63
Alcoholic beverages purchased for off-premise consumption .....	48,853	16,388	.34	61,162	18,972	.31	75,461	25,497	.34
Purchased meals and beverages .....	245,954	179,103	.73	294,942	218,288	.74	380,021	267,770	.70
Alcoholic beverages in purchased meals .....	33,694	13,801	.41	32,170	13,604	.42	40,591	16,487	.41
Shoes .....	32,903	231.24	.70	40,732	33,126	.81	49,281	34,960	.71
Women's and children's clothing and accessories except shoes (also includes clothing for infants) .....	115,711	75,828	.66	127,456	79,788	.63	149,205	87,889	.59
Men's and boys' clothing and accessories except shoes .....	63,645	45,018	.71	80,594	42,883	.53	92,586	45,769	.49
Gasoline, fuel oil, and other energy goods .....	124,639	107,384	.86	147,739	127,847	.87	177,467	148,800	.84
Tobacco products .....	48,008	27,266	.57	53,848	27,565	.51	89,122	35,668	.40
Toilet articles and preparations .....	37,903	21,268	.56	51,624	25,749	.50	54,154	31,144	.58
Services									
Total comparable .....	1,097,829	1,181,360	1.08	1,467,801	1,539,886	1.05	1,896,143	1,936,406	1.02
All services (including those not comparable) .....	2,421,171	1,559,430	.64	3,235,778	2,002,754	.62	4,379,788	2,550,730	.58
Ratio of most comparable to all services .....	.45	.76		.45	.77		.43	.76	
Owner occupied nonfarm dwellings .....	455,079	567,986	1.25	588,292	751,763	1.28	820,710	1,014,126	1.24
Rent and utilities, excluding telephone .....	302,733	300,749	.99	374,363	366,184	.98	466,483	424,634	.91
Rental value of farm dwellings .....	7,207	0	.00	9,665	0	.00	11,769	0	.00
Other lodging .....	32,615	22,657	.69	45,699	30,842	.67	53,633	37,333	.70
Telephone and telegraph .....	70,669	62,266	.88	103,648	85,416	.82	128,259	107,258	.84
Domestic service .....	11,356	7,937	.70	14,688	7,954	.54	16,754	8,958	.53
Other household operations (i.e., moving and storage, household insurance, rug and furniture cleaning, electrical repair, reupholstery and furniture, postage, household operation services not elsewhere classified) .....	29,550	34,940	1.18	43,250	44,680	1.03	56,146	55,530	.99
Transportation .....	157,664	158,353	1.00	245,666	225,711	.92	287,988	252,818	.88
Admissions to all events .....	16,614	12,658	.76	24,984	18,595	.74	34,583	21,888	.63
Radio and television repair .....	2,977	1,092	.37	3,900	775	.20	4,034	360	.09
Cleaning, storage, and repair of clothing and shoes .....	11,365	12,722	1.12	13,646	7,966	.58	15,784	13,501	.86

Text table 6. Summary comparison of aggregate Consumer Expenditures vs. Personal Consumption Expenditures for 2003 (in millions of dollars), restricted to most comparable, based on concepts and comprehensiveness

	2003		
	PCE	CE	CE/PCE ratio
Total durables, nondurables, and services .....	4,170,160	3,427,180	0.82
All items (including those not comparable) .....	7,760,877	4,639,029	.60
Ratio of most comparable to all items .....	.54	.74	
Durable goods			
Total comparable .....	380,429	291,843	.77
All durables (including those not comparable) .....	950,689	731,483	.77
Ratio of most comparable to all durables .....	.40	.40	
New autos .....	97,508	119,911	1.23
Furniture, including mattresses and bedsprings .....	60,496	47,692	.79
Kitchen and other household appliances .....	33,065	35,140	1.06
Video and audio goods, including musical instruments, and computer goods .....	121,316	51,639	.43
Wheel goods (including bicycles and motorcycles), sports (also includes guns) and photographic equipment, boats, and pleasure aircraft .....	68,044	37,461	.55
Nondurable Goods			
Total comparable .....	1,821,581	1,111,681	.61
All nondurables (including those not comparable) .....	2,200,093	1,231,571	.56
Ratio of most comparable to all nondurables .....	.83	.90	
Food purchased for off-premise consumption .....	647,099	407,852	.63
Alcoholic beverages purchased for off-premise consumption .....	79,858	27,642	.35
Purchased meals and beverages .....	406,496	268,497	.66
Alcoholic beverages in purchased meals .....	42,840	17,386	.41
Shoes .....	50,695	33,823	.67
Women's and children's clothing and accessories except shoes (also includes clothing for infants) .....	151,152	82,418	.55
Men's and boys' clothing and accessories except shoes .....	93,906	42,800	.46
Gasoline, fuel oil, and other energy goods .....	208,235	166,716	.80
Tobacco products .....	88,076	33,255	.38
Toilet articles and preparations .....	53,224	31,292	.59
Services			
Total comparable .....	1,968,150	2,023,656	1.03
All services (including those not comparable) .....	4,610,095	2,675,975	.58
Ratio of most comparable to all services .....	.43	.76	
Owner occupied nonfarm dwellings .....	859,580	1,079,220	1.26
Rent and utilities, excluding telephone .....	487,765	451,467	.93
Rental value of farm dwellings .....	11,870	0	.00
Other lodging .....	54,656	33,992	.62
Telephone and telegraph .....	129,766	110,246	.85
Domestic service .....	18,481	10,743	.58
Other household operations (i.e., moving and storage, household insurance, rug and furniture cleaning, electrical repair, reupholstery and furniture, postage, household operation services not elsewhere classified) .....	57,569	57,496	1.00
Transportation .....	294,029	246,209	.84
Admissions to all events .....	35,624	21,312	.60
Radio and television repair .....	4,019	401	.10
Cleaning, storage, and repair of clothing and shoes .....	14,791	12,570	.85

