

CONSUMER EXPENDITURE SURVEYS

“Overview and Recent Developments in the Consumer
Expenditure Surveys”

NBER

July 22-23, 2002



Outline

- ◆ Overview
- ◆ Recent Research
- ◆ Data Comparisons
- ◆ Recent Developments
- ◆ Current/Future Research

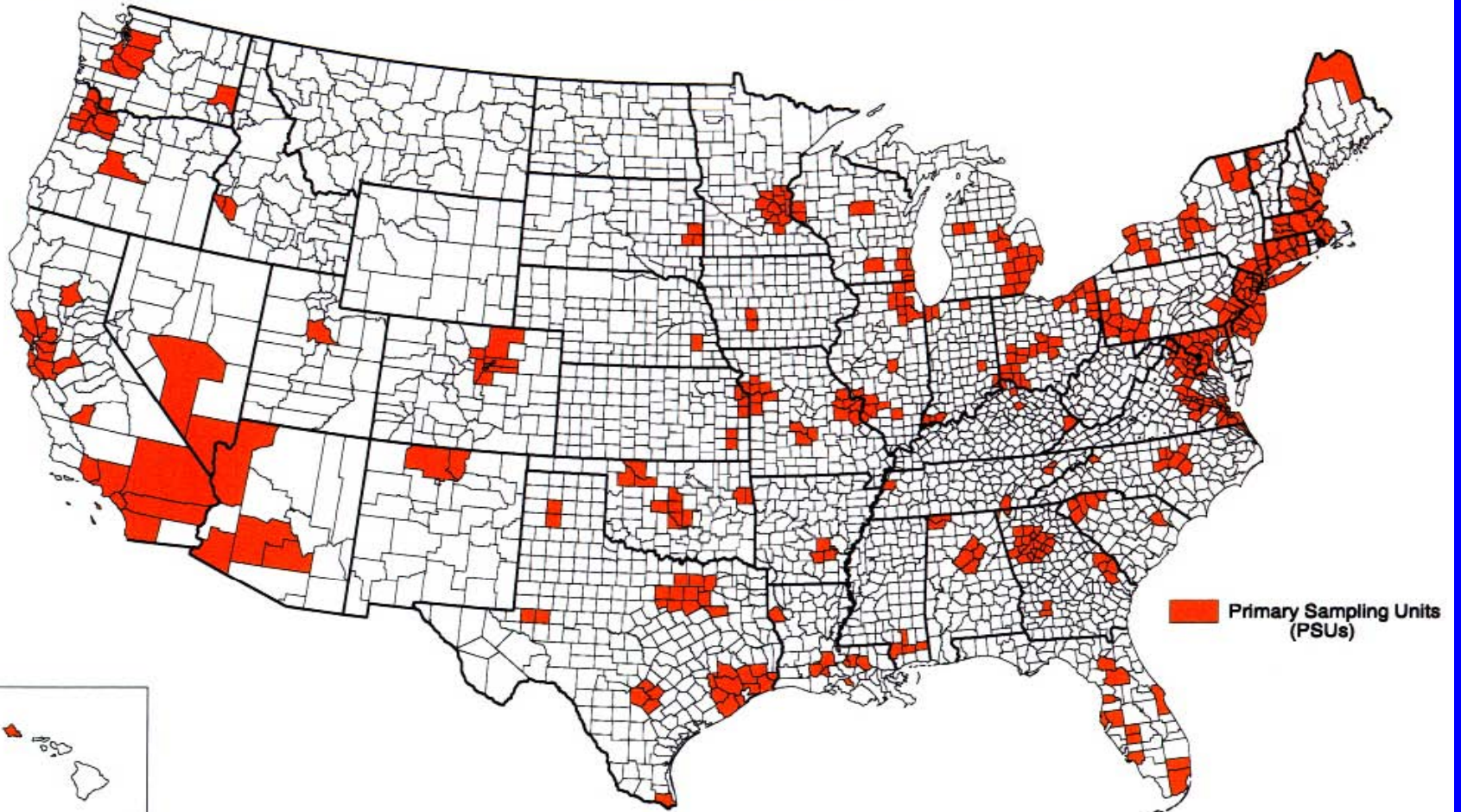
The survey is designed to represent a

- ◆ National Probability Sample
 - using the most recent decennial census, augmented by new construction permits
 - consisting of primary sampling units (PSU)
 - based on probabilities proportional to population size
 - consists of counties, group of counties, or independent cities

Housing Units are selected..

