Constructing a PCE-Weighted Consumer Price Index

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Abstract

The Bureau of Labor Statistics (BLS) uses consumer expenditure and pricing data derived from four major surveys to identify domestic price changes through the publication of the Consumer Price Index (CPI). One of the four surveys, the Consumer Expenditure Survey (CE), produces data that are primarily used to construct expenditure category weights, or "item" weights. The Bureau of Economic Analysis (BEA) also identifies consumer expenditures through its publication of Personal Consumption Expenditures (PCE) in the National Income and Product Accounts. This paper evaluates current CPI estimation methods by constructing comparative price indexes for 2005-2010 that utilize weights derived from PCE data instead of using expenditure weights constructed from CE data.

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1. Introduction

Consumer Expenditure Survey (CE) data are a source of frequent debate in the federal statistical community. Because survey data comprise CE, arguments ranging from population and item coverage bias to inaccurate reporting have been cited as disadvantages of the CE.[2] However, alternatives are few and far between, and CE data have many advantages, including scope and population specificity. CE data are utilized in a variety of sources, but definitely one the most important uses is in the construction of weights for the U.S. Consumer Price Index (CPI). Reported expenditures in the CE survey directly affect how each item category is represented in the index. In order for the CPI to be an accurate measure of price change, it is vital that the weight data are accurate and representative of the appropriate population. If there is a systemic bias in the CE weights, each CPI release will then be biased.

An alternative source of consumer expenditure data and an alternate index is the Personal Consumption Expenditures (PCE) component of the National Income and Product Accounts (NIPA), produced by the Bureau of Economic Analysis. These data are based on a census of establishments and a variety of other sources rather than on a single survey, and they are widely used to measure consumption expenditures. This paper examines the accuracy and reliability of CE data by recalibrating CE weights to PCE expenditure levels using a PCE over CE spending factor. These new weights are then used to construct indexes for the years 2005-2010 using CPI methodology, and those indexes are then compared to the official CPI. One of these indexes uses PCE expenditure levels with CPI item definitions (or "what" falls into each item category) and PCE expenditure definitions (or how expenditure data is collected for that item category). The other index uses PCE expenditure levels, CPI item definitions, and CPI expenditure definitions. Doing this will allow us to gain a better understanding of item representativeness and item response accuracy in the CE-sourced CPI aggregation weights. It will also be useful in providing a check of the two data sources against each other. Both PCE and CE measure consumer expenditures, but they do so in very unique ways.

2. Data and Hybrid Index Design

Previous work has studied weighting bias, deflator differences, and expenditure ratios between PCE and CE in order to stimulate discussion and methodological improvement. This paper will build upon that body of work by reconstructing CPI aggregation weights using PCE expenditure levels and item definitions in order to create hybrid indexes. These hybrid indexes use CPI index methodology and CE

[2] Garner, Thesia I., George Janini, William Passero, Laura Paszkiewicz, and Mark Vendemia provide a brief chronology of work comparing CE and PCE in "The CE and the PCE: a comparison." Monthly Labor Review, September 2006, pp. 20-46.

expenditure data to construct weights as the CPI does; however, CPI expenditures in the hybrid index aggregation weights are multiplied by factors that adjust them to PCE expenditure levels. The following pages will discuss the realities of creating such PCE-calibrated CPIs using current CPI methodology and will describe both results and drawbacks of such work. Designing a PCE-calibrated CPI will be especially valuable to the current discussion of CE design, as it gives us a better idea of whether CE item response is both accurate and representative.[3] We see this not only through the closeness of the match between the CPI-U and a PCE-calibrated, CPI-valued index but also through the item relative importance differences between the two.

To create PCE-calibrated indexes, a concordance between CPI and PCE item classifications is required. With this concordance, PCE expenditures can be approximately matched to CPI item classifications and used to adjust the CPI numbers to the levels where they would be if a PCE index were constructed in the same manner as the CPI using CPI item definitions but PCE expenditure definitions. This constitutes the PCE scope index in this study: a PCE-calibrated, PCE-valued index. The PCE scope index will be referred to as PCE1 in this paper. The second created index goes one step further and tries to maintain the CPI structure but account for PCE expenditure definition differences using factors derived from secondary sources. These factors adjust items to match CPI expenditure definitions where necessary. For example, both PCE and CPI measure apparel data in the same way, but they measure medical data differently: CPI only uses out of pocket consumer spending for medical goods and services, whereas PCE takes into account all expenditures made both by and on behalf of consumers for medical goods and services, taking into account additional expenditures such as insurance payments and contributions by non-profits. Therefore, this secondary index includes a factor that adjusts PCE medical expenditures down to include out of pocket payments only. This index will be referred to as PCE2 for the purposes of this paper. The methodology section below will elaborate on this process.

2.1 Previous Consumer Expenditure Data Comparisons

Numerous authors have undertaken important research into the comparison of PCE and CPI data on consumer expenditures in order to examine the quality and accuracy of CE. This previous work delves further into potential causes of bias and error between PCE and CE. Lebow and Rudd (2003) approached the issue of weighting bias in the CPI after the 1990s brought about tremendous change in CPI methodology.[4] They constructed a set of PCE weights to compare to CPI weights in the same time period by performing a variety of adjustments to PCE data and then aggregating the weights. They excluded out-of-scope items, adjusted medical, housing, and education expenditures to more closely align with CPI

[3] For a description of the current CE redesign project, see www.bls.gov/cex/geminiproject.htm.
[4] See Lebow, David E. and Rudd, Jeremy B. "Measurement Error in the Consumer Price Index: Where Do We Stand?" Journal of Economic Literature, March 2003, pp. 159–201.

values, and attempted to adjust for population using a factor. Fixler and Jaditz (2002) compared the CPI and the PCE deflator, the BEA's price index computed from PCE data, and attempted to derive the magnitude of index difference attributable in 1992-1997 to each type of major difference: formulaic, conceptual, and implementation-related.[5] They focused on what they called an "accounting" solution that attempted to adjust for each of the major differences and calculate its ratio of the index discrepancies; Fixler and Jaditz did not attempt to examine weighting or pricing issues directly. McCully, Moyer, and Stewart (2007) build on work like that by Fixler and Jaditz to expand the time period addressed forward to 2007 and calculate formula, scope, weight, and "other" effects, such as seasonal adjustment, that cause fundamental differences between the deflator and the CPI.[6] Garner, Janini, Passero, Paszkiewicz, and Vendemia (2006) have produced a variety of papers in which they construct and update expenditure category ratios between PCE and CE data.[7] Those authors construct ratios for both comparable and non-comparable goods and services categories, taking care to examine each category in their paper and explain the caveats to the comparison and provide some reasons why ratios differ from one. A ratio of one would indicate a perfect expenditure match for a given item category between PCE and CE. Many other authors including Clark (2003), Triplett (1978 and 1981), Parker (1994), Schultze and Mackie (2002), and others have also examined the PCE and CPI; the work of the authors mentioned above adds to the debate about differences between the two subjects.

All of the papers discussed above bring to light a variety of fundamental issues in attempting to relate PCE and CE or CPI data. Garner, Janini, Passero, Paszkiewicz, and Vendemia (2006) explain data collection methodology differences between the two. CE obtains its data through a series of diary and interview surveys of consumers. In contrast, PCE data comes from a variety of data sources but is primarily derived from the quinquennial Economic Census, with data from trade and industry surveys to supplement in the off years (or non benchmark years). Many authors speak of the item scope differences between the two surveys. As McCully, Moyer, and Stewart (2007) explain, CPI includes out of pocket consumer expenditures and PCE includes purchases both by and on behalf of consumers. Two big conceptual differences discussed by Fixler and Jaditz (2002) are population and implementation at the component level. In most cases, they argue, CE data should be a subset of PCE data. PCE includes expenditures by military personnel and third party payers such as employers that CE does not allow. However, there are some areas in which CE and CPI go outside of the bounds of PCE. PCE does not include items that it considers coercive, such as vehicle registration and licensing, which are included in

[5] See Fixler, Dennis and Jaditz, Ted. "An Examination of the Difference Between the CPI and the PCE Deflator." BLS Working Paper 361, June 2002.
[6] For more information see McCully, Clinton P., Brian C. Moyer, and Kenneth J. Stewart. "A Reconciliation between the Consumer Price Index and the Personal Consumption Expenditures Price Index." September 2007.
[7] See Garner, Thesia I., George Janini, William Passero, Laura Paszkiewicz, and Mark Vendemia. "The CE and the PCE: a comparison." Monthly Labor Review, September 2006, pp. 20-46.

both CE and the Consumer Price Index. PCE also does not include CPI and CE items such as lawn mowers and garden tractors, household maintenance and repairs, and fishing and hunting licenses. There are even differences in definition between items that match each other in the two indexes, such as apparel and food. In many cases, PCE and CPI categories will be a perfect match, except that the item definitions in CPI will be arranged in a way that is slightly different from how it is done in PCE. For example, CPI and PCE apparel categories concord perfectly, except that CPI includes wallets, umbrellas, and purses in apparel under accessories. PCE includes these items not in apparel but in luggage. Some of this structure knowledge is derived from concordance research conducted as a collaborative effort between the CE, CPI, and PCE offices (Blair, Cage, Garner, McCully, and Passero 2011).

Garner, Janini, Passero, Paszkiewicz, and Vendemia (2006) note that previous studies have shown that although underreporting in CE and diminished representativeness or respondent accuracy may be a cause for the difference between PCE and CE results, the magnitude of PCE revisions indicates that there are potential estimation issues coming from those data as well. Issues may also arise in the way that PCE uses a variety of data sources. The general consensus among authors who studied both PCE and CE data was that one could not be chosen as the whole source of bias and difference between the two, and all agreed that there was further work to be done.

2.2 Index Methodology

Two experimental indexes were constructed in this study: a PCE scope index that is PCE-calibrated using PCE valuation of consumption (PCE1) and a CPI scope index that is PCE-calibrated using CPI valuation of consumption (PCE2). PCE1 was created in the following manner:

1. A CPI elementary level item (ELI) to PCE series code concordance was created with input from CE and the BEA. In the concordance, ELIs were assigned to the lowest-level matching PCE series code publicly available. Although this was sometimes a perfect match, sometimes multiple ELIs matched to one broad PCE code and sometimes an ELI had to be split between multiple PCE codes in the concordance. Using this concordance, all ELIs were broken down into one of three categories: out of PCE scope (labeled ‘N/A’ in Appendix A), one PCE series code per ELI, and multiple PCE series codes per ELI.

One example of an ELI that falls outside the scope of PCE is TF011:

ELI	ELI Description	PCE Series Code	PCE Description	Allocation Ratio
TF011	STATE VEHICLE REGISTRATION AND DRIVER'S LICENSE	N/A	N/A	0.00

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An example with the other two types of ELIs can be seen below in apparel:

ELI	ELI Description	PCE Series Code	PCE Description	Allocation Ratio
AA021	MEN'S UNDERWEAR, HOSIERY AND NIGHTWEAR	DMBCRC	Men's and boys' clothing	1.00
AA022	MEN'S ACCESSORIES	DMBCRC	Men's and boys' clothing	0.93
AA022	MEN'S ACCESSORIES	DLUGRC	Luggage and similar personal items	0.07

The ELI AA021 maps into only one PCE series code, DMBCRC. AA022, however, maps mostly into DMBCRC but also maps in part to DLUGRC. This is because CPI includes wallets and umbrellas in apparel, whereas PCE includes those items in luggage.

2. Allocation ratios were assigned to each ELI-PCE code combination so that all ratios for an ELI summed to one.[8] All ELIs that matched perfectly to one PCE code, regardless of the number of ELIs per PCE code, were given a value of '1' as in the example above for ELI AA021. ELIs that are not included in the scope of PCE were given a value of '0', as shown above in the TF011 example. All other ELIs were divided into their component PCE series codes using underlying CE expenditure data at the observation level. For most ELIs, this meant using data at the CE diary survey level. For the few split ELIs that are only available in the interview portion of CE, an even split ratio was provided for all PCE codes that mapped to the ELI. This was only the case in two education ELIs. In the apparel example above, a scan of all 2003-2008 AA022 diary data showed that 7% of all AA022 expenditures were wallets and umbrellas, whereas 93% of AA022 consisted of other accessories. Therefore, the AA022 allocation ratios are 0.93 for DMBCRC and 0.07 for DLUGRC.
3. The ratios were multiplied by CPI expenditure data and then summed across PCE codes to create a set of total CPI expenditures by PCE code.
4. Using NIPA underlying table 2.*4.5U. Personal Consumption Expenditures by Type of Product* and the CPI expenditures data from Step #3, PCE/CPI factors were created for each PCE series code. For example, in a PCE category where PCE reported $200 of expenditures and CE reported $100 of expenditures, the PCE/CPI factor would be 2.
5. The factor was applied to CPI expenditure data as reported in CE to recalibrate CPI aggregation weights to PCE values for the 2003-2008 period. For example, an ELI that

[8] If the ELI did not completely map to PCE, i.e., part but not the ELI but not the entire ELI was out of PCE scope, then the ratios for that ELI would sum to the percentage of ELI expenditures that were within scope for both CE and PCE. For example, the ratios for EE031, "Other Information Services", sum to approximately .98 because a small web services component of that ELI does not map to PCE at all.

matched one-to-one in definition with a PCE series code would have a recalibration factor of 1. If PCE reported $200 in expenditures for that PCE code and CPI reported $100 in expenditures for that PCE code, then the factor would be 2 as in Step #4. Because of the perfect definition match, the PCE calibration for this ELI would simply multiply the CPI expenditures value by 2.

