The Consumer Expenditure Survey in Comparison: Focus on Personal Consumption Expenditures

Federal Economic Statistics Advisory Committee Meeting
Bureau of Labor Statistics
Washington, D.C.

March 21, 2003
Outline

- Overview
- Recent Developments
- Current/Future Research
- Data Comparisons
Overview of the Consumer Expenditure Survey

- The CE produces annual information on the buying habits of consumers living in the US; including data on their expenditures, income, and socio-demographic characteristics.
Sample Size

- The data are collected in independent quarterly Interview and weekly Diary surveys.
- Interview Survey information is obtained from approximately 7,500 households (5,000 prior to 1999) each quarter.
- Diary Survey information is collected from an annual sample of another 7,500 households who each fill out two weekly diaries.
- This is an effective annual sample size for publication purposes of 30,000 cases for Interview and 15,000 cases for Diary.
Population Coverage

- The survey uses a national probability sample based on decennial census data augmented by new construction permits.
- The survey targets the total urban and rural noninstitutionalized US population (also excluding those living on military bases).
SAMPLE PSUs FOR THE CONSUMER EXPENDITURE SURVEYS
1990 Design

Primary Sampling Units (PSUs)

Prepared by the Geography Division
U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census
Issues we need to consider when improving data quality:

- Respondent burden and confidentiality
- Consumer non-response
  - Recall
  - Non-response to specific questions
  - Proxi reporting
- Uses and Customers
- Cost
Recent Developments


Ongoing Work

- Comparison of CE and PCE aggregate expenditures
- Global vs. detailed questions
- AC Nielsen research – household scanner data
- Future Diary research and a study of individual member spending
- Issues of income non-response
Primary Interest in PCE

- Used for source selection for integrated published data (Diary or Interview)
- Publish comparisons in biennial publications
- Monitor consistency of results
- Help identify areas where CE data collection and methods might be improved by understanding the differences
Comparing CE Expenditure Estimates with Data from Other Sources

Focus:
Personal Consumption Expenditures of the National Income and Product Accounts
Data Comparisons

- Health Care Financing Administration
  - National Health Expenditures
- Department of Energy
  - Residential Energy Consumption Survey
  - Residential Transportation Energy Consumption Survey
- Progressive Grocer/Supermarket Business
- Health Care Quality and Research Agency
  - Medical Expenditure Panel Survey (Household)
- Bureau of Economic Analysis (BEA)
  - Personal Consumption Expenditures (PCE)
“What was expected from these comparisons was a sense of degree and direction of possible survey errors, rather than an exact measure of bias, because the specific estimates from other sources are not necessarily the ‘true’ values”

(Gieseman 1987, p. 9)
PCE: Primary Source of Independent Data for Comparison Over Time

- Used for source selection for integrated published data (Diary or Interview)
- Publish comparisons in biennial publications
- Monitor consistency of results
- Help identify areas where CE data collection and methods might be improved
CE and PCE Compared

◆ Current methodology (Gieseman 1987; Branch 1994; CE bulletins and reports beginning in 1990)
  – Type by expenditure (food, apparel, housing, etc.)
  – Trends over time in ratios
    » 1984-2000

◆ Re-examination and evaluation (April 2000 to present)
  – Type by product (durables, non-durables, services)
  – CE and PCE aggregates and ratios
  – Concerns and issues
  – Detailed example: Apparel
Major Findings from Re-evaluation

- After adjustments for comparability, CE/PCE ratio
  » 0.89 for 1992 (vs. 0.66 unadjusted)
  » 0.80 for 1997 and 2000 (vs. 0.64 and 0.60 unadjusted)

- Rental value of dwellings and new autos CE expenditure aggregates greater than PCE

- For most other items, CE aggregates lower than PCE and ratios decreasing over time

- Explanations
  » some can be explained
  » others need more work to understand
Making Comparisons: Issues to Consider

- Populations
- Expenditures (publication vs. “comparable”)
  - Underlying conceptual framework (scope)
  - Definition
- Sources of data
  - Censuses
  - Surveys
  - Administrative records
  - Trade association publications
- Periodicity
  - Collection, reference, production
Populations

◆ CE: consumer units and persons
  – Civilian non-institutional population and some institutional
  – Continental U.S., Alaska, and Hawaii
  – Urban and Rural

