

Comparison of Estimates from the CE Survey and PCE from the NIPA: The Case of Recreation Expenditures

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Outline

- ◆ Overview of CE-PCE Comparisons
- ◆ Summary of CE-PCE Recreation Estimates
- ◆ Derivation of CE & PCE Estimates
- ◆ Evaluation of CE & PCE Estimates
- ◆ Methodology & Questionnaire Design

Since the Start of the Ongoing CE...

“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”

(Gieseeman 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 by understanding the differences

CE to PCE Aggregate Expenditures

	1992 (billions)	1997 (billions)	2002 (billions)
Total CE	\$2,856	\$3,590	\$4,457
Total PCE	\$4,235	\$5,545	\$7,376
% Total	67%	65%	60%
Total CE Comparable	\$2,085	\$2,564	\$3,126
Total PCE Comparable	\$2,422	\$3,028	\$3,842
% Comparable	86%	85%	81%
<i>CE Comparable as % of CE Total</i>	<i>73%</i>	<i>71%</i>	<i>70%</i>
<i>PCE Comparable as % of PCE Total</i>	<i>57%</i>	<i>55%</i>	<i>52%</i>

Revised, 1997 Benchmark

Issues to Consider: CE vs. PCE

- ◆ Populations differ – CE pop. 3.3% than PCE in 1997
- ◆ 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

1997 Expenditures for Recreation
in the CE and PCE

Rationale for Year and Expenditure Category

◆ Why 1997?

- Data represent latest benchmark year at time of study
- Benchmark data are available at finer level of item detail

◆ Why recreation?

- CE expenditures for services, in general, are only 3/5 of PCE services
- The difference between aggregate CE and PCE recreation estimates is relatively large
- As opposed to other service categories exhibiting large differences, there are no a priori explanations for the results

Expenditures for recreation, total and by major item category, 1997 CE and PCE - (millions of dollars)

Item category	<i>CE</i>	<i>PCE</i>	<i>% Ratio CE/PCE</i>
Total recreation	\$107,583	\$215,067	50.0%
Motion picture & legitimate theaters, opera, and entertainments of non- profit institutions (excl. athletic)	13,582	15,781	86.1%
Spectator sports	5,013	10,108	49.6%
Radio & TV repair	775	2,850	27.2%
Clubs & fraternal organizations	7,931	16,285	48.7%
Commercial participant amusements	10,896	59,423	18.3%
Parimutuel net receipts & lotteries	5,616	18,265	30.7%
Pets, vets, & other pet services	11,688	12,837	91.0%
Cable TV	27,697	30,131	91.9%

Expenditures for recreation, total and by major item category, 1997 CE and PCE (cont.)

Item category	<i>CE</i>	<i>PCE</i>	<i>% Ratio CE/PCE</i>
Film developing & photo studios	5,570	12,602	44.2%
Sporting & recreational camps	2,254	1,414	159.4%
Video cassette rental	4,255	8,193	51.9%
Internet service providers	2,181	3,575	61.0%
Commercial amusements, not elsewhere classified	10,125	23,311	43.4%

Derivation of CE Estimates

- ◆ Interview survey is the source for about 86 percent of aggregate recreation expenditures, while the Diary survey accounts for the remaining 14 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 recreation estimate by factor, 1997 PCE

Factor	Value added <i>(millions of dollars)</i>	
Total	\$215,067	
Basic value		\$208,064
Wholesale margin		30
Transportation cost		76
Wholesale taxes		6,153
Retail margin		677
Retail taxes		68

Aggregation and allocation of receipts for recreation, 1997 I/O Accounts *(millions of dollars)*