Expenditures that the PCE covers include all that consumers spend and those made by other entities on behalf of consumers. Expenditures by other entities include those financed by non-profits and employers. The PCE also includes excise and sales tax, just as does the CE. The PCE excludes person-to-person transactions.

Data for the PCE are collected from businesses using numerous surveys and censuses. In general, the BEA uses the Census of Manufactures (CM) and Annual Survey of Manufactures (ASM) to obtain the basic value of shipments, the Census of Wholesale Trade (CWT) and Annual Wholesale Trade Survey (AWTS) to derive wholesale trade margins and taxes, the Census of Retail Trade (CRT) and Annual Retail Trade Survey (ARTS) to obtain retail trade margins and taxes, and the Census of Service Industries (CSI) and Service Annual Surveys.

Populations covered by CE and PCE are defined somewhat differently. The CE collects data from consumer units who are representative of the civilian noninstitutional population residing in the continental United States, Alaska, and Hawaii. The PCE includes all "persons resident" in the United States, including the nonprofit institutions that serve them. Persons resident includes persons who are physically located in the United States, visitors, tourists, employees of U.S. businesses working abroad for 1 year or less, and U.S. Government civilian and military personnel stationed abroad. Nonprofit institutions in the PCE populations are tax-exempt, non-business-like, not-for-profit organizations. These include public charities, domestic fraternal societies, labor organizations, political organizations, and social and recreation clubs, along with some professional organizations.

Three major reasons for the differences between CE and PCE are scope (both in terms of whose expenditures are being measured and how expenditures are defined), definition, and methodology. Some examples of these differences are grouped as follow:

*Scope:* PCE covers expenditures of nonprofit institutions, military personnel, and others whose expenditures are not covered in the CE. In addition, certain commodities are out of scope for previous comparisons, because the BEA uses the CE as the primary source for PCE estimates. For example, the BEA has used or still uses CE data directly—or through extrapolation—for motor vehicle leasing (cars and trucks), motor vehicle rental, taxis, nursery schools, and childcare.<sup>2</sup> In addition to population differences as noted above, other examples are value of home production for own consumption on farms; standard clothing issued to military; and services furnished without payment by financial intermediaries, except life insurance.

<sup>2</sup>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.

*Definition:* CE education expenses are out-of-pocket, while PCE education and research expenditures are those made by households and by profit and nonprofit institutions serving households. Other definitional examples are CE published expenditures for owner occupied housing (i.e., interest and charges, property taxes, maintenance and repairs, and other expenses) while PCE imputes rent to estimate owner occupied dwellings; CE premiums and contributions including those to Social Security; and PCE expenses of handling life insurance and pensions plans.

The CE estimates pension plans as out-of-pocket premiums and contributions, while the PCE estimates pension plans as the expenses of handling them.

*Methodology:* As mentioned earlier, BLS collects its CE data through two household surveys and integrates these data to the population. In contrast, PCE estimates are based on industry production with data collected from numerous surveys and censuses. CE, like any household survey, is subject to errors inherent in household surveys, such as proxy reporting<sup>3</sup> and under-reporting of certain expenditures, such as alcohol and tobacco, because of the sensitive nature of these products. Since PCE data are collected from censuses and surveys, data are subject to measurement errors and judgment errors.

These basic differences between the CE and PCE explain some of the discrepancies in estimates between the two. Considering these differences still yields varied estimates between the CE and PCE aggregates. A new comparison method was developed to present the numerical difference between the CE and PCE.

### **CE-to-PCE Comparison Methodologies (Historic and Reevaluated)**

Comparisons of CE estimates to PCE estimates have been made since the early 1980s. The first step to accomplishing any comparison is the selection of item categories for evaluation. The initial framework on which to produce matching CE-to-PCE estimates came from the detailed item categories in the CE 2-year report published biennially.<sup>4</sup> It has not been possible to create conceptually similar CE-to-PCE categories in every case. Sometimes, item categories have been combined to achieve comparability. In other instances, adjustments have been made to published CE categories, to produce categories comparable to PCE.