Numbers of persons 2.1% less than represented by PCE

◆ PCE: persons resident
  – Individuals
    » Persons resident in U.S. and those who physically located in U.S. and have resided, or expect to reside in U.S. for 1 year or more
    » Employees of U.S. businesses abroad for 1 year or less
    » U.S. government civilian and military personnel stationed abroad regardless of time
  – Nonprofit institutions serving individuals
Definition: CE Publication

- What consumers spend: transaction costs including excise and sales taxes of goods and services acquired during reference period
  - Primarily out-of-pocket expenditures (OOP) reported by consumers plus value of in-kind food and rent as pay, and food stamps

- In scope for CE, out of scope for PCE
  - Transactions between households (includes person to person sales such as for used vehicles, apparel, etc.)
  - Life and personal insurance, and pensions
Definition: PCE

- Value of goods and services purchased by the personal sector (excludes intra-sector transactions) including excise and sales taxes
  - Spent by individuals
  - Operating expenses of nonprofit institutions serving individuals
  - Value of food, fuel, clothing, rent of dwellings, and financial services received in kind by individuals; and net purchases of used goods

- In scope for PCE, out of scope for CE publication
  - Rental value of owner occupied dwellings and owned appliances
  - Value of home production for own consumption on farms
  - Standard clothing issued to military
  - Services furnished without payment by financial intermediaries except life insurance carriers
Scope/Definition

- Partly Out Of Scope For CE / Partly Defined Quite Differently
  - Medicare Care Expenditures
  - Religious and Welfare

- Defined Quite Differently
  - Education Expenditures
  - Life and Personal Insurance and Pension Plans
  - Owner-Occupied Housing Expenditures
Data Sources and Periodicity

◆ **CE: direct**
  - Household Surveys
    » Interview
    » Diary
  - Periodicity
    » Annual
    » Quarterly
    » Monthly
    » Weekly
  - Sampling and non-sampling errors
  - Imputation/allocation

◆ **PCE: indirect (commodity flow; mostly residual)**
  - Sources
    » Government statistical reports
    » Government administrative and regulatory agency reports
    » Reports from private organizations
    » CE (motor vehicle leasing and rental, taxis, nursery schools, child care)
  - Periodicity
    » 5-year Benchmark (detailed)
    » Annual
    » Quarterly
    » Monthly
  - Interpolation/extrapolation
  - Expert judgment
  - Revisions
Current Methodology:  
CE to PCE Published Ratios  

- Classification scheme:  
  - *Type by expenditure*  
  - *CE into PCE*  

- Benchmark: *1992 PCE*  

- Categories: *selected*  

- Years: *1984 to 2000*
CE to PCE Ratios:
Averages Over Time

- Total food
- Alcoholic beverages
- Rent, utilities, related
- HHI operations
- Apparel G & S
- Transportation
- Entertainment
- Personal care
- Reading
- Tobacco prod.
- Miscellaneous

1984 to 2000 vs. 1992 to 2000
Stable, Higher Ratios

Rent, Utilities, and Public Services

Vehicle Purchases

1992 benchmark

1987 benchmark

25
Stable/Decreasing, Mid Ratio

*Entertainment*

Televisions, Radios, Sound Equipment
Decreasing, Lower Ratios

Apparel and Services

Other Apparel P &S

1992 benchmark

1987 benchmark
Others Have Been Watching and Using…

- Economic Growth
  - Slesnick (1992, 1998)
  - Triplett (1997)

- Consumption based measure of poverty

- CE in the production of the CPI
  - Fixler and Jaditz (2002)
  - Johnson and Greenlees (2003)
  - Lebow and Rudd (2003)
  - National Research Council (2002)
Calls for Further Examination with Caution…

- **Slesnick (1992)**
  - *remaining differences “is a mystery that can only be resolved by future investigation.”*
  - “...suggest caution is in order before one assigns full blame ... to underreporting in the CEX.” [due to magnitude of PCE revisions]

- **Triplett (1997)**
  - “...individual components of PCE and CE have been studied too little to permit conclusions about which is better ...”

- **GAO report (1996) referring to 1994 BEA study**
  - “...more than half [of the differences in the aggregate expenditures] was traceable to coverage and definitional differences, with the remainder due to statistical differences.”
Call For Further Examination

- National Research Council (2002)
  - “On the basis of available evidence, it is unclear whether the PCE or CEX weights are superior...It is an open question as to how accurately expenditure categories can be mapped from the PCE to CEX. We are not in a position to advocate one set of weights over the other, but the question certainly warrants further investigation”

But then go on to say...