Aggregation of receipts	Basic value	Whole. margin	Trans. cost	Comm & whole. taxes	Retail margin	Retail taxes	Purchasers' value
Payroll establishments	\$310,593						
Nonemployer establishments	19,922						
Tax-exempt establishments	82						
	\$330,597						
Adjustments:							
Secondary production	14,783						
Nonemployer misreporting	1,664						
Filer misreporting	1,505						
Nonfiler misreporting	3,337						
Capital consumption allow.	507						
	21,796						
Allocable receipts	\$352,393	\$112	\$294	\$7,565	\$752	\$74	\$361,190
Imports	2,332						
Adjustments:							
Census re-exports	-41						
NIPA territorial adj. to imports	1						
	2,292						
Allocable import receipts	2,292						2,292
Total allocable receipts	354,685	112	294	7,565	752	74	363,482

Aggregation and allocation of receipts for recreation, 1997 I/O Accounts – cont. (millions of dollars)

Allocation of Production	Basic value	Whole. margin	Trans. cost	Comm & whole. taxes	Retail margin	Retail taxes	Purchasers' value
Exports of goods	1,400	30	78	0			1,508
Intermediate production	19,186	46	119	74	6	0	19,431
Travel & conference services	7,124	0	0	9			7,133
Real estate services	6,505	0	0	38			6,544
Legal, accounting, & insurance services	5	0	0	0			6
Communication & utility services	4,054	0	0	59			4,113
Rental & leasing of equipment	11,748	0	0	261			12,009
Repairs & maintenance costs	9,870	0	0	53			9,924
Government purchases & sales – Federal, state, local, foreign	-1,828	0	0	-284			-2,112
Net purchases & sales of foreigners	2,099	0	0	0			2,099
Change in inventories	44	1	1	0			45
Unspecified costs	41,497	5	13	565			42,080
Unallocated output	5,783	0	0	259			6,042

Aggregation and allocation of receipts for recreation, 1997 I/O Accounts – cont. *(millions of dollars)*

Allocation of Production	Basic value	Whole. margin	Trans. cost	Comm & whole. taxes	Retail margin	Retail taxes	Purchasers' value
PCE Sporting Equipment	602	0	0	5	0	0	607
PCE Sports Supplies, Incl. Ammo	48	1	3	0	41	4	97
PCE Fish & Seafood	78	0	5	0	28	2	113
PCE Food in Purchased Meals	452	0	0	33	0	0	486
PCE Alcohol in Purchased Meals	98	0	0	0	0	0	98
PCE Other Meats	129	0	0	0	0	0	129
PCE Toys, Dolls, & Games	16	0	0	0	0	0	16
PCE Electrical Repair	1,708	0	0	22	0	0	1,730
PCE Laundry & Garment Repair	230	0	0	12	0	0	242
PCE Beauty Shops & Health Clubs	6,557	0	0	169	0	0	6,726
PCE Commercial & Vocational Schools	1,742	0	0	1	0	0	1,743
PCE Elementary & Secondary Schools	832	0	0	0	0	0	832
PCE Miscellaneous Personal Services	15	0	0	0	0	0	15
PCE Bus	663	0	0	0	0	0	663
PCE Mass Transit Systems	7,686	0	0	0	0	0	7,686

Aggregation and allocation of receipts for recreation, 1997 I/O Accounts – cont. (millions of dollars)

Allocation of Production	Basic value	Whole. margin	Trans. cost	Comm & whole. taxes	Retail margin	Retail taxes	Purchasers' value
PCE Other Purchased Intercity Transportation	6,242	0	0	37	0	0	6,278
PCE Other Motor Vehicle Services	98	0	0	2	0	0	100
PCE Hotels & Motels	418	0	0	15	0	0	433
PCE Postage	16	0	0	0	0	0	16
PCE Household Operations Services, Not Elsewhere Classified (NEC)	4,105	0	0	74	0	0	4,179
PCE Professional Association Expenses	4,417	0	0	0	0	0	4,417
PCE Social Welfare	2,980	0	0	8	0	0	2,988
<i>PCE Recreation</i>	<i>208,064</i>	<i>30</i>	<i>76</i>	<i>6,153</i>	<i>677</i>	<i>68</i>	<i>215,067</i>
	354, 685	112	294	7,565	752	74	363,482