<sup>3</sup> The best way to define proxy reporting is to provide an example. In the CE, proxy reporting is likely a reason for lower estimates of out-of-pocket health insurance premiums, as compared with the Medical Expenditure Panel Survey (MEPS) and the source of some misreporting. This is because the respondent might not have perfect knowledge of the paying arrangements and out-of-pocket premiums for insurance policies held by other CU members. Some CU respondents may have claimed that policy premiums were paid entirely by an employer or union, when in reality, the CU actually paid some or all of the policy premiums.

<sup>4</sup> The last CE-to-PCE comparison was published in the *Consumer Expenditure Survey, 1998-99*, Report 955, November 2001.

Irreconcilable conceptual differences are present for categories such as health care, insurance, and finance charges and are excluded from CE-to-PCE comparison.

Having determined comparable CE-to-PCE item categories, basic CE and PCE expenditure data are processed and formatted to calculate annual estimates. Because CE Interview and Diary components collect expenditure data for many of the same items, one of the two survey components is chosen as the data source for the estimate. Estimates of PCE are generated by BEA and published in tables organized by type of product and type of expenditure.

For expenditure categories for which comparisons between the CE and the PCE can be made, a concordance is established that identifies which detailed CE and PCE items should be included to construct the category. Annual aggregate estimates for these items are summed for the CE and PCE, and ratios of these aggregates are calculated. Earlier comparisons were based on a classification by type of expenditure, while the re-evaluated method uses classification by type of products (i.e., durables, non-durables, and services).

### **Aggregate Estimates in CE and PCE Estimates (Historic Methodology)**

Aggregate estimates for expenditures in the CE and PCE, and trends in the ratio of CE estimates to PCE estimates are examined in this section. “Comparables” in this section are based on the methodology that was used for published CE-to-PCE comparisons in the CE 2-year reports last published by BLS in 2001. (See footnote 4.) The primary period of interest is 1992-2002, and PCE estimates are benchmarked to 1997. Several categories of expenditures are excluded from these and previous CE-to-PCE comparisons, as they are considered not comparable. These categories include health care, education, cash contributions, and personal insurance and pensions.

Aggregate expenditure ratios are presented in text table 3. Two different time periods were used to calculate these ratios. The first time period is for 1984 to 1991, since CE began publishing consistent data in 1984, and 1992 to 2002, because 1992 is a PCE benchmark year. Ratios represented by the average ratios for the two time periods reflect consistent decreases over time. The CE and PCE aggregates for rent, utilities, and other related goods and services were the highest at 92 percent and 89 percent for 1984 to 1991 and 1992 to 2002, respectively. CE-to-PCE aggregates were between 73 to 89 percent for transportation, household operations, and total food. CE aggregate expenditures were relatively low for apparel and services, entertainment, and personal care (between 54 to 67 percent). PCE miscellaneous expenditures were substantially larger than CE estimates, resulting in quite low ratios of between 0.20 and 0.29.

As the ratios show, gaps between the CE and PCE are widening for most commodity groups in the more recent time period, making studying the underlying reasons a pressing issue. While some reasons for differences—such as

definition, scope, and methodology between the CE and PCE—have been recognized and documented in the past when these comparative estimates were presented, a more formal, comprehensive examination has never been conducted. For this reason, a team was chartered to investigate issues relating to the differences between CE and PCE.

### **Reevaluated Comparison Methodology**

To understand better the differences in the CE and PCE, another classification system was used than the one for earlier comparisons. For this new re-evaluated method, in contrast to earlier comparisons based on classification by type of group, CE items are regrouped by UCC. This is to correspond with PCE classification aggregations by major type of product (i.e., durable goods, nondurable goods, and services), using the PCE Bridge Table provided by BEA. The Bridge Table provides the most detailed information available regarding what is included in each commodity aggregate in the PCE. For many cases, there was not a one-to-one match between the CE and PCE, even when concepts were generally the same. These are discussed in the section below.

The CE and PCE are compared using the following major aggregations: durable goods, non-durable goods, and services. This breakout is used to coincide with the way PCE classifies its sub-items in the Bridge Table. Within each of these sub-items, expenditure aggregates are presented using subgroup aggregations. All UCCs that are within scope are included in the comparison. In some cases, such as medical care, the category is in scope for both the CE and PCE; but the definitions are sufficiently different resulting in estimates that are not comparable. For the PCE, the full costs of health care are included regardless of payers, but for the CE only the expenditures made by consumer units, net of health insurance reimbursements, are included. Also, as in earlier comparisons, person-to-person sales (intra-household sector transactions) were included in the CE but were out of scope for the PCE and, thus, were deemed not comparable.