- ◆ Within each PSU using such information as:
 - vacancy status
 - number of persons residing in housing unit
 - value of the housing unit
 - rent paid for the housing unit

SAMPLE PSUs FOR THE CONSUMER EXPENDITURE SURVEYS 1990 Design



Prepared by the Geography Division

U.S. Department of Commerce Economics and Statistics Administration Bureau of the Census

Definitions

- ◆ CE is interested in determining consumer units - based on the financial relationship of the members of the household.

How do we define Consumer Units?

- ◆ Members of a household related by blood, marriage, adoption, or other legal arrangement
- ◆ Single person living alone or sharing a household with others but who is financially independent
- ◆ Two or more persons living together who are financially dependent

How does this compare to others?

- ◆ SIPP and CPS use a household definition... All persons who occupy a housing unit

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- ◆ Although we have slightly different definitions - the CE based on the financial relationship between members -- the difference between consumer unit and housing unit is small. About 3% of our housing units contain more than one consumer unit.

Respondent

- ◆ CE - One person responds for the entire consumer unit. We ask for the person most knowledgeable of expenditures for the entire consumer unit
- ◆ CPS - One person, preferably most knowledgeable about the labor force activities of the others.
- ◆ SIPP - A separate questionnaire is administered to each member over age 15

Reference Person

- ◆ All three surveys have a similar definition - the person or one of the persons who owns or rents the unit.

Survey Instruments

◆ Diary

- 2 consecutive 1-week
- includes
 - » detailed expenditures for food, personal care, household supplies expenditures
- excludes
 - » expenditures for out-of-town trips

◆ Interview

- 5 quarterly, only inventory and basic sample data from 1st
- excludes expenditures for:
 - » housekeeping supplies (e.g., postage stamps)
 - » personal care products
 - » non-prescription drugs

Socio-demographic Variables

- ◆ Collected during each interview
 - Member level
 - Consumer unit level
 - » reference person
 - » CU
- ◆ Collected 2nd and/or 5th interview
 - Income, work experience, contributions

Publication Tables

- ◆ are “integrated”
 - Neither survey collects the entire universe of expenditures.
 - Some data are only collected in one instrument
 - Some data are collected in both instruments.
 - For these areas we determine which is the best source and use that in our publications

-
- ◆ Both the Interview and Diary samples are purposely non-clustered
 - ◆ Past research has shown that clustered samples for expenditure data would not yield expenditure patterns that are representative of the entire area
 - ◆ Clustered samples tend to cut down on travel expenses and hours per schedule.

Let's look at sample size

- ◆ Census uses the term “cases” when referring to its collection workload and costs.
- ◆ A Case is defined as one interview or one diary visit.
- ◆ For households with more than one consumer unit, each consumer unit would be counted separately

Let's look at some Census figures

- ◆ In order to collect the equivalent of 7800 households completing 5 interviews or 2 diaries, we must field about
 - ◆ 60,000 cases for Interview
 - and
 - ◆ 25,000 cases for Diary

How does this translate to households?

- ◆ 60,000 represents the size of the sample prior to any refinement.
- ◆ About 1/5 of these cases are Interview 1 -- the bounding interview
- ◆ The field representatives refine the sample to determine those housing units that are out of scope of our survey

-
- ◆ Once eligible households are determined the field representatives attempt to collect the data.
 - ◆ As in every survey they encounter refusals.
 - ◆ The result is the number of completed cases that can be used to determine expenditures

Let's do the math...

◆ Total Cases	60,000
◆ Bounding Interview	12,000
– equals	48,000
◆ Out of Scope	8,800
◆ Refusals	8,000
◆ Net Sample Yield	31,200

This translates to about 7800 consumer units.