6. The adjustments in Step #5 were made for each ELI at the reported CPI expense level. The resulting adjusted costs were then weighted and summed to the elementary CPI item-area category level, annualized for the 2003-2004, 2005-2006, and 2007-2008 expenditure reference periods, and converted into aggregation weights.
7. The new aggregation weights were then used to create indexes for 2005-2010 using standard CPI-U methodology.

Because two market basket structure changes have taken place in the CPI over the past few years, the aggregation weights were adjusted depending on the market basket structure used in that year. The final result of this work was a set of biennial expenditure weights by CPI item-area that could be used to create PCE1 under standard CPI methodology. That is, the indexes presented here all employ the same formula and biennial weight update process used in the CPI-U, whereas the PCE indexes published by the BEA use quarterly weights and a Fisher Ideal index formula.

An important difference between the CE and PCE weights is that the former are calculated and used in the CPI at the item-area level. For example, the CPI employs "apple" category weights for 38 geographic areas and matches them to 38 corresponding area-level basic price indexes. In contrast, PCE weights and indexes are basically at the national level. For this paper, elementary item-area prices and adjusted weights were used.

To create PCE2, the original recalibration factors were modified by secondary source data to create a new set of factors that not only reflected differences in item definition, but also reflected differences in expenditure definition. The CPI apparel example above is a difference in item definition: CPI wallets and umbrellas are listed in clothing accessories, whereas PCE wallets and umbrellas are included in luggage; the ratios for both PCE1 and PCE2 are created so that the wallet and umbrella value from CPI apparel is recalibrated by PCE luggage expenditures. An expenditure definition difference can be seen in CPI education: CPI higher education tuition reflects only out-of-pocket payments, whereas PCE higher education tuition reflects all payments – out-of-pocket and third party; the expenditure factor must be adjusted by a constant that represents the average US out-of pocket spending on college tuition as a percentage of total US spending on college tuition. After this proportion adjustment is made, the process aligns perfectly with the process used to create PCE1 in Steps #4-7 above.

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In this project, eight adjustments are made to differentiate PCE2 from PCE1, or to adjust PCE categories with different expenditure definitions to fit CPI expenditure definitions. In many cases, this adjustment served to remove third party payments from PCE expenditure data. The adjustments and affected ELIs can be seen in Figure 1 below, with GJPPV as a data source referring to Garner, Janini, Passero, Paszkiewicz, and Vendemia (2006).

Table 1: PCE2 Adjustments by ELI

ELI	PCE Series Code	Adjustment Factor	Data Source
All "EB" ELIs	All	0.59375	NCES
FV051	DMSLRC	0.59375	NCES
GD051	DFEERC	0.08	GJPPV
HA011	All	0.98	GJPPV
HF011	All	1.02	GJPPV
HF021	All	0.86	GJPPV
HG011	All	0.69	GJPPV
MA011	All	0.167	AHRQ
MA090	DOMORC	0.167	AHRQ
All "MC" ELIs	All	0.167	AHRQ
All "MD" ELIs	All	0.167	AHRQ
All "ME" ELIs	All	0.167	AHRQ
MB023	All	0.167	AHRQ
All "TD" ELIs	All	0.67	GJPPV
TE011	All	2.11	GJPPV

For PCE2, student tuition and board expenditures from PCE1 are adjusted to exclude third party payments such as grants using National Center for Education Statistics data on total and out-of-pocket costs of college for American students.[9] Medical expenditures that typically include some insurance payment component are adjusted to exclude third-party payments made by employers and others using data from the Agency for Healthcare Research and Quality's Medical Expenditure Panel Survey (2008).[10] Utilities, rent, financial services fees, vehicle insurance, and vehicle maintenance and repair are adjusted using the CE-PCE ratios in Garner, Janini, Passero, Paszkiewicz, and Vendemia (2006) to fit PCE levels. The ratios from Garner, Janini, Passero, Paszkiewicz, and Vendemia (2006) are not ideal for such an index because they include other factors beyond expenditure difference such as item under- or over-

[9] The NCES data used is derived from Tables 1 and 2 in "What Is the Price of College? Total, Net, and Out-of-Pocket Prices in 2007-2008." (Wei, 2010)

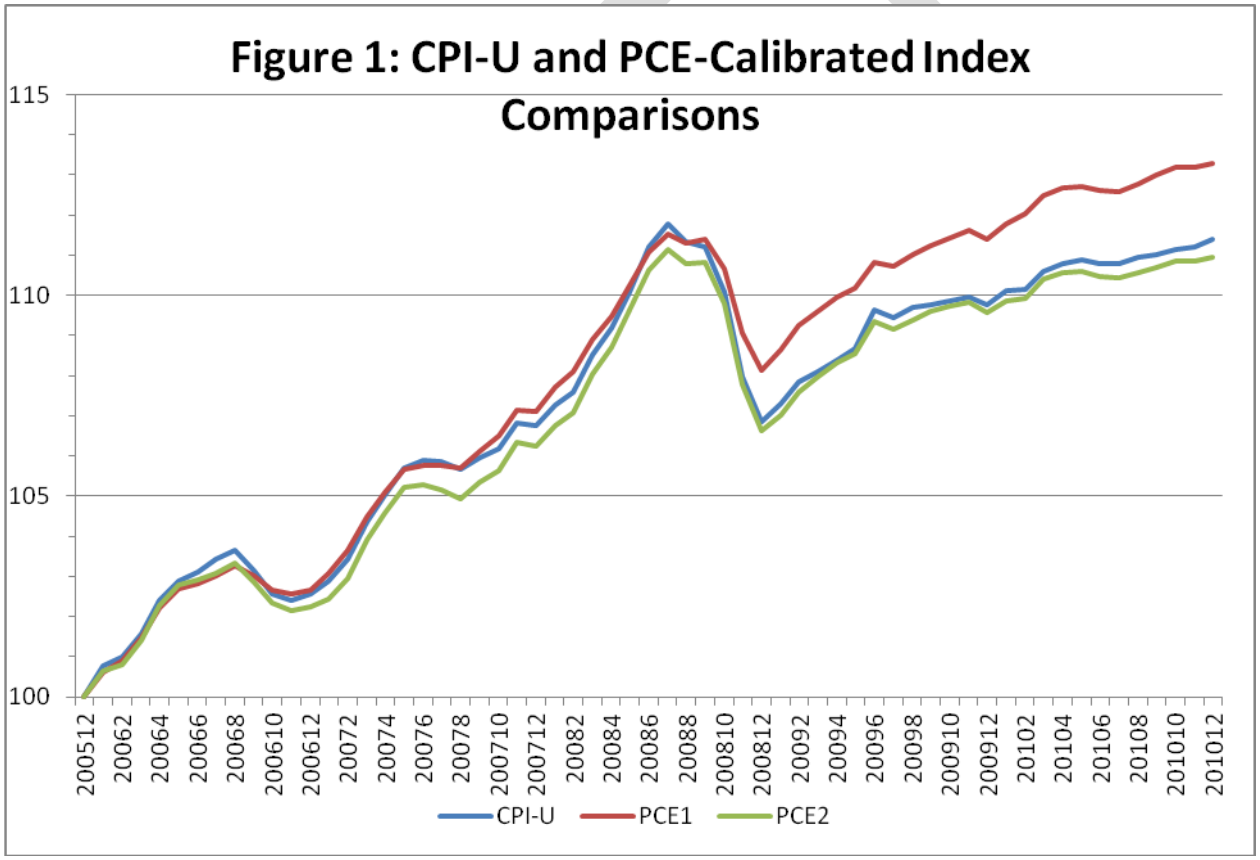
[10] MEPS data comes from "Medical Expenditure Panel Survey Table 1: Total Health Services-Median and Mean Expenses per Person With Expense and Distribution of Expenses by Source of Payment: United States, 2008."

reporting.[11] However, in these cases, quality national data that separated item costs by the expenditure type needed is unavailable.

3. Results

3.1 CPI-defined Hybrid Index

When the PCE-calibrated indexes are compared to the CPI-U between 2005 and 2010, it is clear how closely the published CPI-U and PCE2 track each other. As shown in Figure 1 below, the CPI-U tends to be slightly higher than PCE2. Overall, though, the PCE2 5-year annualized growth rate is only 0.081% lower than the CPI-U 5-year annualized growth rate. In contrast, the PCE1 5-year annualized growth rate is 0.344% higher than the average CPI-U 12-month change.



Lebow and Rudd (2003) concluded that the CPI has an upward bias of approximately 0.1 percent per year due to inaccurate weights. Their conclusion was based on comparison of indexes using CE and PCE weights over the 1987-2001 period, with those weights computed at the 24-item level. This paper,

[11] The goal of this paper is to produce broad-level PCE/CE ratios to shed a critical light on how the two have changed over the years. These ratios may differ from 1 for a variety of reasons other than differences in the way category consumer expenditures are measured.

using a later time period and a more detailed weight and index decomposition, shows a lower average growth rate in the PCE-calibrated, CPI-valued index than in the CPI-U, but the difference is of the same magnitude as that found by Lebow and Rudd.

Figure 1 demonstrates the shape and direction of the indexes. As previously noted, both indexes containing the CPI definitions (CPI-U and PCE2) move together and are lower than the index that uses PCE expenditure valuation (PCE1). This is logical because PCE expenditures in the medical and education categories are much higher due to the fact that they include third-party expenditures. However, the figure also shows that the CPI-U is slightly higher than PCE2. This may be due to differences in contributions to the direction of the index between item categories. However, because the adjustments between PCE1 and PCE2 are broadly applied, it could also be due to differences in the ways in which individual items are affected by the adjustment factors. In other words, if consumers spend more out of pocket than the average of 16.7% used in this study on a given medical item, that item could play a role in driving the PCE2 index down.

In Figure 2, the 12-month index change values for each of the three indexes can be seen. While 5-year average 12-month index change for the CPI-U is approximately 2.013%, that value is 0.025% lower for PCE2 and 0.446% higher for the PCE1 index. This is consistent with the previously discussed results.

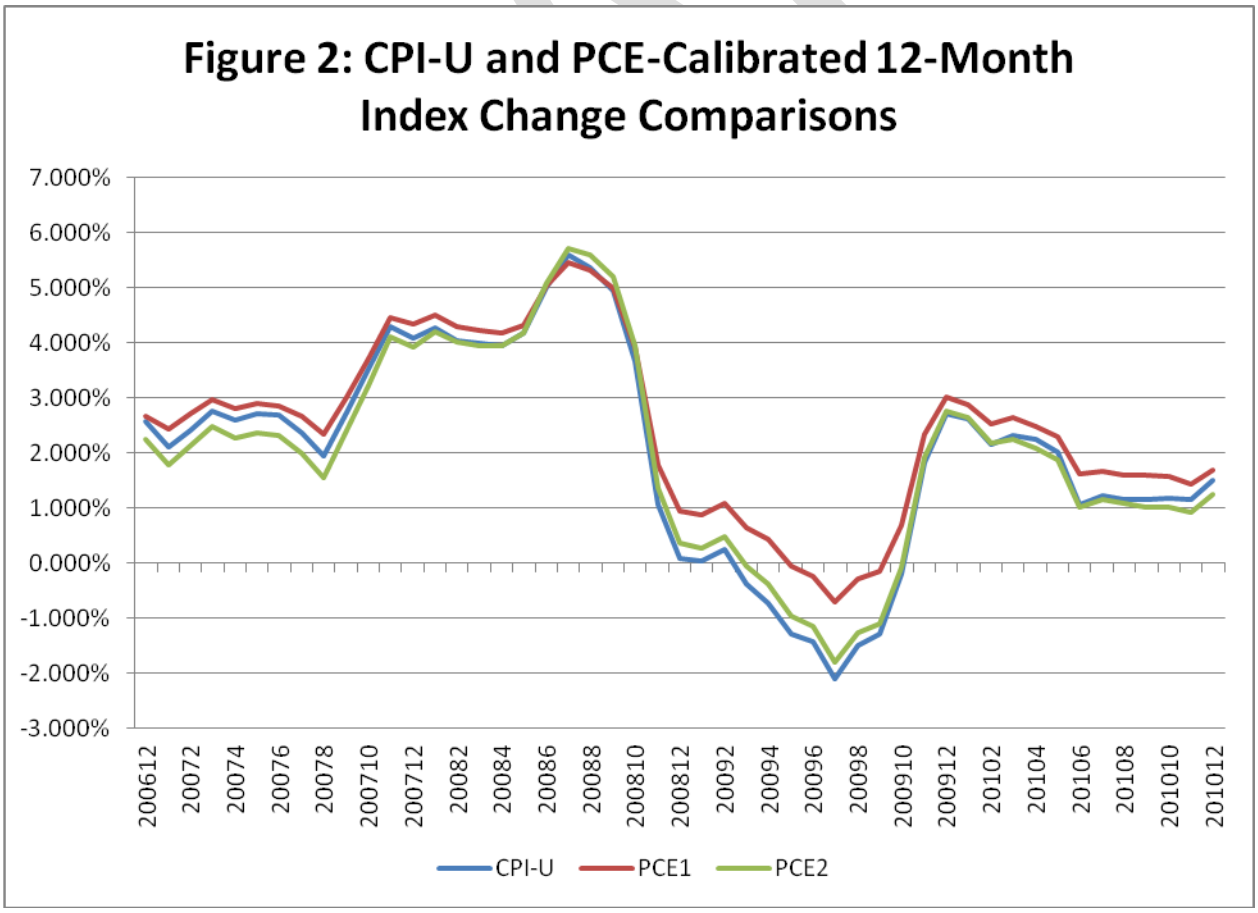
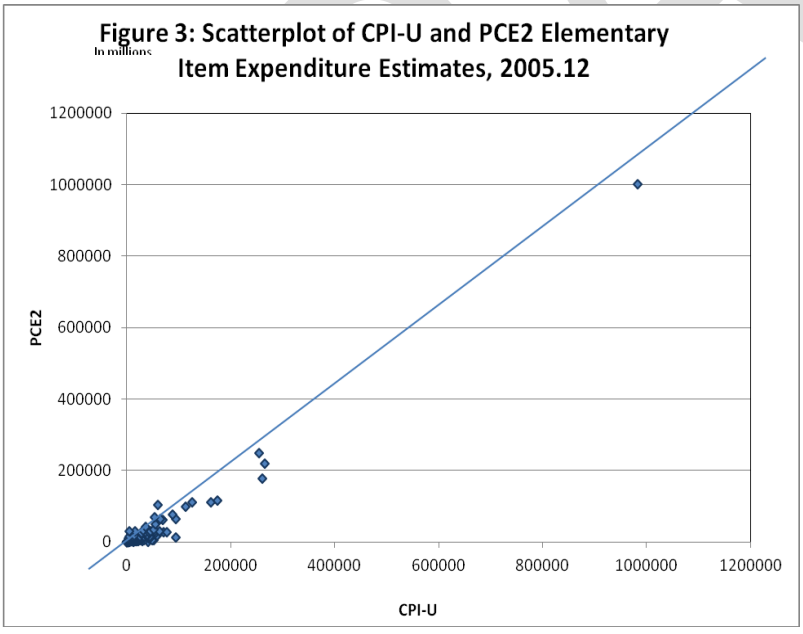