Text table 4 shows a comparison of CE-to-PCE 2002 aggregate expenditures by type of product but not adjusted for comparisons, while text table 5 shows this comparison for 1992, 1997, and 2002, using re-evaluated methodology. As seen in text table 4, a table of all items (comparable and not comparable), for 2002, the ratio of CE-to-PCE total goods and services is 0.60, not adjusting for comparability. CE aggregate durable goods expenditures are 76 percent of those for the PCE. CE nondurable goods account for 58 percent of the PCE value, while the services CE-to-PCE ratio is 0.58. These ratios are not adjusted to account for the differences in population represented by the CE and PCE. As noted earlier, PCE expenditures represent those made by a larger population than the CE population. For most commodities that are fairly comparable, the CE and PCE estimates are similar. When concepts differ, or the categories vary in composition beyond that which can be controlled, aggregate expenditures diverge and diverge substantially in some cases.

By considering only those items in the CE and PCE that are comparable to each other as identified by this study, the ratio of CE to PCE increases by an average of 0.22. (See text table 5.) In 1992, taking out non-comparable items increases the ratio from 0.67 to 0.88. This ratio takes into account only the comparability of the items, without adjustment for population differences between the CE and PCE. For nondurable goods and services in 1992, the ratios of CE to PCE both increased by taking out non-comparable items. For nondurable goods, the ratio went from 0.65 to 0.69; and for services, the ratio increased from 0.64 to 1.08. The ratio for durable goods decreased slightly from 0.89 to 0.86 in 1992. This was because net purchases of used autos, as well as aggregates for other vehicles, are not comparable in CE and PCE; both commodity groups had a ratio of CE to PCE well over 1.00.

In 1997, the ratio also improved with the comparability adjustment. In 1997, using only comparable commodity groups, the CE is 86 percent of the PCE, as compared to 65 percent for all items. The nondurable goods and the services ratios increased with the nondurable goods ratio increasing from 0.63 to 0.67 and the services increasing to 1.06 from 0.62. The ratio for durable goods decreased slightly from 0.81 to 0.79.

For 2002, the ratio with the comparability adjustment rose from 0.60 for all items to 0.83. As in 1992 and 1997, in 2002 the nondurable goods and the services ratios increased. The nondurable goods ratio rose from 0.58 to 0.63, while the services increased from 0.58 to 1.03. The ratio for durable goods decreased from 0.76 to 0.75.

Contributing to the improvements in the ratios is the number of items that must be taken out of the PCE to provide comparability with the CE. By taking non-comparable items out of the comparison, the ratio of the items remaining were mostly the “good ratios” that are close to 1.00. However, for some items, despite their comparability, the ratio is still low. This is the case for radio and television repair, which in 1992 had a ratio after accounting for comparability of 0.37, 0.20 in 1997, and 0.09 in 2002. Alcoholic beverages purchased for off-premise consumption is another item that continued to have a low aggregate expenditure ratio between the CE and PCE. In 1992 and 2002, the ratio of CE to PCE was 0.34; and for 1997, the ratio was 0.31. However, these low ratios are not surprising. As mentioned earlier, the CE is expected to have underreporting in spending on sensitive items, such as alcohol. This also explains the relatively low ratio for tobacco products for which the ratios were 0.57 in 1992, 0.51 in 1997, and 0.40 in 2002. However, the low ratio for radio and television repair cannot be as easily explained.

### **Detailed Results Based on Re-evaluated Methodologies**

#### **Durables**

Durables include motor vehicles and parts, furniture and household equipment, and other durable goods. Among

durable goods expenditures, those that are comparable for the CE and PCE are new automobiles, furniture (including mattresses and bedsprings), and kitchen and other household appliances. (See text tables 4 and 5.) As mentioned above, the ratio for durable goods in 2002 decreased from 0.76 to 0.75, when taking into account only the comparable items.

*Motor vehicles and parts.* Even though not comparable, CE aggregate expenditures were higher than those reported for the PCE with a ratio of 1.02 in 2002. The comparable item in motor vehicles and parts is new automobiles with a ratio of 1.10. Net purchase of used autos, not comparable, has the highest ratio at 1.93. The reason for such a high ratio in the aggregates for used vehicles could be that person-to-person sales are included in the CE—but not in the PCE.

*Furniture and household equipment.* Furniture and household equipment includes a broad set of items. The CE-to-PCE ratio for this group is 0.56 in 2002. From among the overall set of items, durable goods that appear to be most similar conceptually and operationally are furniture (including mattresses and bedsprings) and kitchen and other household appliances. The ratios for these are 0.68 and 1.07, respectively. Video and audio goods, including musical instruments and computer goods, are also comparable; but the expenditures from the CE are 43 percent of those reported for the PCE. The CE estimate is for non-business only. The difference could result from the way the CE and PCE determine non-business use.