In Comparison

- ◆ CE fields about 60,000 Interview cases and 25,000 Diary cases each year
- ◆ SIPP fields about 129,000 cases each year
- ◆ CPS fields about 875,000 cases each year

Average Time per Case

- ◆ CE

- Diary 3.1 hours
- Interview 4.0 hours

- ◆ SIPP 3.65 hours

- ◆ CPS 1.3 hours

- ◆ All hours include travel time

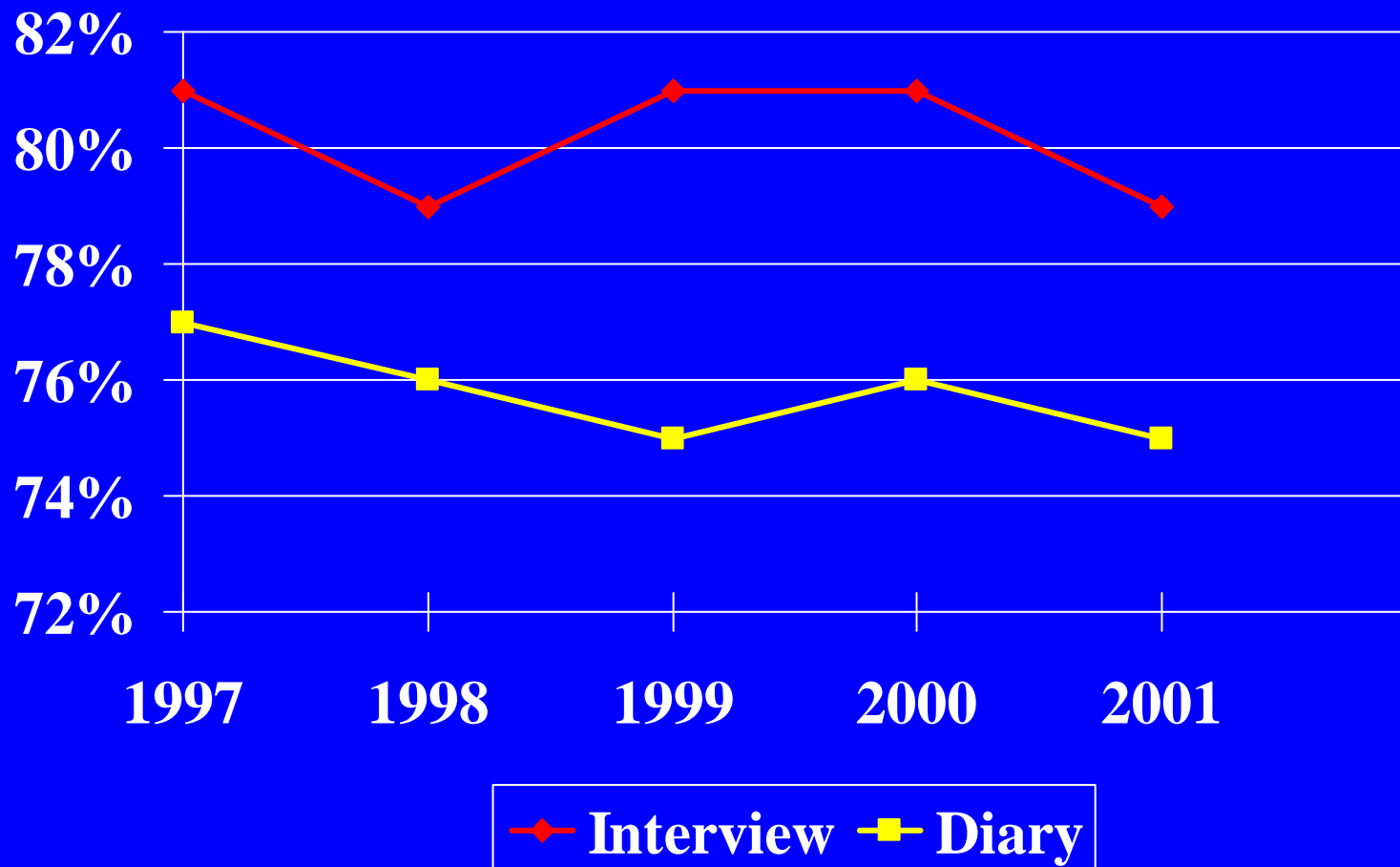
Census Budgets

◆ CE	\$24,653,000
◆ SIPP	\$31,400,000
◆ CPS	\$55,000,000

Cost per Case

◆ CE	\$290.00
◆ SIPP	\$193.00
◆ CPS	\$65.00

Response Rates



◆ How many households completed all 5 interviews?