- “The panel concluded that it is likely that the CEX estimates of consumer expenditure shares are biased, perhaps seriously.”
Re-examination

◆ Classification:
  – Type by product (durables, non-durables, services)
  – CE into PCE
  – PCE Bridge to 1992 Input-Output Table

◆ Benchmark: 1992

◆ Categories
  – All
  – Redefined “comparable”
    » e.g., drop used vehicles; include owned dwellings

CE Integrated/Personal Consumption Expenditures Ratios: Comparables

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
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</tr>
<tr>
<td>Comparable</td>
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<tr>
<td>All</td>
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<td>Comparable</td>
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<tr>
<td>Comparable</td>
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</tr>
</tbody>
</table>

**All items**

**Durables**

**Nondurables**

**Services**
Comparable Non-farm Owner-Occupied Dwellings

With adjustment for the implicit rental value of appliances
## CE to PCE Aggregate Expenditures

<table>
<thead>
<tr>
<th></th>
<th>1992 (billions)</th>
<th>1992 (billions)</th>
<th>1992 (billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total CE</td>
<td>$2,788</td>
<td>$3,553</td>
<td>$4,020</td>
</tr>
<tr>
<td>Total PCE</td>
<td>$4,210</td>
<td>$5,529</td>
<td>$6,728</td>
</tr>
<tr>
<td>% Total</td>
<td>66%</td>
<td>64%</td>
<td>60%</td>
</tr>
<tr>
<td>Total CE Comparable</td>
<td>$2,107</td>
<td>$2,490</td>
<td>$2,982</td>
</tr>
<tr>
<td>Total PCE Comparable</td>
<td>$2,369</td>
<td>$3,117</td>
<td>$3,723</td>
</tr>
<tr>
<td>% Comparable</td>
<td>89%</td>
<td>80%</td>
<td>80%</td>
</tr>
</tbody>
</table>

**CE Comparable as % of CE Total**

- 76%
- 70%
- 74%

**PCE Comparable as % of PCE Total**

- 56%
- 56%
- 55%
Issues to Consider: CE vs. PCE

- Populations differ
- Expenditures: concept / scope, definition
- Collection / Sources of data
- Sources of error
  - CE
    » Measurement errors associated with surveys
    » Processing imputation / allocation
  - PCE
    » Expert judgment
    » Interpolation / extrapolation
    » Measurement errors associated with surveys (non-benchmark)
- PCE revisions
Analytical Example

1992 Expenditures for Apparel in the CE and PCE
Rationale for Year and Expenditure Category

◆ Why 1992?
  – Data represent latest benchmark year at time of study
  – Benchmark data are available at finer level of item detail

◆ Why apparel?
  – The difference between aggregate CE and PCE estimates is relatively large
  – The trend in the ratio of CE to PCE estimates has demonstrated a continuous decline over time
Expenditures for apparel, total and by major item category, 1992 CE and PCE

<table>
<thead>
<tr>
<th>Item category</th>
<th>Annual expenditures (millions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CE Total</strong></td>
<td></td>
</tr>
<tr>
<td>Men’s &amp; boys’ apparel</td>
<td>$143,970</td>
</tr>
<tr>
<td>Women’s &amp; girls’ apparel</td>
<td>$45,018</td>
</tr>
<tr>
<td>Apparel for children under 2</td>
<td></td>
</tr>
<tr>
<td>Footwear</td>
<td>$68,056</td>
</tr>
<tr>
<td></td>
<td>$7,772</td>
</tr>
<tr>
<td></td>
<td>$23,124</td>
</tr>
<tr>
<td><strong>PCE Total</strong></td>
<td>$212,259</td>
</tr>
<tr>
<td>Clothing for males</td>
<td>$63,645</td>
</tr>
<tr>
<td>Clothing for females</td>
<td>$107,474</td>
</tr>
<tr>
<td>Clothing for infants</td>
<td>$8,237</td>
</tr>
<tr>
<td>Shoes</td>
<td>$32,903</td>
</tr>
</tbody>
</table>
Derivation of CE Estimates

- Diary survey is the source for about 63 percent of aggregate apparel expenditures, while the Interview survey accounts for the remaining 37 percent.

- Individual expenditure reports originate in three ways:
  - Directly reported by respondent
  - Allocation of expenditures where respondent reports expenditure for a combination of items
  - Imputation of expenditures where respondent acknowledges purchase, but does not provide value
Derivation of PCE Estimates

- Process uses data created for preparation of input-output accounts for U. S.