*Other durable goods.* In 2002, the aggregate expenditures for other durable goods are lower in the CE than in the PCE with a ratio of 0.45. The items included in the CE and PCE are not exactly the same, and the PCE appears to be more comprehensive than the CE. Another source of difference is, in part, due to the reimbursements for ophthalmic products and orthopedic appliances in the CE and not in the PCE. CE aggregate expenditures for this grouping are 38 percent of the PCE amount.

#### **NonDurables**

Nondurables are grouped into four major categories: food; clothing and shoes; gasoline, fuel oil, and other energy goods; and other nondurable goods. Only the gasoline, fuel oil, and other energy goods category is considered comparable at the major group level. However, sub-groups of food are comparable when comparing the CE and PCE. In 2002, the ratio for the energy items is quite high at 0.84, while the ratio for food is lower at 0.66. (See tables 4 and 5.) When comparing only those items that are comparable between CE and PCE, the nondurable goods ratio rose from 0.58 to 0.63.

*Food.* CE expenditures for purchased meals and beverages are 70 percent of the value for the PCE, the highest ratio among food items. Included in the PCE—but not in the CE—

are additions to certain food groupings for the Women's, Infants', and Children's program (WIC), a federally sponsored program to support low-income women and children up to age 5 who are at nutritional risk, by providing food to supplement diets, information on healthy eating, and referrals to health care. In general, detail provided in the PCE is greater than that in the CE. PCE food furnished to employees is more comprehensive than the category used to produce the CE aggregate. The CE only includes the value of meals as pay, while the PCE includes the value of food provided to civilians and the military. If meals are provided in addition to pay, no amount is collected in the CE. Also, for the CE, no value is collected for military personnel living on base, as these personnel are not included in the CE population.

*Clothing and shoes.* CE clothing and shoes are not entirely comparable as a group with the ratio of CE expenditures to PCE at 57 percent; however, the sub-group shoes is fairly comparable with a ratio for shoes at 0.71 for 2002. The CE includes some athletic shoes in the recreation section, while the PCE includes all shoes here. The only other major item difference that appears for clothing and shoes is that standard clothing issued to military personnel is included in the PCE and not the CE.

*Gasoline, fuel oil, and other energy goods.* The CE and PCE appear to define durable energy goods the same conceptually. This is reflected in the result that the ratio is somewhat higher than the average for all nondurable goods. The CE-to-PCE ratio is 0.84.

*Other nondurable goods.* Other nondurable goods include a mix of items, for example, tobacco products, toilet articles and preparations, as well as flowers, seeds, and potted plants. Given this mix, it is not surprising that this category is not as comparable—the ratio is only 0.39 for the group. The two items under this category that are comparable are tobacco products and toilet articles and preparations. In 2002, the CE and PCE ratios for these two items were 0.40 and 0.58, respectively. However, the 0.40 ratio for tobacco products is not unexpectedly low despite the comparability of this item, because the CE is expected to have underreporting in sensitive items, as earlier noted.

## Services

Services include housing and household operations, transportation, medical care, recreation, personal care, personal business, education and research, and religious and welfare activities. Of the eight categories, only transportation was deemed to be comparable conceptually. Within these major groupings, differences in coverage sometimes exist. (See text tables 4 and 5.) In 2002, when comparing only those items that are comparable between PCE and CE, the services ratio rose more, from 0.58 to 1.03, than the ratios for durables and non-durables.

*Housing and household operations.* Unlike earlier comparisons, this comparison includes rental equivalence of owner occupied housing. Housing and household operations expenditures, which are not considered comparable overall, are 28 percent of the total CE aggregate expenditures for 2002. This category includes those for owner-occupied nonfarm dwellings, rent and utilities excluding telephone, rental value of farm dwellings, other lodging, telephone and telegraph, domestic services, and other household operations. The aggregate expenditure ratio for housing and household operation services is 1.06, with the ratios for the two largest items—owner occupied housing and rent and utilities excluding telephone—at 1.24 and 0.91, respectively. Both of these sub-groupings are considered comparable. Included in the rent and utilities excluding telephone item are the following sub-groupings, all of which are comparable: tenant occupied nonfarm dwellings, electricity, gas, and water and other sanitary services. Expenditures for electricity are approximately the same for CE and PCE, with a ratio of 0.98, while the ratios are lower for the other three sub-items—tenant occupied nonfarm dwellings has a ratio of 0.93, gas is 0.91, and water and other sanitary services is 0.67.

There are various possible reasons for the higher CE aggregate for owner occupied housing. In the CE aggregate, no adjustment is made to subtract the value of the flow of services from appliances already in the house, as is done in the PCE. Also, the BEA method for imputing rents could contribute to the difference, since their methodology is based on rent-to-value ratios from rental housing in a previous time period that could be up to 10 years—even though average space rents are updated by the Consumer Price Index (CPI) for owner occupied housing each year. This approach may underestimate the value of owner occupied housing in the PCE.