Table 2 shows change in total expenditure values between the three indexes. In the CPI-U, expenditure levels moved from about 4.3 trillion dollars in 2005 to 5.1 trillion dollars in 2010. NIPA published total expenditure estimates tend to be a little bit over twice the value of published CE expenditure estimates. As would then be expected, PCE1 consistently doubles the CPI-U expenditure values. PCE2, the hybrid index that includes data at PCE expenditure levels but adjusted down to CPI expenditure definitions, falls in between the CPI-U and PCE1, with expenditures totaling approximately 6.1 trillion in 2005 and rising to 8.9 trillion dollars at the end of 2010.

Table 2: Total Expenditures by Index

Period	CPI-U	PCE1	PCE2
Dec-05	$ 4,267,539,636,086	$ 7,738,382,681,973	$ 6,140,514,289,472
Dec-06	$ 4,377,219,002,599	$ 7,945,464,539,249	$ 6,278,530,412,729
Dec-07	$ 4,862,114,049,610	$ 8,736,457,746,387	$ 6,884,800,967,184
Dec-08	$ 4,866,572,610,652	$ 8,819,747,869,241	$ 6,909,733,353,949
Dec-09	$ 5,053,102,025,748	$ 9,266,066,367,994	$ 7,510,541,584,499
Dec-10	$ 5,128,680,524,751	$ 9,439,390,164,825	$ 7,615,139,459,420

3.2 Item Representation



In 2008, the median item PCE-to-CPI expenditure ratio was 2.069 – this is a simplified approximation of the ratio that was applied to CE data in Step #3 in order to create weights for the PCE scope and CPI scope indexes. It aligns well with the previously stated final expenditure totals: the final PCE1 expenditure total was approximately twice the CPI-U expenditure total. This is important because the ratios vary by item, and items with extreme expenditure values or ratios could skew the expenditure totals up or down; that does not, however, appear to have been the case here.

Figures 3 and 4 show scatterplots of the CPI-U and PCE2 expenditure values for each item (with owner's equivalent rent excluded in Figure 4, so that all other items may be more easily examined).

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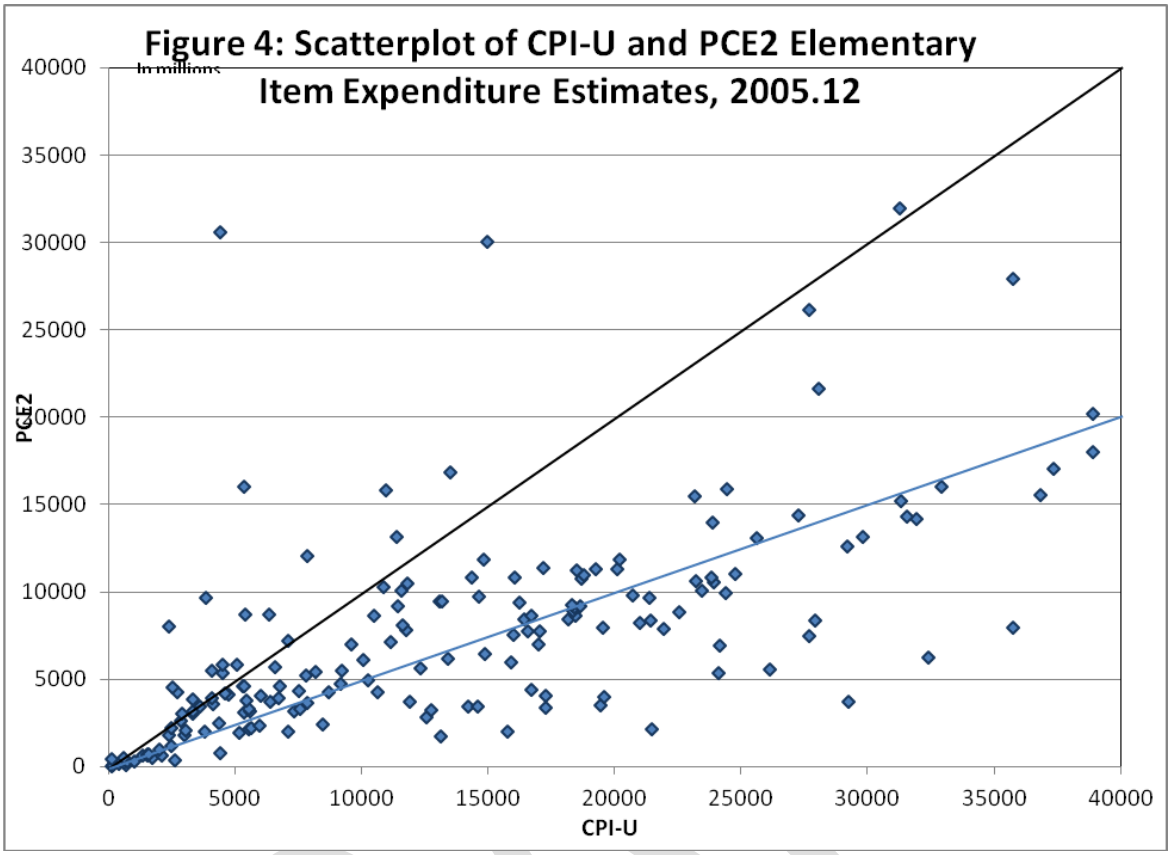


Table 3 below shows item category relative importances for the three indexes using December 2005 weights. As one might expect, we see large differences in housing and medical relative importances between PCE1 and PCE2 and small differences in these relative importances between the CPI and PCE2. Some categories show larger differences between the CPI-U and PCE2, which could be indicative of an item representation issue in CE. Four categories that are commonly cited as being underrepresented in CE due to respondent behavior are apparel, other goods, tobacco, and alcohol. This expectation is supported by the evidence from this study. Tobacco and alcohol, which are believed to be underreported because of their sensitive nature, also have a significantly smaller relative importance in the CPI-U than in PCE2 index. Apparel and other goods may be underreported in CE because of proxy reporting: if only one member reports expenditures for the entire household, they may be more aware of family food, housing, and education purchases than of the clothing and other personal goods purchases made by all household members.[12] Both of those categories also have significantly higher relative importance values in both PCE-calibrated indexes than they do in the CPI-U.

[12] Garner, Thesia I., George Janini, William Passero, Laura Paszkiewicz, and Mark Vendemia provide an in-depth discussion of underreporting in the context of PCE/CE ratios in their 2006 paper.

Table 3: December 2005 Item Relative Importances		PCE-Calibrated Indexes	
CONSUMPTION CATEGORY	**CPI-U**	**PCE1**	**PCE2**
FOOD AND BEVERAGES	15.1%	13.7%	17.2%
Food at home	8.0%	7.0%	8.8%
Food away from home	6.0%	4.9%	6.1%
Alcoholic beverages	1.1%	1.8%	2.3%
HOUSING	42.4%	26.2%	32.5%
Rent	5.8%	3.4%	4.1%
Owner's equivalent rent	23.4%	12.7%	16.0%
Other housing	13.1%	10.1%	12.4%
APPAREL	3.8%	4.4%	5.6%
MEDICAL CARE	6.2%	22.2%	5.1%
TRANSPORTATION	17.4%	13.6%	17.3%
Motor vehicles	7.9%	5.1%	6.4%
Gasoline	4.2%	3.4%	4.3%
Other transportation	5.4%	5.1%	6.6%
EDUCATION AND COMMUNICATION	6.0%	6.2%	6.1%
RECREATION	5.6%	6.8%	8.5%
TOBACCO	0.7%	1.0%	1.2%
OTHER GOODS AND SERVICES	2.8%	6.0%	6.4%
	100.0%	100.0%	100.0%

PCE1 relative importances are slightly different. Because medical care is measured so differently between the two sources (CE and PCE) and therefore carries a large adjustment in this study, medical care makes up almost a quarter of PCE1, but makes up only five percent of the CPI-U and PCE2. In accordance with the other adjustments made to create PCE2, the PCE1 transportation and housing categories have lower relative importances than the corresponding CPI-U and PCE2 categories, while PCE1 education is a bit higher. Slight variations exist in some of the other item categories such as recreation and other goods. This merits further investigation; it is possible that there could be a significant difference in item representation in one of those categories as well.

3.3 Caveats

As mentioned above, there are a variety of ways in which it is nearly impossible to create a perfect PCE-calibrated CPI due to differences in the nature of the data. Although secondary source data does make the ratio estimates for education and medical expenses are more useful, they are applied broadly in the creation of PCE2 rather than disaggregated down to the item level. It is unlikely that the ratio of medical expenditures that are paid out-of-pocket by consumers will be identical for the purchase medical specialist services and prescription drugs or primary care doctor visits. It is also possible that the

proportions of education expenditures for public and private universities are different between the CPI and the NCES survey from which the tuition ratio is derived. Certainly there are ratios other than those created by Garner, Janini, Passero, Paszkiewicz, and Vendemia (2006) in which the non-consumer portion of the ratio can be removed in aggregation, although they may be difficult to find in secondary sources. In addition, the populations covered by the aggregate CPI-U and PCE data are very different. CPI-U data cover urban, non-military, non-institutional households, whereas PCE data cover domestic consumers including third parties that make purchases on behalf of consumers. PCE does not include domestic consumers who have been and will be in the country for less than one year.

Other small discrepancies may arise in specifics of the concordance and in the scope of the two consumption datasets; PCE and CPI both contain items that are out-of-scope in the other consumption data. In order to produce the two indexes above, four ELIs from the three market basket structures used had to be removed altogether because they are considered out-of-scope in PCE and therefore have no expenditure value. Vehicle registration and license fees are seen as coercive and not included in PCE, while gardening and lawn services and inside home maintenance and repair are not included in PCE because they are considered to be intermediate expenditures of homeowners. Some additional portions of CPI items, such as hunting and fishing licenses, are excluded from PCE. In such cases, the portion of the ELI that is not used in PCE was removed, causing these ELI proportions to sum to less than one. There is also the potential for item definition differences that were not addressed in the concordance used for this study. This is because CE uses survey data, and item definition interpretations can vary from respondent to respondent. For example, PCE disaggregates the CPI "souvenirs" UCC out to categories that describe the individual components. Guidebooks and programs are included in books, postcards are included in stationery, and t-shirts are a part of apparel. However, determining this disaggregation in the CPI can be nearly impossible because some respondents simply write "$20 souvenirs" rather than "$15 t-shirt, $5 postcards" in the diary portion of the survey.

Finally, an unsolved methodological debate arose during this project that involves the way in which PCE-CPI expenditure ratios were calculated for ELIs that had to be split between PCE codes. Data is PCE-calibrated by fitting CPI expenditures into PCE series categories, but the data must then be mapped back into CPI items (one level above ELIs) in order to construct expenditure weights as CE data are in CPI production. For the purposes of this paper, data were mapped into the item categories corresponding to the ELIs from which their CPI expenditures originally came. However, a future improvement to this methodology would be to identify the CPI items that best match where the PCE expenditures map so that CPI price quotes are functionally "moved" into the categories that best fit the PCE calibration rather than staying in their original item categories.

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4. Future Research

The comparison of PCE and CE data using indexes has been studied for years at the Bureau of Labor Statistics and in the broader federal community.[13] There is still much work to be done, however. If anything, this paper illustrates the need for further analysis in this area. The PCE-calibrated price indexes constructed here only explore only a few of the many possibilities that exist in bringing current CPI data closer to the data used in PCE. Although some of these possibilities seem infeasible currently, there is always the hope that more light will be shed on them in future efforts.

One such area in which methodological improvements could be made is in population matching. CE and CPI populations differ dramatically from the defined PCE population, which is a problem that is rooted in the way the data are collected. PCE data come primarily from the production side as part of the National Income and Product Accounts and are typically the result of equations that take the total purchase value of a good or service and remove all non-consumer use allocations to create a personal consumption value. CE (and therefore CPI) data are collected directly from the consumer, a practice that allows for more population limiting. These data are limited to non-military, non-institutionalized households and, in the case of the CPI-U, can be further limited to exclude consumption by rural households. Finding a method by which to more closely match the CPI population to the PCE population would allow for more accurate use of PCE data in weighting the CPI to compare the two data sources.