Evaluation of CE and PCE Estimates

- ◆ Standard errors and confidence intervals
- ◆ Expert judgment
- ◆ Classification of items

Standard error and 95% confidence interval for total recreation expenditures, 1997 CE

Item	Value <i>(millions of dollars)</i>
Total recreation	\$107,583
Standard error	\$2,430
95% confidence intervals	
Upper limit	\$112,346
Lower limit	\$102,820

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 based on survey, census, or other reliable published source
- ◆ Quality ID of 2 – basic value based on source data, but further estimates made by BEA
- ◆ Quality ID of 3 – basic value not based on survey data or other reliable source
- ◆ 83 percent of basic value for recreation derived from Quality ID 2 transactions
- ◆ Remaining 17 percent derived from Quality ID 3 transactions

Expert Judgment in CE

- ◆ Data adjustment in CE
 - Allocation procedures
 - Imputation procedures

- ◆ “Analyst judgment” in PCE
 - Tradition & experience – ‘S’s, ‘R’s & ‘IED998’s
 - Explicit

Impact of data adjustment procedures on recreation estimates, 1997 CE *(millions of dollars)*

Item	Total	Allocated	% Allocated	Imputed	% Imputed	Other*	% Other*
Total recreation	\$107,583	\$3,447	3.2%	\$2,663	2.5%	\$2,945	2.7%
Movies, theater, etc.	13,582	259	1.9%	608	4.4%	711	5.2%
Spectator sports	5,013	86	1.7%	299	6.0%	237	4.7%
Radio & TV repair	775	67	8.6%	15	1.9%	1	0.1%
Clubs & frat. orgs.	7,931	0	0.0%	323	4.1%	<1	<0.1%
Comm. participant amusements	10,896	1,285	11.8%	582	5.3%	1,355	12.4%
Parimut. & lotteries	5,616	347	6.2%	0	0.0%	0	0.0%
Pets & vets	11,688	109	0.9%	32	0.3%	9	0.1%

* Other includes manual adjustment, combined imputation and allocation, and special Section 18 processing (Trips and Vacations).

Impact of data adjustment procedures on recreation estimates, 1997 CE – cont. *(millions of dollars)*

Item	Total	Allocated	% Allocated	Imputed	% Imputed	Other*	% Other*
Cable TV	\$27,697	189	0.7%	\$223	0.8%	\$13	<0.1%
Film developing & photo studios	5,570	403	7.2%	228	4.1%	<1	<0.1%
Sport. & rec. camps	2,254	404	17.9%	0	0.0%	0	0.0%
Video cassette rental	4,255	0	0.0%	186	4.4%	1	<0.1%
Internet service providers	2,181	0	0.0%	17	0.8%	0	0.0%
Commercial amusements, NEC	10,125	298	2.9%	150	1.5%	617	6.1%

* Other includes manual adjustment, combined imputation and allocation, and special Section 18 processing (Trips and Vacations).

Expert Judgment in PCE

- ◆ Tradition & experience
 - ‘S’ - Domestic supply
 - ‘IED998’ - Converted 1992 commodity flow records
 - ‘R’ - Residual
- ◆ Explicit
 - “Based on analyst judgment”

Classification of Items

- ◆ CE - UCC for parimutuel receipts include miscellaneous fees, such as pet, fishing, & hunting licenses that can't be separated
- ◆ CE - UCC for sporting and recreational camp fees includes sports camps, such as football and baseball.
 - PCE assigns sports instruction camps to commercial amusements, NEC.

Methodology & Questionnaire Design: Spectator Sports Example

- ◆ Items in PCE
 - Pro & semi-pro baseball admission receipts
 - Pro & semi-pro football admission receipts
 - Other pro & semi-pro sports clubs admissions
 - Other receipts from sports teams & clubs
 - Admission receipts for horse racetracks
 - Admission receipts for dog racetracks
 - Admission receipts for auto racetracks
 - Racing (excl. track oper., radio, TV, & ads)
 - Exhibition bowling
 - Travel arrangement & reservation services

Spectator Sports Example – cont.