- The benchmark purchasers’ value of goods and services is calculated to determine allocable output.

- Total purchasers’ value is allocated among intermediate and end users.
Amount of value added to total apparel estimate by factor, 1992 PCE

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value added (millions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$238,843</td>
</tr>
<tr>
<td>Basic value</td>
<td>$119,114</td>
</tr>
<tr>
<td>Wholesale margin</td>
<td>21,286</td>
</tr>
<tr>
<td>Transportation cost</td>
<td>3,369</td>
</tr>
<tr>
<td>Wholesale taxes</td>
<td>163</td>
</tr>
<tr>
<td>Retail margin</td>
<td>84,860</td>
</tr>
<tr>
<td>Retail taxes</td>
<td>10,051</td>
</tr>
</tbody>
</table>
## Production and allocation of apparel, 1992 I/O Accounts (millions of dollars)

<table>
<thead>
<tr>
<th>Production</th>
<th>Basic value</th>
<th>Whole margin</th>
<th>Trans. cost</th>
<th>Comm &amp; whole. taxes</th>
<th>Retail margin</th>
<th>Retail taxes</th>
<th>Purchasers’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipments</strong></td>
<td>65,605</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Adjustments:</td>
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<td></td>
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<tr>
<td>Secondary production</td>
<td>103</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Nonemployer receipts</td>
<td>394</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Filer misreporting receipts</td>
<td>68</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Nonemployer misreporting receipts</td>
<td>35</td>
<td>600</td>
<td></td>
<td></td>
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<tr>
<td><strong>Adjusted shipments</strong></td>
<td>66,205</td>
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<tr>
<td>Handling charges of mail order houses and mailing of gifts</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Allocable shipments</strong></td>
<td>66,379</td>
<td>21,286</td>
<td>3,369</td>
<td>163</td>
<td>84,860</td>
<td>10,051</td>
<td>186,108</td>
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<tr>
<td><strong>Imports</strong></td>
<td>51,778</td>
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<td>Adjustments:</td>
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<tr>
<td>Census re-exports</td>
<td>-183</td>
<td></td>
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<td></td>
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<tr>
<td>NIPA territorial adj. to imports</td>
<td>1,140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Allocable imports</strong></td>
<td>52,735</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>52,735</td>
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<tr>
<td><strong>Allocable shipments &amp; imports</strong></td>
<td>119,114</td>
<td>21,286</td>
<td>3,369</td>
<td>163</td>
<td>84,860</td>
<td>10,051</td>
<td>238,843</td>
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</table>
Production and allocation of apparel, 1992 I/O Accounts – cont. (millions of dollars)

<table>
<thead>
<tr>
<th>Allocation of Production</th>
<th>Basic value</th>
<th>Whole. margin</th>
<th>Trans. cost</th>
<th>Comm &amp; whole. taxes</th>
<th>Retail margin</th>
<th>Retail taxes</th>
<th>Purchasers’ value</th>
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</thead>
<tbody>
<tr>
<td>Exports</td>
<td>5,422</td>
<td>1,257</td>
<td>356</td>
<td>2</td>
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<td>7,037</td>
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<td>Intermediate production</td>
<td>4,934</td>
<td>3,609</td>
<td>1,937</td>
<td>27</td>
<td></td>
<td></td>
<td>10,507</td>
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<tr>
<td>Government purchases &amp; sales – Federal</td>
<td>625</td>
<td>111</td>
<td>17</td>
<td>1</td>
<td></td>
<td></td>
<td>754</td>
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<tr>
<td>Government purchases &amp; sales – State &amp; local</td>
<td>1,607</td>
<td>295</td>
<td>53</td>
<td>4</td>
<td></td>
<td></td>
<td>1,959</td>
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<tr>
<td>Change in intermediate goods inventories</td>
<td>44</td>
<td>11</td>
<td>9</td>
<td>1</td>
<td></td>
<td></td>
<td>65</td>
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<tr>
<td>Unspecified costs</td>
<td>1,768</td>
<td>253</td>
<td>27</td>
<td>2</td>
<td></td>
<td></td>
<td>2,050</td>
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<tr>
<td>Change in wholesale inventories</td>
<td>841</td>
<td>148</td>
<td>28</td>
<td>3</td>
<td></td>
<td></td>
<td>1,020</td>
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<tr>
<td>Change in retail inventories</td>
<td>3,260</td>
<td>460</td>
<td>36</td>
<td>4</td>
<td></td>
<td></td>
<td>3,760</td>
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<td>Gross private fixed investment</td>
<td>-337</td>
<td>151</td>
<td>54</td>
<td>6</td>
<td></td>
<td></td>
<td>-126</td>
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<tr>
<td>Unallocated output</td>
<td>290</td>
<td>35</td>
<td>18</td>
<td>2</td>
<td></td>
<td></td>
<td>345</td>
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</table>
### Production and allocation of apparel, 1992 I/O Accounts – cont. *(millions of dollars)*