Further study into the historical differences between the CPI-U and an index similar to PCE2 would also be very useful. Being able to see ten or more years of comparative data instead of five would help researchers to better understand the differences and how they have changed with time and structure updates in both the CPI and PCE. CPI has undergone two major structure changes in the past few years, and PCE has moved from one benchmark year period to the next. These changes could potentially have a large effect on the data but also help us to more easily identify bias and data inaccuracies as they change from structure to structure or period to period.

A larger-scale update to the methodology used in this paper lies in the items themselves. Although this concording exercise focuses on the weight side of the Consumer Price Index, it would be beneficial to create a hybrid CPI that is matched to PCE definitions for both weighting and pricing. On a similar wavelength, a set of hybrid indexes created using concorded UCCs rather than concorded ELIs could create a more accurate comparison by fine-tuning the good- and service-level comparisons.

Finally, there are a few ways in which data from the Consumer Price Index can be used to create a more accurate representation of a PCE-calibrated index. An index could be constructed by modifying the level of aggregation in the CPI. A CPI aggregated to the major group (apparel, education and

[13] See Lebow and Rudd (2003) or Fixler and Jaditz (2002)for examples of this.

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communication, food, other goods, housing, medical, recreation, transportation) level would remove many definitional discrepancies between PCE and CPI, allowing us to focus on the largest differences. Going in the opposite direction, more detailed concording research could be done to break data down for classification at the individual observation level, causing each data point in the CPI or PCE data to be intentionally mapped to its correct ELI or PCE series code. This would mean the creation of a "true" PCE1 or PCE2 but would also involve mapping both NIPA and CPI data to underlying categories.

5. Conclusion

This paper has contrasted current BLS Consumer Price Index values with the values derived from PCE-calibrated Consumer Price Indexes adjusted to PCE and CPI good and service definitions. Ultimately, the results indicate that adjusting PCE weights to CPI expenditure definitions yields an index (PCE2) that closely tracks the CPI-U. However, there are also strong differences between the two indexes, particularly once results are disaggregated to the item level. We see differences in item relative importance in the apparel, alcohol, and tobacco categories that may be indicative of an item representativeness issue in those categories in the CE survey. Overall, the PCE1 annualized growth rate over five years is 0.344% higher than that of the CPI-U, while the PCE2 annualized growth rate over five years is 0.081% lower than that of the CPI-U.

As shown above, there is still a lot of ground to cover in order for this work to accurately represent the two indexes. Some aspects may be more difficult to correct in future work, such as adjustments for population and scope differences between PCE and CPI, while others may be easily corrected with further research, such as more detailed item concording using further disaggregated data from both the BLS and the BEA. The closer these indexes come to accurately representing the real CPI and a real PCE-valued CPI, the more useful they are to us in examining the representativeness of CE survey data. Finding that PCE and CE have similar item-level outcomes may be useful in future survey design to reduce respondent burden or allow for detailed data quality checks. Large differences would indicate that it may be time to reexamine the motivations and methodology in the two consumer expenditure datasets. Although, when using this index data, we cannot show whether match issues are due to CE bias or PCE methods, the above results and future work will help us to better determine how to continue refining our data collection and aggregation methods.

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7. Additional Material

Appendix A. ELI to PCE Series Code Basic Mapping

Below is a copy of the basic ELI-to-PCE code mapping used to create the proportions that were used in the index creation described above. This concordance only lists all PCE codes that map to each ELI.

ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
AA011	MEN'S SUITS	DMBCRC	Men's and boys' clothing
AA012	MEN'S SPORT COATS AND TAILORED JACKETS	DMBCRC	Men's and boys' clothing
AA013	MEN'S OUTERWEAR	DMBCRC	Men's and boys' clothing
AA021	MEN'S UNDERWEAR, HOSIERY AND NIGHTWEAR	DMBCRC	Men's and boys' clothing
AA022	MEN'S ACCESSORIES	DLUGRC	Luggage and similar personal items
AA022	MEN'S ACCESSORIES	DMBCRC	Men's and boys' clothing
AA023	MEN'S ACTIVE SPORTSWEAR	DMBCRC	Men's and boys' clothing
AA031	MEN'S SHIRTS	DMBCRC	Men's and boys' clothing
AA032	MEN'S SWEATERS AND VESTS	DMBCRC	Men's and boys' clothing
AA033	MEN'S SHIRTS, SWEATERS, AND VESTS	DMBCRC	Men's and boys' clothing
AA041	MEN'S PANTS AND SHORTS	DMBCRC	Men's and boys' clothing
AA090	UNSAMPLED MEN'S APPAREL	DMBCRC	Men's and boys' clothing
AB011	BOYS' OUTERWEAR	DMBCRC	Men's and boys' clothing
AB012	BOYS' SHIRTS AND SWEATERS	DMBCRC	Men's and boys' clothing
AB013	BOYS' UNDERWEAR, NIGHTWEAR, HOSIERY AND ACCESSORIES	DLUGRC	Luggage and similar personal items
AB013	BOYS' UNDERWEAR, NIGHTWEAR, HOSIERY AND ACCESSORIES	DMBCRC	Men's and boys' clothing
AB014	BOYS' SUITS, SPORT COATS, AND PANTS	DMBCRC	Men's and boys' clothing
AB015	BOYS' ACTIVE SPORTSWEAR	DMBCRC	Men's and boys' clothing
AB090	UNSAMPLED BOY'S APPAREL	DMBCRC	Men's and boys' clothing
AC011	WOMEN'S OUTERWEAR	DWGCRC	Women's and girls' clothing
AC021	WOMEN'S DRESSES	DWGCRC	Women's and girls' clothing
AC031	WOMEN'S TOPS	DWGCRC	Women's and girls' clothing
AC032	WOMEN'S SKIRTS, PANTS, AND SHORTS	DWGCRC	Women's and girls' clothing

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
AC033	WOMEN'S SUITS AND SUIT COMPONENTS	DWGCRC	Women's and girls' clothing
AC041	WOMEN'S UNDERWEAR AND NIGHTWEAR	DWGCRC	Women's and girls' clothing
AC042	WOMEN'S HOSIERY AND ACCESSORIES	DLUGRC	Luggage and similar personal items
AC042	WOMEN'S HOSIERY AND ACCESSORIES	DWGCRC	Women's and girls' clothing
AC043	WOMEN'S ACTIVE SPORTSWEAR	DWGCRC	Women's and girls' clothing
AC090	UNSAMPLED WOMEN'S APPAREL	DWGCRC	Women's and girls' clothing
AD011	GIRLS' OUTERWEAR	DWGCRC	Women's and girls' clothing
AD012	GIRLS' DRESSES	DWGCRC	Women's and girls' clothing
AD013	GIRLS' TOPS	DWGCRC	Women's and girls' clothing
AD014	GIRLS' SKIRTS AND PANTS	DWGCRC	Women's and girls' clothing
AD015	GIRLS' ACTIVE SPORTSWEAR	DWGCRC	Women's and girls' clothing
AD016	GIRLS' UNDERWEAR, NIGHTWEAR, HOSIERY AND ACCESSORIES	DLUGRC	Luggage and similar personal items
AD016	GIRLS' UNDERWEAR, NIGHTWEAR, HOSIERY AND ACCESSORIES	DWGCRC	Women's and girls' clothing
AD090	UNSAMPLED GIRL'S APPAREL	DWGCRC	Women's and girls' clothing
AE011	MEN'S FOOTWEAR	DSHURC	Shoes and other footwear
AE021	BOYS' FOOTWEAR	DSHURC	Shoes and other footwear
AE022	GIRLS' FOOTWEAR	DSHURC	Shoes and other footwear
AE031	WOMEN'S FOOTWEAR	DSHURC	Shoes and other footwear
AF011	INFANTS' & TODDLERS' OUTERWEAR, PLAY & DRESSWEAR, & SLEEPWEAR	DCICRC	Children's and infants' clothing
AF012	INFANTS' AND TODDLERS' UNDERWEAR AND DIAPERS	DCICRC	Children's and infants' clothing
AG011	WATCHES	DWTCRC	Watches
AG021	JEWELRY	DJLYRC	Jewelry
EA011	COLLEGE TEXTBOOKS	DEBKRC	Educational books
EA012	ELEMENTARY AND HIGH SCHOOL BOOKS AND SUPPLIES	DEBKRC	Educational books
EA013	ENCYCLOPEDIAS AND OTHER SETS OF REFERENCE BOOKS	DRBKRC	Recreational books
EA090	UNSAMPLED EDUCATIONAL BOOKS AND SUPPLIES	DEBKRC	Educational books

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
EA090	UNSAMPLED EDUCATIONAL BOOKS AND SUPPLIES	DRBKRC	Recreational books
EA090	UNSAMPLED EDUCATIONAL BOOKS AND SUPPLIES	DSTYRC	Stationery and miscellaneous printed materials
EB011	COLLEGE TUITION AND FIXED FEES	DHEDRC	Higher education
EB021	ELEMENTARY AND HIGH SCHOOL TUITION AND FIXED FEES	DESCRC	Elementary and secondary schools
EB031	DAY CARE AND NURSERY SCHOOL	DNSCRC	Day care and nursery schools
EB041	TECHNICAL AND BUSINESS SCHOOL TUITION AND FIXED FEES	DVEDRC	Commercial and vocational schools
EB090	UNSAMPLED TUITION, OTHER SCHOOL FEES, AND CHILDCARE	DESCRC	Elementary and secondary schools
EB090	UNSAMPLED TUITION, OTHER SCHOOL FEES, AND CHILDCARE	DGEDRC	Proprietary and public higher education
EB090	UNSAMPLED TUITION, OTHER SCHOOL FEES, AND CHILDCARE	DNSCRC	Day care and nursery schools
EB090	UNSAMPLED TUITION, OTHER SCHOOL FEES, AND CHILDCARE	DVEDRC	Commercial and vocational schools
EC011	POSTAGE	DPSTRC	First-class postal service (by U.S. Postal Service)
EC021	DELIVERY SERVICES	DODSRC	Other delivery services (by non-U.S. postal facilities)
ED011	LAND-LINE TELEPHONE SERVICE, LOCAL CHARGES	DCELRC	Cellular telephone services
ED011	LAND-LINE TELEPHONE SERVICE, LOCAL CHARGES	DLOCRC	Land-line telephone services, local charges
ED021	LAND-LINE TELEPHONE SERVICE, LONG-DISTANCE CHARGES	DCELRC	Cellular telephone services
ED021	LAND-LINE TELEPHONE SERVICE, LONG-DISTANCE CHARGES	DLDTRC	Land-line telephone services, long-distance charges
ED031	CELLULAR PHONE SERVICE	DCELRC	Cellular telephone services
ED041	TELEPHONE SERVICES, LAND-LINE	DCELRC	Cellular telephone services
ED041	TELEPHONE SERVICES, LAND-LINE	DLDTRC	Land-line telephone services, long-distance charges
ED041	TELEPHONE SERVICES, LAND-LINE	DLOCRC	Land-line telephone services, local charges
EE011	PERSONAL COMPUTERS AND PERIPHERAL EQUIPMENT	DCPPRC	Personal computers and peripheral equipment

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
EE021	COMPUTER SOFTWARE AND ACCESSORIES	DCPPRC	Personal computers and peripheral equipment
EE021	COMPUTER SOFTWARE AND ACCESSORIES	DCPSRC	Computer software and accessories
EE031	OTHER INFORMATION SERVICES	DINTRC	Internet access
EE041	TELEPHONE, PERIPHERAL EQUIPMENT AND ACCESSORIES	DTCERC	Telephone and facsimile equipment
EE042	CALCULATORS, TYPEWRITERS, & OTHER INFORMATION PROCESSING EQUIPMENT	DOIPRC	Calculators, typewriters, and other information processing equipment
EE090	UNSAMPLED INFORMATION AND INFORMATION PROCESSING	DCPPRC	Personal computers and peripheral equipment
FA011	FLOUR AND PREPARED FLOUR MIXES	DGRARC	Cereals
FA021	CEREAL	DGRARC	Cereals
FA031	RICE, PASTA, CORNMEAL	DGRARC	Cereals
FB011	BREAD	DBAKRC	Bakery products
FB021	FRESH BISCUITS, ROLLS, AND MUFFINS	DBAKRC	Bakery products
FB031	CAKES AND CUPCAKES (EXCLUDING FROZEN)	DBAKRC	Bakery products
FB032	COOKIES	DBAKRC	Bakery products
FB041	CRACKERS AND BREAD AND CRACKER PRODUCTS	DBAKRC	Bakery products
FB042	SWEETROLLS, COFFEE CAKE AND DOUGHNUTS(EXCLUDING FROZEN)	DBAKRC	Bakery products
FB043	FROZEN BAKERY PRODUCTS AND FROZEN/REFRIG DOUGHS AND BATTERS	DBAKRC	Bakery products
FB043	FROZEN BAKERY PRODUCTS AND FROZEN/REFRIG DOUGHS AND BATTERS	DOFDRC	Food products, not elsewhere classified
FB044	PIES, TARTS, TURNOVERS (EXCLUDING FROZEN)	DBAKRC	Bakery products
FC011	UNCOOKED GROUND BEEF	DBEERC	Beef and veal
FC021	UNCOOKED BEEF ROASTS	DBEERC	Beef and veal
FC031	UNCOOKED BEEF STEAKS	DBEERC	Beef and veal
FC041	UNCOOKED OTHER BEEF AND VEAL	DBEERC	Beef and veal