Rental value of farm dwellings, the only item within the housing and household operations category for which there are no CE data has a ratio of 0.00. The ratio for telephone and telegraph, which is comparable, is 0.84. Ratios for domestic services and other lodging, also considered comparable, are the lowest of all items in this group at 0.53 and 0.70, respectively. CE expenditures for other household operations are about the same as PCE, with a ratio of 0.99 even though differences do exist between CE and PCE. For example, household insurance is defined as premiums—net of reimbursements—for the PCE but as premiums only for the CE. Reimbursements in the CE are assigned to the category in which the housing repair occurred. These cannot be distinguished from non-insurance related expenditures.

*Transportation.* Transportation, which is comparable and has a 2002 CE-to-PCE ratio of 0.88, includes a broad range of services from repairs to passenger fares. Some of the CE-to-PCE ratios are quite high, with railway fares at 3.15 and vehicle insurance at 2.19. The source of the PCE data for railway



fares is Amtrak revenues. CE expenditures cover more than Amtrak in the United States, as well as travel abroad. If an all-inclusive travel package was reported by the respondent in the CE, the full value of the travel would be included in the CE—but not the PCE. As for other types of insurance, the treatment of insurance in the CE and PCE is different. Vehicle insurance is premiums net of reimbursements in the PCE, while in the CE only the premiums are collected, again resulting in a higher aggregate and ratio for the CE.

*Medical care.* Medical care, which is not comparable, includes expenditures provided by health care providers, health care facilities, and insurance. One of the reasons for the low ratios is that the expenditures of non-profits serving households are included in the PCE estimate and not the CE aggregates. Another reason is that CE expenditures are after reimbursements by insurance companies and other third party payers. Those for the PCE represent the full costs of the care regardless of the payer. CE-to-PCE ratios are quite low with the exception of medical care and hospitalization health insurance, which has a ratio of 1.64.

*Recreation.* Recreation, also not comparable, includes various activities, such as radio and television repairs and admissions to sporting events. The CE-to-PCE ratio for this category is low at 0.51. The largest CE-to-PCE ratio in this group is for pari-mutuel receipts at 1.03, followed by admissions to picture theater, theatre, opera, and entertainment at 0.76. The CE recreation category includes a few more items that do not appear to be in the PCE category, such as licenses for pets, fishing, and guns. One possible reason for the low CE ratio of 0.27 for commercial participant amusements is that these costs (for example, sightseeing) in the CE would be included under transportation travel when a package vacation is reported.

*Personal care.* This category is not comparable, and the overall CE personal care expenditures are about 46 percent of those reported in the PCE. The category for which the CE is extremely low is watches, clocks, and jewelry repair and miscellaneous personal services with a ratio of 0.05.

*Personal business.* Personal business, which overall is not comparable, includes a broad set of services and expenditures from the CE and PCE. These are comparable for some but not most sub-groups. Conceptually, funeral and burial expenses appear to be comparable, and the ratio is 0.72. Many of the other services included in the PCE are not ones for which consumers make direct payments. These are often included in the expenditure paid by the consumer for a particular service, for example, life insurance.

*Education and research.* Education and research, not comparable, is similar to medical care in that the expenditures of non-profits serving households are included with those of the households for the PCE. For most items in the education

category, consumers do not pay the full costs. For example, many college students receive grants, scholarships and other forms of payments provided by non-profits. In the PCE, the entire tuition and other associated costs are included; but in the CE, only those expenditures incurred by the household are included in the higher education aggregates. For the nursery school CE-to-PCE comparison, the CE includes nursery schools, day care, and preschool, as they cannot be separated out given the current detailed item classification system used by BLS. PCE allocates part of total childcare to education and research and all other to religious and welfare activities. This could explain why the CE-to-PCE ratio for nursery schools is high at 2.33.

*Religious and welfare activities.* As for education and research, religious and welfare activities expenditures in the PCE include those for non-profits serving households—not just those for households. This is one of the reasons this category is considered non-comparable. The ratio for the entire category is 0.61. Childcare is considered comparable in the CE and PCE. However, the estimates still differ with a ratio of CE to PCE of 0.23. As noted above, PCE includes daycare expenditures in childcare, while CE includes these expenditures with nursery schools. For 2002, combining just the nursery schools expenditures with just the childcare expenditures for PCE and CE yields a ratio of 0.76. (See text table 4.) The BEA uses the CE as the primary source of the childcare data, thus, other costs, such as operating costs, must be included in the PCE estimates.