<table>
<thead>
<tr>
<th>Allocation of Production</th>
<th>Basic value</th>
<th>Whole. margin</th>
<th>Trans. cost</th>
<th>Comm &amp; whole. taxes</th>
<th>Retail margin</th>
<th>Retail taxes</th>
<th>Purchasers’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCE Clocks, Lamps &amp; Artwork</td>
<td>45</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>PCE Sporting Equipment</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>PCE Vehicle Accessories &amp; Parts</td>
<td>-65</td>
<td>-54</td>
<td>-29</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-148</td>
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<tr>
<td>PCE Jewelry &amp; Watches</td>
<td>-765</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-765</td>
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<tr>
<td>PCE Lighting Supplies</td>
<td>47</td>
<td>17</td>
<td>6</td>
<td>1</td>
<td>43</td>
<td>6</td>
<td>120</td>
</tr>
<tr>
<td>PCE Other Personal Hygiene Products</td>
<td>43</td>
<td>15</td>
<td>5</td>
<td>1</td>
<td>30</td>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>PCE Food in Off-Premise Food</td>
<td>-721</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-721</td>
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<tr>
<td>Purchases</td>
<td>-295</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-295</td>
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<tr>
<td>PCE Magazines</td>
<td>562</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>571</td>
</tr>
<tr>
<td>PCE Laundry &amp; Garment Repair</td>
<td>22</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>15</td>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>PCE Semi-durable Housefurnishings</td>
<td>205</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>230</td>
</tr>
<tr>
<td>PCE Military Clothing</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>9</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>PCE Apparel</td>
<td><strong>101,570</strong></td>
<td><strong>14,941</strong></td>
<td><strong>849</strong></td>
<td><strong>100</strong></td>
<td><strong>84,760</strong></td>
<td><strong>10,039</strong></td>
<td><strong>212,259</strong></td>
</tr>
<tr>
<td>Purchasers’ value</td>
<td><strong>119,115</strong></td>
<td><strong>21,286</strong></td>
<td><strong>3,369</strong></td>
<td><strong>163</strong></td>
<td><strong>84,860</strong></td>
<td><strong>10,051</strong></td>
<td><strong>238,844</strong></td>
</tr>
</tbody>
</table>
Evaluation of CE and PCE Estimates

- Standard errors and confidence intervals
- Expert judgment
- Content difference in component categories
Standard error and 95% confidence interval for total apparel expenditures, 1992 CE

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total apparel</strong></td>
<td>$143,970</td>
</tr>
<tr>
<td><strong>Standard error</strong></td>
<td>$4,598</td>
</tr>
<tr>
<td><strong>95% confidence intervals</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Upper limit</strong></td>
<td>$152,982</td>
</tr>
<tr>
<td><strong>Lower limit</strong></td>
<td>$134,958</td>
</tr>
</tbody>
</table>
Quality identifier in PCE

- Since PCE is compiled from numerous sources, calculating standard errors and confidence intervals is not feasible.

- The basic value for each transaction contributing to PCE is assigned a quality ID of 1, 2, or 3, in decreasing order of quality or level of confidence.
Quality identifier in PCE – cont.

- Quality ID of 1 - basic value taken directly from data source, such as published table in Census of Manufactures
- Quality ID of 2 - misreporting adjustments and estimates of non-employer receipts from IRS data
- Quality ID of 3 - secondary production adjustments and handling charges for catalog and mail-order houses
- Ninety-eight percent of basic value for apparel derived from Quality ID 1 transactions
Expert Judgment

- Data adjustment in CE
  - Allocation procedures
  - Imputation procedures

- Trade margin calculation in PCE
  - Wholesale
  - Retail
## Impact of data adjustment procedures on apparel estimates, 1992 CE (*millions of dollars*)