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
FD011	BACON, SAUSAGE AND RELATED PRODUCTS	DPORRC	Pork
FD021	HAM	DPORRC	Pork
FD031	PORK CHOPS	DPORRC	Pork
FD041	OTHER PORK INCLUDING ROASTS AND PICNICS	DPORRC	Pork
FE011	FRANKFURTERS	DMEARC	Other meats
FE012	LUNCHMEATS	DMEARC	Other meats
FE013	LAMB, ORGAN MEATS, AND GAME	DMEARC	Other meats
FF011	CHICKEN	DPOURC	Poultry
FF021	OTHER POULTRY INCLUDING TURKEY	DPOURC	Poultry
FG011	FRESH FISH AND SEAFOOD	DFISRC	Fish and seafood
FG021	PROCESSED FISH AND SEAFOOD	DFISRC	Fish and seafood
FH011	EGGS	DGGSRC	Eggs
FJ011	MILK	DMILRC	Fresh milk
FJ021	CHEESE AND CHEESE PRODUCTS	DDAIRC	Processed dairy products
FJ031	ICE CREAM AND RELATED PRODUCTS	DDAIRC	Processed dairy products
FJ041	OTHER DAIRY AND RELATED PRODUCTS	DMILRC	Fresh milk
FK011	APPLES	DFRURC	Fruit (fresh)
FK021	BANANAS	DFRURC	Fruit (fresh)
FK031	CITRUS FRUITS	DFRURC	Fruit (fresh)
FK041	OTHER FRESH FRUITS	DFRURC	Fruit (fresh)
FL011	POTATOES	DVEGRC	Vegetables (fresh)
FL021	LETTUCE	DVEGRC	Vegetables (fresh)
FL031	TOMATOES	DVEGRC	Vegetables (fresh)
FL041	OTHER FRESH VEGETABLES INCLUDING FRESH HERBS	DVEGRC	Vegetables (fresh)
FM011	CANNED FRUITS AND VEGETABLES	DPFVRC	Processed fruits and vegetables
FM021	FROZEN FRUITS AND VEGETABLES	DPFVRC	Processed fruits and vegetables
FM031	OTHER PROCESSED FRUITS AND VEGETABLES INCLUDING DRIED	DPFVRC	Processed fruits and vegetables
FN011	CARBONATED DRINKS	DJNBRC	Mineral waters, soft drinks, and vegetable juices
FN021	FROZEN NONCARBONATED JUICES AND DRINKS	DJNBRC	Mineral waters, soft drinks, and vegetable juices

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
FN031	NONFROZEN NONCARBONATED JUICES AND DRINKS	DJNBRC	Mineral waters, soft drinks, and vegetable juices
FP011	COFFEE	DCTMRC	Coffee, tea, and other beverage materials
FP021	TEA	DCTMRC	Coffee, tea, and other beverage materials
FP022	OTHER BEVERAGE MATERIALS	DCTMRC	Coffee, tea, and other beverage materials
FR011	SUGAR AND ARTIFICIAL SWEETENERS	DSWERC	Sugar and sweets
FR021	CANDY AND CHEWING GUM	DSWERC	Sugar and sweets
FR031	OTHER SWEETS	DSWERC	Sugar and sweets
FS011	BUTTER AND MARGARINE	DFATRC	Fats and oils
FS021	SALAD DRESSINGS	DFATRC	Fats and oils
FS031	PEANUT BUTTER	DFATRC	Fats and oils
FS032	OTHER FATS AND OILS	DFATRC	Fats and oils
FT011	SOUPS	DOFDRC	Food products, not elsewhere classified
FT021	FROZEN AND FREEZE DRIED PREPARED FOODS	DOFDRC	Food products, not elsewhere classified
FT031	SNACKS	DOFDRC	Food products, not elsewhere classified
FT041	SALT AND OTHER SEASONINGS AND SPICES	DOFDRC	Food products, not elsewhere classified
FT042	OLIVES, PICKLES, RELISHES	DOFDRC	Food products, not elsewhere classified
FT042	OLIVES, PICKLES, RELISHES	DPFVRC	Processed fruits and vegetables
FT043	SAUCES AND GRAVIES	DOFDRC	Food products, not elsewhere classified
FT044	OTHER CONDIMENTS(EXCLUDING OLIVES, PICKLES, RELISHES)	DOFDRC	Food products, not elsewhere classified
FT044	OTHER CONDIMENTS(EXCLUDING OLIVES, PICKLES, RELISHES)	DSWERC	Sugar and sweets
FT051	BABY FOOD	DOFDRC	Food products, not elsewhere classified
FT061	PREPARED SALADS	DOFDRC	Food products, not elsewhere classified

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
FT062	OTHER MISCELLANEOUS FOODS	DOFDRC	Food products, not elsewhere classified
FV011	FULL SERVICE MEALS AND SNACKS	DCTMRC	Coffee, tea, and other beverage materials
FV011	FULL SERVICE MEALS AND SNACKS	DMOERC	Meals at other eating places
FV021	LIMITED SERVICE MEALS AND SNACKS	DCTMRC	Coffee, tea, and other beverage materials
FV021	LIMITED SERVICE MEALS AND SNACKS	DMLSRC	Meals at limited service eating places
FV031	FOOD AT EMPLOYEE SITES AND SCHOOLS	DCTMRC	Coffee, tea, and other beverage materials
FV031	FOOD AT EMPLOYEE SITES AND SCHOOLS	DMOERC	Meals at other eating places
FV031	FOOD AT EMPLOYEE SITES AND SCHOOLS	DMSLRC	Meals at schools
FV041	FOOD FROM VENDING MACHINES AND MOBILE VENDORS	DCTMRC	Coffee, tea, and other beverage materials
FV041	FOOD FROM VENDING MACHINES AND MOBILE VENDORS	DMLSRC	Meals at limited service eating places
FV051	BOARD, CATERED EVENTS AND OTHER FOOD AWAY FROM HOME	DMDPRC	Meals at drinking places
FV051	BOARD, CATERED EVENTS AND OTHER FOOD AWAY FROM HOME	DMOERC	Meals at other eating places
FV051	BOARD, CATERED EVENTS AND OTHER FOOD AWAY FROM HOME	DMSLRC	Meals at schools
FW011	BEER, ALE AND OTHER MALT BEVERAGES AT HOME	DLIQRC	Spirits
FW011	BEER, ALE AND OTHER MALT BEVERAGES AT HOME	DMLTRC	Beer
FW021	DISTILLED SPIRITS AT HOME	DLIQRC	Spirits
FW021	DISTILLED SPIRITS AT HOME	DWINRC	Wine
FW031	WINE AT HOME	DWINRC	Wine
FX011	ALCOHOLIC BEVERAGES AWAY FROM HOME	DAPMRC	Alcohol in purchased meals
GA011	CIGARETTES	DTOBRC	Tobacco
GA021	TOBACCO PRODUCTS OTHER THAN CIGARETTES	DTOBRC	Tobacco

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
GA090	UNSAMPLED TOBACCO AND SMOKING PRODUCTS	DTOBRC	Tobacco
GB011	PRODUCTS AND NONELECTRIC ARTICLES FOR THE HAIR	DEAPRC	Electric appliances for personal care
GB011	PRODUCTS AND NONELECTRIC ARTICLES FOR THE HAIR	DOPHRC	Hair, dental, shaving, and miscellaneous personal care products except electrical products
GB012	DENTAL AND SHAVING PRODUCTS, INCL NONELECTRIC ARTICLES	DOPHRC	Hair, dental, shaving, and miscellaneous personal care products except electrical products
GB013	DEODORANT/SUNTAN PREPARATIONS, SANITARY/FOOTCARE PRODUCTS	DOPHRC	Hair, dental, shaving, and miscellaneous personal care products except electrical products
GB014	ELECTRIC PERSONAL CARE APPLIANCES	DEAPRC	Electric appliances for personal care
GB021	COSMETICS/PERFUME/BATH/NAIL PREPARATIONS AND IMPLEMENTS	DCOSRC	Cosmetic/perfumes/bath/nail preparations and implements
GB090	UNSAMPLED PERSONAL CARE PRODUCTS	DEAPRC	Electric appliances for personal care
GB090	UNSAMPLED PERSONAL CARE PRODUCTS	DOPHRC	Hair, dental, shaving, and miscellaneous personal care products except electrical products
GC011	HAIRCUTS AND OTHER PERSONAL CARE SERVICES	DBBBRC	Hairdressing salons and personal grooming establishments
GD011	LEGAL SERVICES	DGALRC	Legal services
GD021	FUNERAL EXPENSES	DFUNRC	Funeral and burial services
GD031	LAUNDRY AND DRY CLEANING SERVICES	DDRYRC	Laundry and drycleaning services
GD041	SHOE REPAIR AND OTHER SHOE SERVICES	DSCLRC	Repair and hire of footwear
GD042	CLOTHING, ALTERATIONS, RENTALS AND REPAIRS	DLGRRC	Clothing repair, rental, and alterations
GD043	WATCH AND JEWELRY REPAIR	DMPCRC	Miscellaneous personal care services
GD051	CHECKING ACCOUNT AND OTHER BANK SERVICES	DFEERC	Financial service charges and fees
GD052	TAX RETURN PREPARATION AND OTHER ACCOUNTING FEES	DTAPRC	Tax preparation and other related services

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
GD061	CARE OF INVALIDS,THE ELDERLY, AND CONVALESCENTS IN THE HOME	DHHCRC	Home health care
GD090	UNSAMPLED ITEMS	DMPCRC	Miscellaneous personal care services
GD090	UNSAMPLED ITEMS	DTHERC	Other personal business services
GE011	STATIONERY, STATIONERY SUPPLIES, GIFT WRAP	DPAPRC	Household paper products
GE011	STATIONERY, STATIONERY SUPPLIES, GIFT WRAP	DSTYRC	Stationery and miscellaneous printed materials
GE012	LUGGAGE	DLUGRC	Luggage and similar personal items
GE013	INFANTS' EQUIPMENT	DCHNRC	Dishes and flatware
GE013	INFANTS' EQUIPMENT	DFNRRC	Furniture
GE013	INFANTS' EQUIPMENT	DLUGRC	Luggage and similar personal items
GE013	INFANTS' EQUIPMENT	DOPHRC	Hair, dental, shaving, and miscellaneous personal care products except electrical products
HA011	RENT OF PRIMARY RESIDENCE	DGRHRC	Group housing
HA011	RENT OF PRIMARY RESIDENCE	DTMHRC	Tenant-occupied mobile homes
HA011	RENT OF PRIMARY RESIDENCE	DTSPRC	Tenant-occupied stationary homes
HB011	LODGING WHILE AT SCHOOL	DSCHRC	Housing at schools
HB021	RENTAL OF LODGING AWAY FROM HOME	DHOTRC	Hotels and motels
HB021	RENTAL OF LODGING AWAY FROM HOME	DORSRC	Amusement parks, campgrounds, and related recreational services
HC011	OWNERS' EQUIVALENT RENT OF PRIMARY RESIDENCE	DOWNRC	Imputed rental of owner-occupied nonfarm housing
HC090	OWNERS' EQUIVALENT RENT OF SECONDARY RESIDENCES	DOMHRC	Owner-occupied mobile homes
HC090	OWNERS' EQUIVALENT RENT OF SECONDARY RESIDENCES	DOSTRC	Owner-occupied stationary homes
HD011	TENANTS' AND HOUSEHOLD INSURANCE	DFINRC	Net household insurance
HE011	FUEL OIL	DOILRC	Fuel oil
HE021	PROPANE, KEROSENE, AND FIREWOOD	DLPFRC	Other fuels
HF011	ELECTRICITY	DELCRC	Electricity
HF021	UTILITY (PIPED) GAS SERVICE	DGHERC	Natural gas

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
HG011	RESIDENTIAL WATER AND SEWERAGE SERVICE	DWSMRC	Water supply and sewage maintenance
HG021	GARBAGE AND TRASH COLLECTION	DREFRC	Garbage and trash collection
HH011	FLOOR COVERINGS	DFLRRC	Carpets and other floor coverings
HH021	CURTAINS AND DRAPES	DWCTRC	Window coverings
HH022	WINDOW COVERINGS	DWCTRC	Window coverings
HH031	BATHROOM LINENS	DLINRC	Household linens
HH032	BEDROOM LINENS	DLINRC	Household linens
HH032	BEDROOM LINENS	DSEARC	Small electric household appliances
HH033	KITCHEN AND DINING ROOM LINENS	DLINRC	Household linens
HJ011	MATTRESSES AND SPRINGS	DFNRRC	Furniture
HJ012	BEDROOM FURNITURE OTHER THAN MATTRESSES AND SPRINGS	DFNRRC	Furniture
HJ021	SOFAS, SLIPCOVERS, AND DECORATIVE PILLOWS	DFNRRC	Furniture
HJ021	SOFAS, SLIPCOVERS, AND DECORATIVE PILLOWS	DLINRC	Household linens
HJ022	LIVING ROOM CHAIRS	DFNRRC	Furniture
HJ023	LIVING ROOM TABLES	DFNRRC	Furniture
HJ024	KITCHEN AND DINING ROOM FURNITURE	DFNRRC	Furniture
HJ031	INFANTS FURNITURE	DFNRRC	Furniture
HJ032	OUTDOOR FURNITURE	DFNRRC	Furniture
HJ033	OCCASIONAL FURNITURE	DFNRRC	Furniture
HJ090	UNSAMPLED FURNITURE	DFNRRC	Furniture
HK011	REFRIGERATORS AND HOME FREEZERS	DMHARC	Major household appliances
HK012	WASHERS AND DRYERS	DMHARC	Major household appliances
HK013	STOVES AND OVENS EXCLUDING MICROWAVE OVENS	DMHARC	Major household appliances
HK014	MICROWAVE OVENS	DMHARC	Major household appliances
HK021	FLOOR CLEANING EQUIPMENT	DMHARC	Major household appliances
HK022	SMALL ELECTRIC KITCHEN APPLIANCES	DSEARC	Small electric household appliances
HK023	OTHER ELECTRIC APPLIANCES	DMHARC	Major household appliances
HK090	UNSAMPLED APPLIANCES	DMHARC	Major household appliances