### 2003 Data

Much of the analysis for this article was done prior to the release of the 2003 CE and PCE data. This section summarizes the comparisons using the 2003 data and the re-evaluated methodology. As shown in text table 6, the ratio of CE-to-PCE total goods and services is 0.60, not adjusting for comparability, as it was in 2002. By considering only those items in the CE and PCE that are comparable to each other, the ratio of CE to PCE increases to 0.82 in 2003, as compared to 0.83 in 2002. For nondurable goods and for services, the ratios of CE to PCE both increased by taking out non-comparable items. For nondurable goods, the ratio went from 0.56 to 0.61; and for services, the ratio increased from 0.58 to 1.03, very close to the 2002 ratios. The ratio for durable goods remained the same at 0.77, while in 2002, it decreased slightly from 0.76 to 0.75 when adjusting for comparability.

### Summary

The CE and PCE provide estimates of personal consumption expenditures. However, differences such as scope, definition, and methodology in the two result in the production of different estimates of aggregate expenditures.

Even after controlling for as many differences in the two data sources as possible, dissimilarities remain. Comparing only those items that were considered similar between the

two data series, the ratio of CE-to-PCE aggregate expenditures in 1992 was 0.88. In 1997, this ratio fell to 0.86. It further decreased to 0.83 in 2002, and by the year 2003, the ratio dropped to 0.82.

This article is the result of cooperation between the BEA and BLS; however, further research is needed to understand remaining differences in the PCE and CE. Without continued

examination of both CE and PCE data, the question of why differences in the CE and PCE exist—and why the trend is decreasing over time—will remain. Therefore, BLS will continue its efforts and research in this area, along with other efforts, such as examining the potential role of data collection changes to improve data quality, as well as conducting comparisons with data from other sources.

**Text table 3. Ratios of Consumer Expenditures to Personal Consumption Expenditures averages for 1984-1991 and 1992-2002 for selected expenditure categories (historic methodology)**

Item	1984 to 1991	1992 to 2002
Total food .....	0.77	0.73
Rent, utilities, and other related goods and services .....	.92	.89
Household operations .....	.87	.73
Apparel and services .....	.65	.54
Transportation .....	.89	.79
Entertainment .....	.64	.54
Personal care .....	.67	.60
Miscellaneous .....	.29	.20

Text table 4. Comparison of 2002 aggregate Consumer Expenditures to Personal Consumption Expenditures (PCE) (in millions of dollars), based on 1997 PCE benchmark

PCE categories			Aggregates		CE/PCE		
			PCE	CE	ratio		
Total durables, nondurables, and services			7,387,104	4,457,246	0.60		
Durable goods	Motor vehicles and parts		\$916,170	\$693,653	0.76		
			426,144	436,625	1.02		
		New autos <sup>1</sup>	101,649	111,924	1.10		
		Net purchases of used autos	58,392	112,513	1.93		
		Other motor vehicles	215,387	195,506	.91		
		Trucks, new and net used	203,461	183,394	.90		
		Recreational vehicles	11,926	12,112	1.02		
		Tires, tubes, accessories and other parts	50,716	16,682	.33		
	Furniture and household equipment		319,917	179,472	.56		
		Furniture, including mattresses and bedsprings <sup>1</sup>	68,288	46,171	.68		
		Kitchen and other household appliances <sup>1</sup>	31,537	33,666	1.07		
		China, glassware, tableware, and utensils	31,843	8,660	.27		
		Video and audio goods, incl. musical instruments and computer goods <sup>1</sup>	119,062	51,134	.43		
		Video and audio goods incl. musical instruments <sup>1</sup>	74,898	33,617	.45		
		Computers, peripherals, and software <sup>1</sup>	44,164	17,517	.40		
		Other durable house furnishings (i.e., floor coverings, lamps, blinds, writing equipment, hand tools, and supplies)	69,187	40,801	.59		
		Other durable goods	170,109	76,596	.45		
		Ophthalmic products and orthopedic appliances	21,642	8,122	.38		
		Wheel goods, incl. bicycles and motorcycles, sports and photographic equipment, and boats <sup>1</sup>	60,559	43,976	.73		
		Jewelry and watches	51,039	11,577	.23		
		Books and maps	36,869	12,921	.35		
		Nondurable goods	Food		2,080,101	1,212,863	.58
					1,005,828	659,973	.66
Food purchased for off-premise consumption <sup>1</sup>	615,603			389,640	.63		
Alcoholic beverages purchased for off-premise <sup>1</sup>	75,461			25,497	.34		
Purchased meals and beverages <sup>1</sup>	380,021			267,770	.70		
Alcoholic beverages in purchased meals <sup>1</sup>	40,591			16,487	.41		
Food supplied to civilians	9,052			2,563	.28		
Food supplied to military	676			0	.00		
Food produced and consumed on farms	476			0	.00		
	302,114			170,775	.57		
Clothing and shoes	Shoes <sup>1</sup>		49,281	34,960	.71		
	Women's and children's clothing and accessories except shoes <sup>1</sup>		149,204	87,889	.59		
	Men's and boys' clothing and accessories except shoes <sup>1</sup>		92,586	45,769	.49		
	Standard clothing issued to military personnel		343	0	.00		
	Sewing good for males and females		6,501	1,486	.23		
	Luggage for males and females		4,199	671	.16		
Gasoline, fuel oil, and other energy goods <sup>1</sup>	177,467		148,800	.84			
Other nondurable goods			594,692	233,315	.39		
	Tobacco products <sup>1</sup>		89,122	35,668	.40		
	Toilet articles and preparations <sup>1</sup>		54,154	31,144	.58		
	Semi durable house furnishings		37,390	16,258	.43		
	Cleaning and polishing preparations and miscellaneous household supplies		66,636	46,275	.69		
	Drug preparations and sundries		213,034	57,980	.27		
	Nondurable toys and sport supplies		58,955	16,107	.27		
	Stationery and writing supplies		18,077	14,609	.81		
	Net foreign remittances		4,035	0	.00		
	Magazines, newspapers, and sheet music		35,273	9,108	.26		
	Flowers, seeds, and potted plants		18,016	6,166	.34		
	Services	Housing and household operations		4,379,788	2,550,730	.58	
			1,553,754	1,647,839	1.06		
Owner occupied nonfarm dwellings <sup>1</sup>			820,710	1,0141,26	1.24		
	Rent and utilities, excluding telephone <sup>1</sup>	466,483	424,634	.91			