- ◆ Items in PCE – cont.
 - Promoters of performing arts, sports, and similar events
 - College sports
 - Sales & services of higher educational est. incidental to education activities
 - Government sales of elementary & secondary education services

Spectator Sports Example – cont.

◆ UCC's in CE

- 620221 – Admission to sporting events
- 620222 – Admission to sporting events, out-of-town trips

◆ Questions for UCC 620221

- “Since the 1st of (*month, 3 months ago*), have you (or any members of your CU) purchased any of the following for your own use?”
 - Season tickets to sporting events
- “Have you (or any members of your CU) paid any single admissions to spectator sporting events such as football, baseball, hockey, or soccer?”

Spectator Sports Example – cont.

◆ Questions for UCC 620222

- For trips paid for at least in part by the CU and not a package deal:
“Did you (or any members of your CU) spend anything on this trip for entertainment or admissions (not counting what the package deal covered)? *Hand respondent information booklet, page 40.*
- The info booklet gives the following cues:
 - » Movies Theaters Concerts
 - » Museums Tours Sports events
 - » Other entertainment event
- 25 percent of the amount is allocated to UCC 620222 for longer trips, 11 percent if the trip is reported as a local overnight stay.

Spectator Sports Example – cont.

- For reimbursed trips, trips for non-CU members and package deals:
“Did [the trip] expenses include anything for - ?
 - Food and beverages
 - Lodging
 - Transportation
 - Anything else
- A portion of “Anything else” is allocated to entertainment and admissions depending on what other items were included on the trip.
- 25 percent of the entertainment and admissions portion is then allocated to UCC 620222.
- ◆ Thus, the CE instrument and methodology do not elicit the same detail on spectator sports expenses as the PCE source data provides. The questions are also asked towards the end of the interview at which point fatigue may be a factor.

Instrument Changes

- ◆ Section 17A – Subscriptions and Memberships
 - Question in CAPI instrument asks for membership costs or other expenses for item codes 9-12. Item code 9 is split into two new item codes
 - » Original code 9: Country clubs, health clubs, swimming pools, tennis clubs, social or other recreational organizations
 - » New code 6: Golf courses, country clubs, and other social organizations
 - » New code 7: Health clubs, fitness centers, swimming pools, weight loss centers, or other sports and recreational organizations

Instrument Changes – cont.

- ◆ Section 17B – Books and Entertainment Expenses
 - More cues added to questions in CAPI instrument
 - » Original: “Have you . . . paid any fees for participating in sports such as tennis, golf, bowling, or swimming?”
 - » New: “Have you . . . pain any fees for participating in sports such as golf, bowling, biking, hockey, football, or swimming?”
 - » Original: “Have you . . . paid any single admissions to spectator sports such as football, baseball, hockey, or soccer?”
 - » New: “Have you . . . paid any single admissions to spectator sports such as football, baseball, hockey, racing, or track events?”

Instrument Changes – cont.

- ◆ Section 17B – Books and Entertainment Expenses
 - Question added to CAPI instrument with rewording of original question
 - » Original question: “Have you . . . paid any single admissions to entertainment activities such as movies, plays, operas, or concerts?”
 - » Reworded original question: “Have you . . . paid any single admissions to performances such as movies, plays, operas, or concerts?”
 - » Added question: “Have you . . . paid any single admissions to other entertainment activities such as museums, amusement parks, zoos, or state parks?”

Summary of Evaluation

- ◆ Differential between 1997 CE and PCE estimates - \$107 billion
 - If true CE estimate at upper end of confidence interval - \$5 billion
 - If PCE estimate adjusted to CE population - \$7 billion
 - Though we have no estimates of effects, it is unlikely that adjusting other BLS allocation/imputation procedures or reapplying BEA expert judgment in allocation decisions on total purchasers' value would have an appreciable impact on expenditure differential.
- ◆ Remaining differential - approx. \$95 billion
- ◆ A potential methodological reason for the difference is questionnaire design in the CE.