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
HL011	LAMPS AND LIGHTING FIXTURES	DCLFRC	Clocks, lamps, lighting fixtures, and other household decorative items
HL012	HOUSEHOLD DECORATIVE ITEMS AND CLOCKS	DCLFRC	Clocks, lamps, lighting fixtures, and other household decorative items
HL012	HOUSEHOLD DECORATIVE ITEMS AND CLOCKS	DFLORC	Flowers, seeds, and potted plants
HL012	HOUSEHOLD DECORATIVE ITEMS AND CLOCKS	DPAPRC	Household paper products
HL021	INDOOR PLANTS AND FRESH CUT FLOWERS	DFLORC	Flowers, seeds, and potted plants
HL031	DISHES	DCHNRC	Dishes and flatware
HL031	DISHES	DNECRC	Nonelectric cookware and tableware
HL032	FLATWARE	DCHNRC	Dishes and flatware
HL041	NONELECTRIC COOKINGWARE	DNECRC	Nonelectric cookware and tableware
HL042	NONELECTRIC KITCHENWARE	DNECRC	Nonelectric cookware and tableware
HM011	PAINT, WALLPAPER TOOLS AND SUPPLIES	DHDWRC	Tools, hardware, and supplies
HM012	POWER TOOLS	DHDWRC	Tools, hardware, and supplies
HM013	MISCELLANEOUS HARDWARE, SUPPLIES AND EQUIPMENT	DCLFRC	Clocks, lamps, lighting fixtures, and other household decorative items
HM013	MISCELLANEOUS HARDWARE, SUPPLIES AND EQUIPMENT	DFNRRC	Furniture
HM013	MISCELLANEOUS HARDWARE, SUPPLIES AND EQUIPMENT	DHDWRC	Tools, hardware, and supplies
HM013	MISCELLANEOUS HARDWARE, SUPPLIES AND EQUIPMENT	DLINRC	Household linens
HM013	MISCELLANEOUS HARDWARE, SUPPLIES AND EQUIPMENT	DLWNRC	Outdoor equipment and supplies
HM014	NONPOWERED HAND TOOLS	DHDWRC	Tools, hardware, and supplies
HM021	LAWN AND GARDEN AND OUTDOOR EQUIPMENT	DLWNRC	Outdoor equipment and supplies
HM022	LAWN AND GARDEN SUPPLIES AND INSECTICIDE	DCLERC	Household cleaning products
HM022	LAWN AND GARDEN SUPPLIES AND INSECTICIDE	DFLORC	Flowers, seeds, and potted plants

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
HM090	UNSAMPLED TOOLS, HARDWARE, OUTDOOR EQUIPMENT AND SUPPLIES	DCLFRC	Clocks, lamps, lighting fixtures, and other household decorative items
HM090	UNSAMPLED TOOLS, HARDWARE, OUTDOOR EQUIPMENT AND SUPPLIES	DLWNRC	Outdoor equipment and supplies
HM090	UNSAMPLED TOOLS, HARDWARE, OUTDOOR EQUIPMENT AND SUPPLIES	DOPHRC	Hair, dental, shaving, and miscellaneous personal care products except electrical products
HN011	LAUNDRY AND CLEANING PRODUCTS	DCLERC	Household cleaning products
HN012	LAUNDRY AND CLEANING EQUIPMENT	DCLERC	Household cleaning products
HN012	LAUNDRY AND CLEANING EQUIPMENT	DNECRC	Nonelectric cookware and tableware
HN021	HOUSEHOLD PAPER PRODUCTS	DPAPRC	Household paper products
HN031	MISCELLANEOUS HOUSEHOLD PRODUCTS	DCHNRC	Dishes and flatware
HN031	MISCELLANEOUS HOUSEHOLD PRODUCTS	DMHPRC	Miscellaneous household products
HN031	MISCELLANEOUS HOUSEHOLD PRODUCTS	DPAPRC	Household paper products
HP011	HOUSEKEEPING SERVICES	DDMSRC	Domestic services
HP021	GARDENING AND LAWNCARE SERVICES	N/A	N/A
HP031	MOVING, STORAGE, FREIGHT EXPENSE	DMSERC	Moving, storage, and freight services
HP041	APPLIANCE REPAIR	DERERC	Repair of household appliances
HP042	REUPHOLSTERY OF FURNITURE	DFRERC	Repair of furniture, furnishings, and floor coverings
HP043	INSIDE HOME MAINTENANCE AND REPAIR SERVICES	N/A	N/A
HP090	UNSAMPLED HOUSEHOLD OPERATIONS	DMHSRC	Other household services
HP090	UNSAMPLED HOUSEHOLD OPERATIONS	DTAPRC	Tax preparation and other related services

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
MA011	PRESCRIPTION DRUGS	DRXDRC	Prescription drugs
MA090	UNSAMPLED RENT AND REPAIR OF MEDICAL EQUIPMENT	DERERC	Repair of household appliances
MA090	UNSAMPLED RENT AND REPAIR OF MEDICAL EQUIPMENT	DOMORC	All other professional medical services
MB011	INTERNAL AND RESPIRATORY OTC DRUGS	DNRDRC	Nonprescription drugs
MB021	TOPICALS AND DRESSINGS	DOMPRC	Other medical products
MB022	MEDICAL EQUIPMENT FOR GENERAL USE	DOMPRC	Other medical products
MB023	SUPPORTIVE AND CONVALESCENT MEDICAL EQUIPMENT	DOMPRC	Other medical products
MB023	SUPPORTIVE AND CONVALESCENT MEDICAL EQUIPMENT	DTMERC	Therapeutic medical equipment
MC011	PHYSICIANS' SERVICES	DPHYRC	Physician services
MC021	DENTAL SERVICES	DDENRC	Dental services
MC031	EYEGLASSES AND EYECARE	DEYERC	Corrective eyeglasses and contact lenses
MC041	SERVICES BY OTHER MEDICAL PROFESSIONALS	DHHCRC	Home health care
MC041	SERVICES BY OTHER MEDICAL PROFESSIONALS	DMLBRC	Medical laboratories
MC041	SERVICES BY OTHER MEDICAL PROFESSIONALS	DOMORC	All other professional medical services
MC041	SERVICES BY OTHER MEDICAL PROFESSIONALS	DOMSRC	Specialty outpatient care facilities and health and allied services
MD011	HOSPITAL SERVICES	DHSPRC	Hospitals
MD021	NURSING AND CONVALESCENT HOME CARE	DNRSRC	Nursing homes
MD022	ADULT DAY CARE	DFAMRC	Individual and family services
MD031	CARE OF INVALIDS,THE ELDERLY, AND CONVALESCENTS IN THE HOME	DHHCRC	Home health care
ME011	COMMERCIAL HEALTH INSURANCE	DHINRC	Net health insurance
ME021	BLUE CROSS/BLUE SHIELD	DHINRC	Net health insurance
ME031	HEALTH MAINTENANCE PLANS	DHINRC	Net health insurance
ME041	MEDICARE AND OTHER HEALTH INSURANCE	DHINRC	Net health insurance
MF011	PRESCRIPTION DRUGS	DRXDRC	Prescription drugs

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
MF021	INTERNAL AND RESPIRATORY OTC DRUGS	DNRDRC	Nonprescription drugs
MG011	TOPICALS AND DRESSINGS	DOMPRC	Other medical products
MG012	MEDICAL EQUIPMENT FOR GENERAL USE	DOMPRC	Other medical products
MG013	SUPPORTIVE AND CONVALESCENT MEDICAL EQUIPMENT	DOMPRC	Other medical products
MG013	SUPPORTIVE AND CONVALESCENT MEDICAL EQUIPMENT	DTMERC	Therapeutic medical equipment
MG090	UNSAMPLED RENT AND REPAIR OF MEDICAL EQUIPMENT	DRERC	Repair of household appliances
MG090	UNSAMPLED RENT AND REPAIR OF MEDICAL EQUIPMENT	DOMORC	All other professional medical services
RA011	TELEVISIONS	DTVSRC	Televisions
RA021	CABLE AND SATELLITE TELEVISION AND RADIO SERVICE	DCTVRC	Cable and satellite television and radio services
RA031	OTHER VIDEO EQUIPMENT	DOVARC	Other video equipment
RA041	VIDEO CASSETTES AND DISCS, BLANK AND PRERECORDED	DOVERC	Video cassettes and discs, blank and prerecorded
RA042	RENTAL OF VIDEO TAPES AND DISCS	DVIDRC	Video media rental
RA051	AUDIO COMPONENTS, RADIOS, TAPE RECORDERS/PLAYERS, & OTHER EQUIP	DAUDRC	Audio equipment
RA061	PRERECORDED & BLANK AUDIO DISCS/TAPES/DIGITAL FILES/DOWNLOADS	DRTDRC	Prerecorded and blank audio discs/tapes/digital files/downloads
RA090	UNSAMPLED VIDEO AND AUDIO	DAPIRC	Repair of audio-visual, photographic, and information processing equipment
RB011	PET FOOD	DPRPRC	Pets and related products
RB012	PURCHASE OF PETS, PET SUPPLIES, ACCESSORIES	DPRPRC	Pets and related products
RB021	PET SERVICES	DVETRC	Veterinary and other services for pets
RB022	VETERINARIAN SERVICES	DVETRC	Veterinary and other services for pets
RC011	OUTBOARD MOTORS AND POWERED SPORTS VEHICLES	DREVRC	Other recreational vehicles

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
RC011	OUTBOARD MOTORS AND POWERED SPORTS VEHICLES	DSPGRC	Sporting equipment, supplies, guns, and ammunition
RC012	UNPOWERED BOATS AND TRAILERS	DBOARC	Pleasure boats
RC012	UNPOWERED BOATS AND TRAILERS	DREVRC	Other recreational vehicles
RC013	BICYCLES AND ACCESSORIES	DBCYRC	Bicycles and accessories
RC021	GENERAL SPORTS EQUIPMENT EXCLUDING WATER	DDOLRC	Games, toys, and hobbies
RC021	GENERAL SPORTS EQUIPMENT EXCLUDING WATER	DSPGRC	Sporting equipment, supplies, guns, and ammunition
RC022	WATER SPORTS EQUIPMENT	DSPGRC	Sporting equipment, supplies, guns, and ammunition
RC023	HUNTING, FISHING, AND CAMPING EQUIPMENT	DLUGRC	Luggage and similar personal items
RC023	HUNTING, FISHING, AND CAMPING EQUIPMENT	DSPGRC	Sporting equipment, supplies, guns, and ammunition
RC090	UNSAMPLED SPORTING GOODS	DREVRC	Other recreational vehicles
RC090	UNSAMPLED SPORTING GOODS	DRRERC	Maintenance and repair of recreational vehicles and sports equipment
RD011	FILM AND PHOTOGRAPHIC SUPPLIES	DFLMRC	Film and photographic supplies
RD012	PHOTOGRAPHIC EQUIPMENT	DCAMRC	Photographic equipment
RD021	PHOTOGRAPHER'S FEES	DPICRC	Photo studios
RD022	FILM PROCESSING	DFDVRC	Photo processing
RD090	UNSAMPLED PHOTOGRAPHY	DAPIRC	Repair of audio-visual, photographic, and information processing equipment
RE011	TOYS, GAMES, HOBBIES, AND PLAYGROUND EQUIPMENT	DDOLRC	Games, toys, and hobbies
RE012	VIDEO GAME HARDWARE, SOFTWARE AND ACCESSORIES	DCPSRC	Computer software and accessories
RE012	VIDEO GAME HARDWARE, SOFTWARE AND ACCESSORIES	DDOLRC	Games, toys, and hobbies
RE021	SEWING ITEMS	DMHARC	Major household appliances
RE021	SEWING ITEMS	DSEWRC	Sewing items
RE031	MUSIC INSTRUMENTS AND ACCESSORIES	DMSCRC	Musical instruments
RE090	UNSAMPLED RECREATION SERVICES	DDOLRC	Games, toys, and hobbies

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
RE090	UNSAMPLED RECREATION SERVICES	DRBKRC	Recreational books
RE090	UNSAMPLED RECREATION SERVICES	DRRERC	Maintenance and repair of recreational vehicles and sports equipment
RF011	CLUB MEMBERSHIP DUES AND FEES FOR PARTICIPANT SPORTS	DMDFRC	Membership clubs and participant sports centers
RF021	ADMISSION TO MOVIES, THEATERS, CONCERTS & OTHER RECURRING EVENTS	DLIGRC	Live entertainment, excluding sports
RF021	ADMISSION TO MOVIES, THEATERS, CONCERTS & OTHER RECURRING EVENTS	DMOVRC	Motion picture theaters
RF021	ADMISSION TO MOVIES, THEATERS, CONCERTS & OTHER RECURRING EVENTS	DMUSRC	Museums and libraries
RF022	ADMISSION TO SPORTING EVENTS	DSPERC	Spectator sports
RF031	FEES FOR LESSONS OR INSTRUCTIONS	DMDFRC	Membership clubs and participant sports centers
RF031	FEES FOR LESSONS OR INSTRUCTIONS	DORSRC	Amusement parks, campgrounds, and related recreational services
RF090	UNSAMPLED RECREATION SERVICES	DHOLRC	Package tours
RF090	UNSAMPLED RECREATION SERVICES	DORSRC	Amusement parks, campgrounds, and related recreational services
RG011	SINGLE COPY NEWSPAPERS AND MAGAZINES	DMAGRC	Newspapers and periodicals
RG012	SUBSCRIPTIONS TO NEWSPAPERS AND MAGAZINES	DMAGRC	Newspapers and periodicals
RG021	BOOKS PURCHASED THROUGH BOOK CLUBS	DRBKRC	Recreational books
RG022	BOOKS PURCHASED AT RETAIL OUTLETS OTHER THAN BOOK CLUBS	DRBKRC	Recreational books
RG090	UNSAMPLED RECREATIONAL READING MATERIALS	DMAGRC	Newspapers and periodicals
TA011	NEW CAR AND TRUCK PURCHASE	DNDCRC	New domestic autos
TA011	NEW CAR AND TRUCK PURCHASE	DNFCRC	New foreign autos
TA011	NEW CAR AND TRUCK PURCHASE	DNWTRC	New light trucks
TA012	NEW MOTORCYCLES	DMCYRC	Motorcycles
TA021	USED CARS AND TRUCKS	DNETRC	Net transactions in used autos
TA021	USED CARS AND TRUCKS	DUTNRC	Net transactions in used trucks
TA031	VEHICLE LEASING	DALERC	Auto leasing