<table>
<thead>
<tr>
<th>Item</th>
<th>Total expenditure</th>
<th>Allocated expenditure</th>
<th>% Allocated</th>
<th>Imputed expenditure*</th>
<th>% Imputed*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total apparel</td>
<td>$143,970</td>
<td>$21,022</td>
<td>14.6%</td>
<td>$172</td>
<td>0.1%</td>
</tr>
<tr>
<td>Men’s &amp; boys’</td>
<td>45,018</td>
<td>7,901</td>
<td>17.6%</td>
<td>53</td>
<td>0.2%</td>
</tr>
<tr>
<td>Women’s &amp; girls’</td>
<td>68,056</td>
<td>9,412</td>
<td>13.8%</td>
<td>105</td>
<td>0.2%</td>
</tr>
<tr>
<td>Children under 2</td>
<td>7,772</td>
<td>1,092</td>
<td>14.1%</td>
<td>15</td>
<td>0.2%</td>
</tr>
<tr>
<td>Footwear</td>
<td>23,124</td>
<td>2,617</td>
<td>11.3%</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

* Imputed expenditures include both strictly imputed and imputed and allocated expenditures
Calculation of Wholesale Trade Margin in PCE Estimates

- Initial margin estimate is computed for wholesalers whose primary business is apparel.
  - Total sales receipts and the cost of purchases of apparel are obtained from Census of Wholesale Trade (CWT).
  - Misreporting adjustments are made to sales receipts and the cost of purchases from IRS and other data.
  - Changes in the value of inventories held at beginning and end of year are added from CWT and Annual Trade Survey.
Margin estimate for wholesalers whose primary business is apparel is adjusted to account for two factors.
- These wholesalers may also trade in other businesses.
- Wholesalers whose primary business is not apparel may also have apparel operations.

CWT data do not distinguish between apparel and non-apparel operations in either case.
Calculation of Wholesale Trade Margin in PCE Estimates – cont.

◆ A harmonization procedure is used based on sales receipt data which is available for all businesses engaged in apparel trade.
  
  – Trade margin rate (wholesale trade margin / sales receipts) is calculated for wholesalers whose primary business is apparel.
  
  – The trade margin rate is applied to apparel sales receipts of all wholesalers of apparel.
  
  – Trade margin rates for other commodities handled by apparel wholesalers are computed.
  
  – These rates are applied to non-apparel sales receipts of apparel wholesalers.
Calculation of Wholesale Trade Margin in PCE Estimates – cont.

- *Ideally*, the trade margin generated by applying these rates to commodity lines handled by apparel wholesalers = the trade margin derived by evaluating purchases, costs, and inventory adjustments.

- *In practice*, the trade margins are not equal, so adjustments are made to the margin rates for commodity lines and kinds of businesses until the margins are harmonized.
Calculation of Wholesale Trade Margin in PCE Estimates – cont.

◆ Effect of this harmonization procedure
  
  – Margin based on purchases, costs and inventory adjustments is $17,341 million
  
  – Harmonized margin calculated by harmonization procedure is $21,286 million
  
  – Procedure results in 22.7% increase in apparel margin.
Examples of content differences in component categories of apparel

- PCE includes athletic footwear for participant sports in apparel. CE includes such footwear in recreation expenditures. (Currently we cannot isolate these expenditures in either PCE or CE to make an adjustment to the aggregates.)

- PCE includes boot and shoe cut stock and findings in apparel. CE does not include such a category in apparel. It is likely such expenditures are included in shoe repair services.
Examples of content differences in component categories of apparel - cont.

- PCE includes umbrellas in apparel. CE can assign umbrellas to apparel if reported as clothing accessory, to outdoor equipment if reported as patio umbrella, or to general sports equipment if reported as golf umbrella.
Summary of Evaluation

◆ Differential between 1992 CE and PCE estimates - $68 billion
  – If true CE estimate at upper end of confidence interval - $9 billion
  – If true PCE wholesale and retail trade margins were based on the lower of pre- and post-harmonized estimates - $2.8 billion
  – Though we have no estimates of effects, it is unlikely that BLS allocation/imputation procedures or differences in the content of component categories has appreciable impact on expenditure differential

◆ Remaining differential - approx. $56 billion

◆ Change in ratio of CE-PCE apparel estimates - 68% → 73%
Questions for FESAC Committee

- Many of the issues in comparing the CE and PCE data arose because of the different classification schemes used. Is one classification scheme more effective than the other?
- Are there suggestions for ways to quantify the level of measurement error in the PCE and to determine whether differences in PCE and CE expenditures are statistically significant?
- How would we decide whether the CE estimates should be augmented with data from other sources, such as scanner data or the PCE?