Text table 4. Comparison of 2002 aggregate Consumer Expenditures to Personal Consumption Expenditures (PCE) (in millions of dollars), based on 1997 PCE benchmark—Continued

PCE categories			Aggregates		CE/PCE
			PCE	CE	ratio
Services—Continued	Housing and household operations	Tenant occupied nonfarm dwellings <sup>1</sup>	258,677	240,872	0.93
		Electricity <sup>1</sup>	111,748	109,987	.98
		Gas <sup>2</sup>	40,838	36,967	.91
		Water and other sanitary services <sup>1</sup>	55,220	36,808	.67
		Rental value of farm dwellings	11,769	0	.00
		Other lodging <sup>1</sup>	53,633	37,333	.70
		Telephone and telegraph <sup>1</sup>	128,259	107,258	.84
		Domestic service <sup>1</sup>	16,754	8,958	.53
		Other household operations (moving and storage, insurance, furniture cleaning, electrical repair, postage, household operation services n.e.c.)	56,146	55,530	.99
		Transportation <sup>1</sup>	287,990	252,818	.88
		Repair, greasing, washing, parking storage, and leasing <sup>1</sup>	185,992	107,196	.58
		Bridge, tunnel, ferry tolls <sup>1</sup>	5,829	1,624	.28
		Insurance <sup>1</sup>	45,842	100,168	2.19
		Mass transit systems <sup>1</sup>	9,000	7,266	.81
		Taxicab <sup>1</sup>	3,384	2,833	.84
		Railway <sup>1</sup>	573	1,804	3.15
		Bus <sup>1</sup>	2,336	1,287	.55
		Airline <sup>1</sup>	28,113	27,306	.97
		Other including water passenger, passenger transportation arrangement, limousine service, other local transportation <sup>1</sup>	6,921	3,334	.48
	Medical care	1,210,272	197,331	.16	
		Physicians	278,304	16,539	.06
		Dentists	72,162	25,447	.35
		Other professional services	189,695	13,164	.07
		Hospitals	477,141	9,875	.02
		Nursing homes	96,873	1397	.01
		Health insurance			
		Medical care and hospitalization health insurance	79,721	130,909	1.64
		Income loss insurance	1,999	0	.00
		Workers' compensation	14,377	0	.00
	Recreation	299,556	151,663	.51	
		Admissions to all events <sup>1</sup>	34,583	21,888	.63
		Motion picture theater, theatre, opera, and entertainment	21,091	16,129	.76
		Spectator sports	13,492	5,759	.43
		Radio and television repair <sup>1</sup>	4,034	360	.09
		Clubs and fraternal organizations	21,051	12,098	.57
		Commercial participant amusements	78,332	21,032	.27
		Pari-mutuel net receipts	5,314	5,491	1.03
		Other including pets and pet services, veterinarians, cable TV, film developing, lotteries, video rental, commercial amusements n.e.c.	151,075	90,794	.60
	Personal care	92,893	43,015	.46	
		Cleaning, storage, and repair of clothing and shoes <sup>1</sup>	15,784	13,501	.86
		Barbershops, beauty parlors, and health clubs	41,637	27,893	.67
		Other including watch, clock, and jewelry repair, miscellaneous personal services	35,472	1,621	.05
	Personal business	552,124	40,022	.07	
		Brokerage charges and investment counseling	75,694	0	.00
		Bank service charges, trust services, and safe deposit box rental	75,502	3,652	.05
		Services furnished by financial intermediaries except life insurance carriers	193,684	0	.00
		Expense of handling life insurance and pension plans	84,750	0	.00
	Legal services	71,258	14,910	.21	
	Funeral and burial expenses	14,633	10,534	.72	