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ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
TA031	VEHICLE LEASING	DTLERC	Truck leasing
TA041	AUTOMOBILE AND TRUCK RENTAL	DMVRRC	Motor vehicle rental
TA090	UNSAMPLED NEW AND USED MOTOR VEHICLES	DMCYRC	Motorcycles
TA090	UNSAMPLED NEW AND USED MOTOR VEHICLES	DMVRRC	Motor vehicle rental
TA090	UNSAMPLED NEW AND USED MOTOR VEHICLES	DORSRC	Amusement parks, campgrounds, and related recreational services
TB011	REGULAR UNLEADED GASOLINE	DGASRC	Gasoline and other motor fuel
TB012	MID-GRADE UNLEADED GASOLINE	DGASRC	Gasoline and other motor fuel
TB013	PREMIUM UNLEADED GASOLINE	DGASRC	Gasoline and other motor fuel
TB021	AUTOMOTIVE DIESEL FUEL	DGASRC	Gasoline and other motor fuel
TB022	ALTERNATIVE MOTOR FUELS	DGASRC	Gasoline and other motor fuel
TC011	TIRES	DMCYRC	Motorcycles
TC011	TIRES	DTATRC	Tires
TC021	VEHICLE PARTS AND EQUIPMENT OTHER THAN TIRES	DPAARC	Accessories and parts
TC022	MOTOR OIL, COOLANT AND FLUIDS	DLUBRC	Lubricants and fluids
TD011	MOTOR VEHICLE BODY WORK	DVMRRC	Motor vehicle maintenance and repair
TD021	MOTOR VEHICLE MAINTENANCE AND SERVICING	DVMRRC	Motor vehicle maintenance and repair
TD031	MOTOR VEHICLE REPAIR	DVMRRC	Motor vehicle maintenance and repair
TD090	UNSAMPLED VEHICLE MAINTENANCE AND REPAIR	DVMRRC	Motor vehicle maintenance and repair
TE011	MOTOR VEHICLE INSURANCE	DTINRC	Net motor vehicle and other transportation insurance
TF011	STATE VEHICLE REGISTRATION AND DRIVER'S LICENSE	N/A	N/A
TF012	LOCAL VEHICLE REGISTRATION AND LICENSE	N/A	N/A
TF031	PARKING FEES AND TOLLS	DPFTRC	Parking fees and tolls
TF032	AUTOMOBILE SERVICE CLUBS	DHOLRC	Package tours
TF032	AUTOMOBILE SERVICE CLUBS	DORTRC	Other road transportation service
TF090	UNSAMPLED MOTOR VEHICLE FEES	DMDFRC	Membership clubs and participant sports centers
TG011	AIRLINE FARES	DAFTRC	Passenger fares for foreign travel
TG011	AIRLINE FARES	DAITRC	Air transportation

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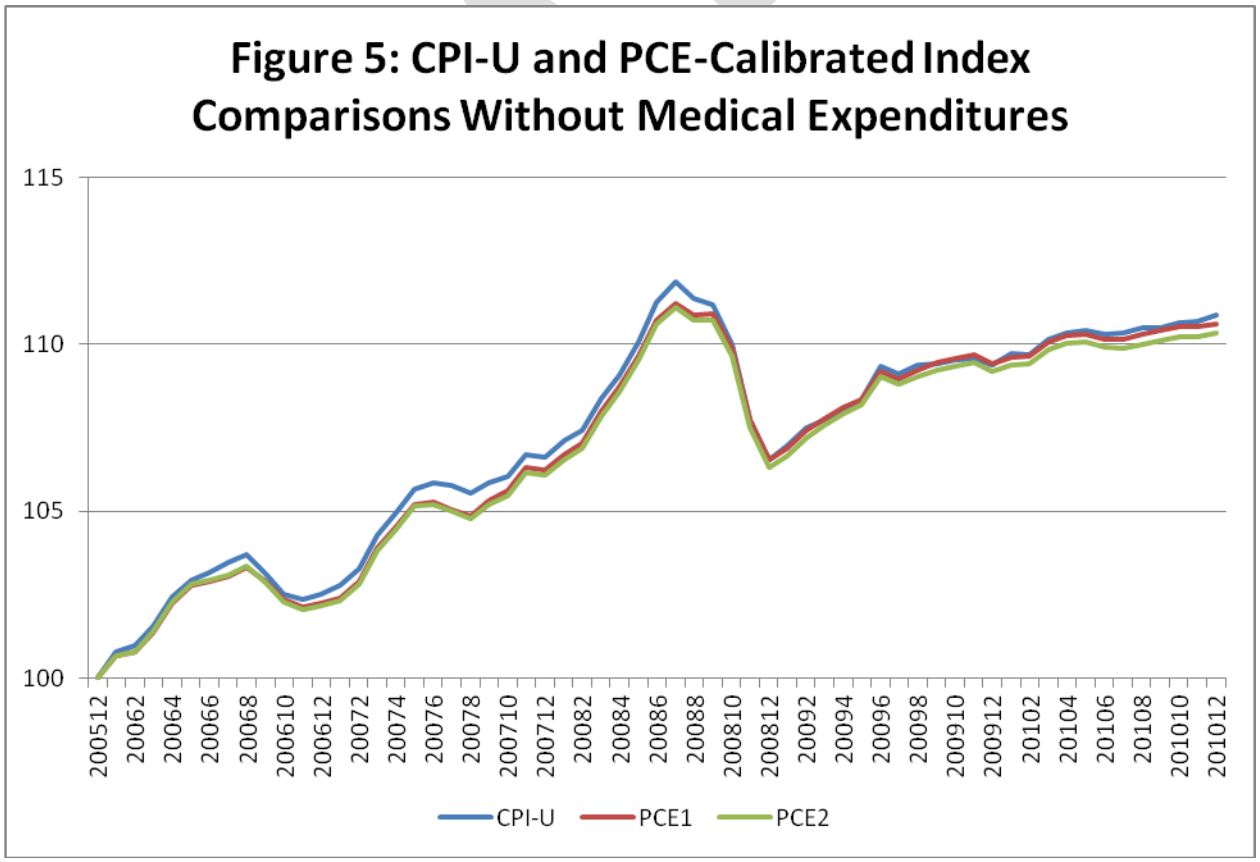
ELI to PCE Series Code Basic Mapping			
ELI	**ELI Description**	**PCE Series Code**	**PCE Description**
TG021	INTERCITY BUS FARES	DIBURC	Intercity buses
TG022	INTERCITY TRAIN FARES	DIRRRC	Railway transportation
TG023	SHIP FARES	DAFTRC	Passenger fares for foreign travel
TG023	SHIP FARES	DWATRC	Water transportation
TG031	INTRACITY MASS TRANSIT	DIMTRC	Intracity mass transit
TG031	INTRACITY MASS TRANSIT	DORTRC	Other road transportation service
TG032	TAXI FARES	DORTRC	Other road transportation service
TG032	TAXI FARES	DTAXRC	Taxicabs
TG033	CAR AND VAN POOLS	DORTRC	Other road transportation service
TG090	UNSAMPLED PUBLIC TRANSPORTATION	DORTRC	Other road transportation service

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Appendix B. Medical-free Index

A "perfect match" index can be created to compare against other constructed PCE-calibrated indexes by simulating a CPI in which only the items whose expenditure definitions and concept definitions match perfectly between the two data sources. When analyzed in conjunction with other research CPIs, this analysis could provide more information on which items present the largest discrepancies between CPI and PCE.

Although it could not be considered to be a perfect match, an index that removes all medical items (ELIs that start with the letter 'M') would demonstrate well how expenditure differences can skew the index as medical is both a large expense and differently defined between PCE and CE. Below, experimental indexes that completely exclude medical items have been constructed and compared in the same manner as PCE1 and PCE2 were created in this paper. This exercise helps to demonstrate exactly how large of an effect both the definitional differences and magnitude of medical consumption can have in shifting index values.



As shown in Figure 2, the three indexes track each other nearly perfectly. In the same way that the CPI-U was slightly higher than the PCE-calibrated, CPI-valued index before, the CPI-U is now higher than both

PCE-calibrated indexes. This can be attributed the same contributions from items like rent that were discussed in the results section.

Relative importances can also be seen to be largely unchanged. Below are the December 2005 relative importance values for the three indexes excluding medical.

Table 4: December 2005 Item Relative Importances (Medical Expenditures Excluded)

		PCE-Calibrated	
CONSUMPTION CATEGORY	**CPI-U**	**PCE1**	**PCE2**
FOOD AND BEVERAGES	16.0%	17.6%	18.1%
Food at home	8.5%	9.0%	9.3%
Food away from home	6.3%	6.3%	6.4%
Alcoholic beverages	1.2%	2.3%	2.4%
HOUSING	45.2%	33.6%	34.3%
Rent	6.2%	4.3%	4.4%
Owner's equivalent rent	25.0%	16.3%	16.9%
Other housing	14.0%	13.0%	13.0%
APPAREL	4.0%	5.7%	5.9%
TRANSPORTATION	18.6%	17.5%	18.2%
Motor vehicles	8.4%	6.5%	6.8%
Gasoline	4.5%	4.4%	4.5%
Other transportation	5.7%	6.5%	6.9%
EDUCATION AND COMMUNICATION	6.4%	7.9%	6.4%
RECREATION	6.0%	8.7%	9.0%
TOBACCO	0.8%	1.3%	1.3%
OTHER GOODS AND SERVICES	2.9%	7.8%	6.8%
	100.0%	100.0%	100.0%

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Appendix C. Item Relative Importances in CPI-U, PCE1, and PCE2

Table 5: December 2005 Item Relative Importances by Index				
ITEM	**Item description**	**CPI-U**	**PCE1**	**PCE2**
SEAA01	Men's suits, sport coats, and outerwear	0.145%	0.173%	0.218%
SEAA02	Men's furnishings	0.182%	0.220%	0.277%
SEAA03	Men's shirts and sweaters	0.197%	0.235%	0.296%
SEAA04	Men's pants and shorts	0.177%	0.207%	0.260%
SEAA09	Unsampled men's apparel	0.017%	0.021%	0.026%
SEAB01	Boys' apparel	0.182%	0.214%	0.270%
SEAB09	Unsampled boy's apparel	0.015%	0.018%	0.022%
SEAC01	Women's outerwear	0.116%	0.132%	0.167%
SEAC02	Women's dresses	0.132%	0.159%	0.201%
SEAC03	Women's suits and separates	0.725%	0.819%	1.032%
SEAC04	Women's underwear, nightwear, sportswear and accessories	0.364%	0.476%	0.600%
SEAC09	Unsampled women's apparel	0.027%	0.032%	0.040%
SEAD01	Girls' apparel	0.230%	0.268%	0.338%
SEAD09	Unsampled girls' apparel	0.017%	0.020%	0.025%
SEAE01	Men's footwear	0.228%	0.189%	0.238%
SEAE02	Boys' and girls' footwear	0.168%	0.144%	0.182%
SEAE03	Women's footwear	0.362%	0.299%	0.377%
SEAF01	Infants' and toddlers' apparel	0.183%	0.152%	0.191%
SEAG01	Watches	0.046%	0.092%	0.115%
SEAG02	Jewelry	0.272%	0.565%	0.712%
SEEA01	Educational books and supplies	0.189%	0.150%	0.189%
SEEA09	Unsampled books and supplies	0.007%	0.013%	0.016%
SEEB01	College tuition and fees	1.462%	1.495%	1.119%
SEEB02	Elementary and high school tuition and fees	0.395%	0.294%	0.220%
SEEB03	Child care and nursery school	0.716%	0.096%	0.072%
SEEB04	Technical and business school tuition and fees	0.065%	0.274%	0.205%
SEEB09	Unsampled tuition, other school fees, and childcare	0.132%	1.051%	0.787%
SEEC01	Postage	0.169%	0.092%	0.115%
SEEC02	Delivery services	0.015%	0.027%	0.034%
SEED01	Land-line telephone services, local	0.749%	0.404%	0.509%
SEED02	Land-line telephone services, long-distance	0.681%	0.691%	0.871%
SEED03	Wireless telephone service	0.816%	0.660%	0.832%
SEEE01	Personal computers and peripheral equipment	0.236%	0.303%	0.382%
SEEE02	Computer software and accessories	0.041%	0.170%	0.214%
SEEE03	Internet services and electronic information providers	0.307%	0.331%	0.417%
SEEE04	Other information processing equipment	0.057%	0.109%	0.137%
SEEE09	Unsampled information and information processing	0.010%	0.001%	0.002%
SEFA01	Flour and prepared flour mixes	0.046%	0.049%	0.062%
SEFA02	Breakfast cereal	0.203%	0.216%	0.272%
SEFA03	Rice, pasta, cornmeal	0.111%	0.119%	0.149%
SEFB01	Bread	0.215%	0.241%	0.304%
SEFB02	Fresh biscuits, rolls, muffins	0.100%	0.112%	0.141%
SEFB03	Cakes, cupcakes, and cookies	0.209%	0.237%	0.299%
SEFB04	Other bakery products	0.213%	0.238%	0.299%

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Table 5: December 2005 Item Relative Importances by Index				
ITEM	**Item description**	**CPI-U**	**PCE1**	**PCE2**
SEFC01	Uncooked ground beef	0.237%	0.150%	0.189%
SEFC02	Uncooked beef roasts	0.108%	0.069%	0.087%
SEFC03	Uncooked beef steaks	0.245%	0.153%	0.193%
SEFC04	Uncooked other beef and veal	0.051%	0.032%	0.040%
SEFD01	Bacon, breakfast sausage, and related products	0.133%	0.085%	0.107%
SEFD02	Ham	0.097%	0.061%	0.077%
SEFD03	Pork chops	0.083%	0.053%	0.067%
SEFD04	Other pork including roasts and picnics	0.108%	0.069%	0.087%
SEFE01	Other meats	0.265%	0.260%	0.328%
SEFF01	Chicken	0.308%	0.385%	0.485%
SEFF02	Other poultry including turkey	0.075%	0.095%	0.120%
SEFG01	Fresh fish and seafood	0.205%	0.082%	0.103%
SEFG02	Processed fish and seafood	0.129%	0.053%	0.067%
SEFH01	Eggs	0.089%	0.070%	0.088%
SEFJ01	Milk	0.309%	0.147%	0.185%
SEFJ02	Cheese and related products	0.264%	0.239%	0.301%
SEFJ03	Ice cream and related products	0.143%	0.130%	0.164%
SEFJ04	Other dairy and related products	0.137%	0.066%	0.083%
SEFK01	Apples	0.080%	0.047%	0.059%
SEFK02	Bananas	0.073%	0.043%	0.054%
SEFK03	Citrus fruits	0.091%	0.053%	0.067%
SEFK04	Other fresh fruits	0.240%	0.140%	0.177%
SEFL01	Potatoes	0.074%	0.072%	0.091%
SEFL02	Lettuce	0.058%	0.056%	0.071%
SEFL03	Tomatoes	0.102%	0.097%	0.123%
SEFL04	Other fresh vegetables	0.251%	0.242%	0.305%
SEFM01	Canned fruits and vegetables	0.129%	0.119%	0.150%
SEFM02	Frozen fruits and vegetables	0.077%	0.072%	0.090%
SEFM03	Other processed fruits and vegetables including dried	0.042%	0.039%	0.049%
SEFN01	Carbonated drinks	0.332%	0.413%	0.520%
SEFN02	Frozen noncarbonated juices and drinks	0.016%	0.020%	0.025%
SEFN03	Nonfrozen noncarbonated juices and drinks	0.259%	0.320%	0.403%
SEFP01	Coffee	0.100%	0.035%	0.044%
SEFP02	Other beverage materials including tea	0.204%	0.070%	0.088%
SEFR01	Sugar and artificial sweeteners	0.054%	0.077%	0.097%
SEFR02	Candy and chewing gum	0.196%	0.277%	0.349%
SEFR03	Other sweets	0.051%	0.073%	0.092%
SEFS01	Butter and margarine	0.071%	0.043%	0.054%
SEFS02	Salad dressing	0.062%	0.037%	0.046%
SEFS03	Other fats and oils including peanut butter	0.099%	0.059%	0.075%
SEFT01	Soups	0.088%	0.082%	0.104%
SEFT02	Frozen and freeze dried prepared foods	0.257%	0.243%	0.306%
SEFT03	Snacks	0.278%	0.261%	0.329%
SEFT04	Spices, seasonings, condiments, sauces	0.221%	0.210%	0.265%
SEFT05	Baby food	0.073%	0.069%	0.087%
SEFT06	Other miscellaneous foods	0.328%	0.309%	0.389%

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Table 5: December 2005 Item Relative Importances by Index				
ITEM	Item description	CPI-U	PCE1	PCE2
SEFV01	Full service meals and snacks	2.594%	2.093%	2.638%
SEFV02	Limited service meals and snacks	2.702%	2.253%	2.839%
SEFV03	Food at employee sites and schools	0.254%	0.207%	0.261%
SEFV04	Food from vending machines and mobile vendors	0.126%	0.106%	0.133%
SEFV05	Board, catered events, and other food away from home	0.277%	0.217%	0.242%
SEFW01	Beer, ale, and other malt beverages at home	0.336%	0.566%	0.714%
SEFW02	Distilled spirits at home	0.125%	0.312%	0.393%
SEFW03	Wine at home	0.254%	0.186%	0.234%
SEFX01	Alcoholic beverages away from home	0.393%	0.745%	0.938%
SEGA01	Cigarettes	0.661%	0.911%	1.148%
SEGA02	Tobacco products other than cigarettes	0.046%	0.066%	0.084%
SEGA09	Unsampled tobacco and smoking products	0.004%	0.005%	0.007%
SEGB01	Hair, dental, shaving, and miscellaneous personal care products	0.369%	0.564%	0.711%
SEGB02	Cosmetics, perfume, bath, nail preparations and implements	0.336%	0.408%	0.514%
SEGB09	Unsampled personal care products	0.005%	0.007%	0.009%
SEGC01	Haircuts and other personal care services	0.675%	0.539%	0.680%
SEGD01	Legal services	0.298%	1.210%	1.525%
SEGD02	Funeral expenses	0.187%	0.252%	0.318%
SEGD03	Laundry and dry cleaning services	0.283%	0.101%	0.128%
SEGD04	Apparel services other than laundry and dry cleaning	0.033%	0.524%	0.661%
SEGD05	Financial services	0.185%	1.214%	0.357%
SEGD06	Care of invalids and elderly at home	0.105%	0.673%	0.849%
SEGD09	Unsampled items	0.081%	0.189%	0.238%
SEGE01	Miscellaneous personal goods	0.195%	0.361%	0.455%
SEHA01	Rent of primary residence	5.832%	3.355%	4.143%
SEHB01	Housing at school, excluding board	0.151%	0.192%	0.242%
SEHB02	Other lodging away from home including hotels and motels	2.460%	0.769%	0.970%
SEHC01	Owner's equivalent rent of primary residence	23.442%	12.702%	16.007%
SEHD01	Tenants' and household insurance	0.375%	0.069%	0.087%
SEHE01	Fuel oil	0.232%	0.315%	0.397%
SEHE02	Other household fuels	0.107%	0.033%	0.041%
SEHF01	Electricity	2.625%	1.593%	2.047%
SEHF02	Utility (piped) gas service	1.530%	0.973%	1.055%
SEHG01	Residential water and sewerage service	0.655%	0.670%	0.582%
SEHG02	Garbage and trash collection	0.222%	0.170%	0.214%
SEHH01	Floor coverings	0.050%	0.278%	0.350%
SEHH02	Window coverings	0.100%	0.137%	0.173%
SEHH03	Other linens	0.227%	0.276%	0.348%
SEHJ01	Bedroom furniture	0.336%	0.352%	0.444%
SEHJ02	Living room, kitchen, and dining room furniture	0.473%	0.503%	0.634%
SEHJ03	Other furniture	0.197%	0.212%	0.268%
SEHJ09	Unsampled furniture	0.007%	0.007%	0.008%
SEHK01	Large appliances	0.192%	0.271%	0.342%
SEHK02	Other appliances	0.140%	0.206%	0.259%
SEHK09	Unsampled appliances	0.007%	0.009%	0.012%

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Table 5: December 2005 Item Relative Importances by Index				
ITEM	Item description	CPI-U	PCE1	PCE2
SEHL01	Clocks, lamps, and decorator items	0.356%	0.405%	0.510%
SEHL02	Indoor plants and flowers	0.104%	0.216%	0.272%
SEHL03	Dishes and flatware	0.082%	0.251%	0.316%
SEHL04	Nonelectric cookware and tableware	0.093%	0.253%	0.319%
SEHM01	Tools, hardware and supplies	0.208%	0.291%	0.367%
SEHM02	Outdoor equipment and supplies	0.371%	0.142%	0.178%
SEHM09	Unsampled tools, hardware, outdoor equipment and supplies	0.188%	0.031%	0.039%
SEHN01	Household cleaning products	0.372%	0.316%	0.398%
SEHN02	Household paper products	0.203%	0.238%	0.300%
SEHN03	Miscellaneous household products	0.266%	0.222%	0.280%
SEHP01	Domestic services	0.247%	0.309%	0.390%
SEHP02	Gardening and lawncare services	0.249%	0.000%	0.000%
SEHP03	Moving, storage, freight expense	0.081%	0.183%	0.231%
SEHP04	Repair of household items	0.126%	0.058%	0.073%
SEHP09	Unsampled household operations	0.076%	0.165%	0.207%
SEMA01	Prescription drugs	1.013%	2.755%	0.580%
SEMA09	Unsampled rent or repair of medical equipment	0.011%	0.043%	0.028%
SEMB01	Nonprescription drugs	0.296%	0.378%	0.476%
SEMB02	Medical equipment and supplies	0.136%	0.242%	0.073%
SEMC01	Physicians' services	1.631%	4.112%	0.865%
SEMC02	Dental services	0.704%	1.159%	0.244%
SEMC03	Eyeglasses and eye care	0.226%	0.295%	0.062%
SEMC04	Services by other medical professionals	0.254%	1.844%	0.388%
SEMD01	Hospital services	1.490%	7.247%	1.525%
SEMD02	Nursing homes and adult day services	0.087%	2.262%	0.476%
SEME01	Commercial health insurance	0.094%	0.465%	0.098%
SEME02	Blue Cross/Blue Shield	0.107%	0.522%	0.110%
SEME03	Health maintenance plans	0.123%	0.605%	0.127%
SEME04	Medicare and other health insurance	0.048%	0.235%	0.049%
SERA01	Televisions	0.164%	0.220%	0.277%
SERA02	Cable and satellite television and radio service	1.144%	0.710%	0.895%
SERA03	Other video equipment	0.047%	0.204%	0.257%
SERA04	Video discs and other media, including rental of video and audio	0.175%	0.358%	0.451%
SERA05	Audio equipment	0.079%	0.223%	0.281%
SERA06	Audio discs, tapes and other media	0.095%	0.224%	0.282%
SERA09	Unsampled video and audio	0.078%	0.098%	0.123%
SERB01	Pets and pet products	0.375%	0.425%	0.536%
SERB02	Pet services including veterinary	0.265%	0.249%	0.314%
SERC01	Sports vehicles including bicycles	0.399%	0.483%	0.608%
SERC02	Sports equipment	0.274%	0.536%	0.675%
SERC09	Unsampled sports equipment	0.009%	0.034%	0.043%
SERD01	Photographic equipment and supplies	0.092%	0.087%	0.109%
SERD02	Photographers and film processing	0.087%	0.154%	0.194%
SERD09	Unsmapled photography supplies	0.002%	0.002%	0.003%
SERE01	Toys	0.264%	0.542%	0.683%

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Table 5: December 2005 Item Relative Importances by Index				
ITEM	**Item description**	**CPI-U**	**PCE1**	**PCE2**
SERE02	Sewing machines, fabric and supplies	0.072%	0.037%	0.047%
SERE03	Music instruments and accessories	0.050%	0.072%	0.090%
SERE09	Unsampled recreation commodities	0.018%	0.057%	0.072%
SERF01	Club membership dues and fees for participant sports	0.507%	0.363%	0.457%
SERF02	Admissions	0.688%	0.589%	0.743%
SERF03	Fees for lessons or instructions	0.216%	0.148%	0.186%
SERF09	Unsampled recreation services	0.221%	0.169%	0.213%
SERG01	Newspapers and periodicals	0.187%	0.462%	0.582%
SERG02	Recreational books	0.130%	0.338%	0.425%
SERG09	Unsampled recreational reading materials	0.001%	0.001%	0.002%
SETA01	New vehicles	5.155%	3.424%	4.314%
SETA02	Used cars and trucks	1.799%	1.135%	1.431%
SETA03	Leased cars and trucks	0.613%	0.358%	0.451%
SETA04	Car and truck rental	0.090%	0.043%	0.054%
SETA09	Unsampled vehicles	0.202%	0.135%	0.171%
SETB01	Gasoline (all types)	4.148%	3.369%	4.246%
SETB02	Other motor fuels	0.042%	0.031%	0.039%
SETC01	Tires	0.217%	0.237%	0.298%
SETC02	Vehicle accessories other than tires	0.146%	0.419%	0.527%
SETD01	Motor vehicle body work	0.085%	0.152%	0.128%
SETD02	Motor vehicle maintenance and servicing	0.423%	0.750%	0.633%
SETD03	Motor vehicle repair	0.602%	1.066%	0.900%
SETD09	Unsampled vehicle repair	0.022%	0.039%	0.033%
SETE01	Motor vehicle insurance	2.301%	0.691%	1.837%
SETF01	State motor vehicle registration and license fees	0.311%	0.000%	0.000%
SETF03	Parking and other fees	0.162%	0.312%	0.394%
SETF09	Unsampled motor vehicle fees	0.012%	0.008%	0.010%
SETG01	Airline fare	0.673%	0.994%	1.253%
SETG02	Other intercity transportation	0.163%	0.124%	0.156%
SETG03	Intracity transportation	0.248%	0.300%	0.378%
SETG09	Unsampled public transportation	0.003%	0.009%	0.011%
Total	All Items	100.000%	100.000%	100.000%

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