↓ about 75%

◆ How many households completed both diaries?

↓ about 92%

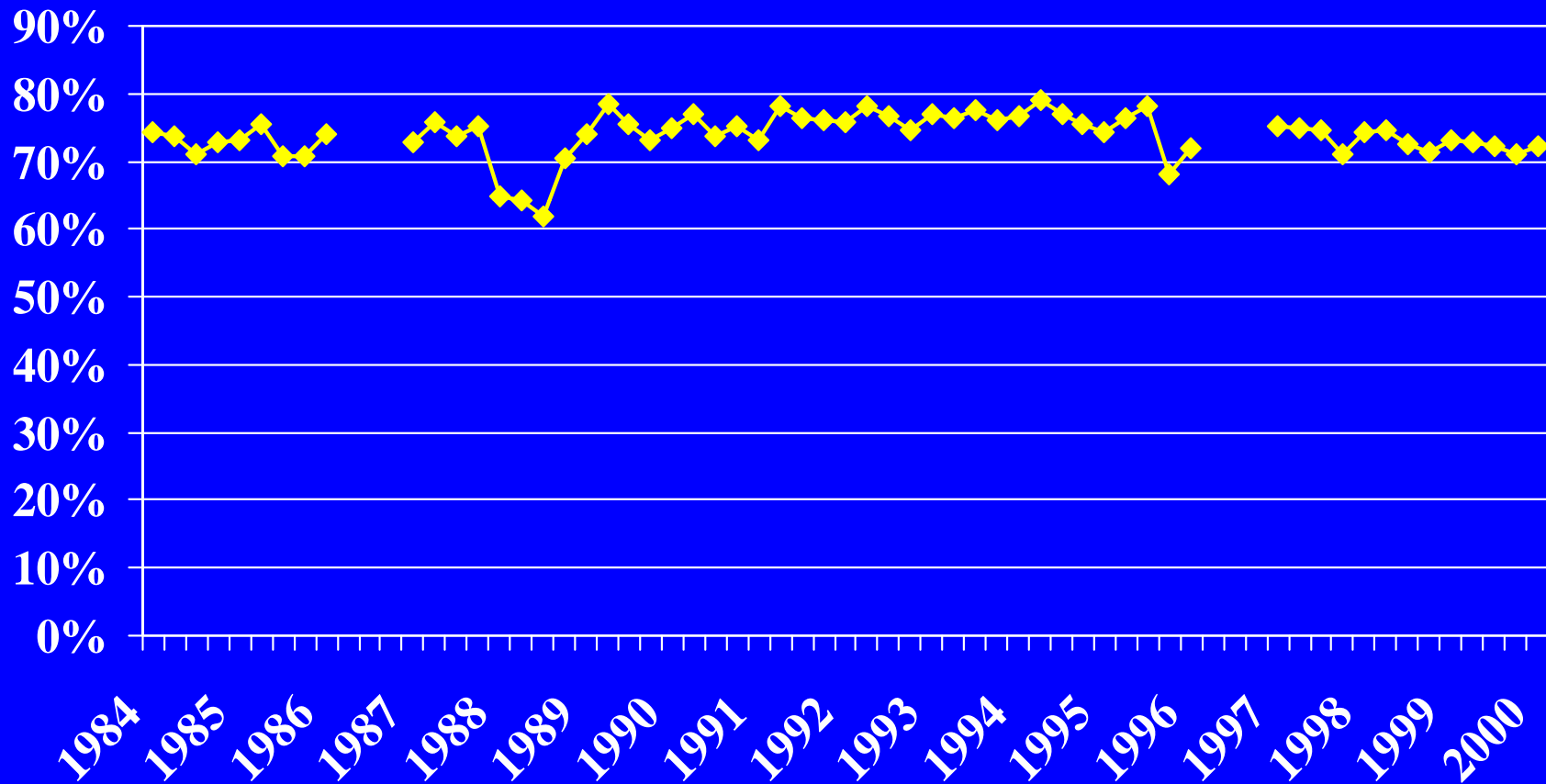
Outline

- ◆ Research using Interview, “four quarter”, complete income reporters
- ◆ Importance of attrition
- ◆ Importance of income
 - New bracketing procedure
- ◆ Quality of global questions
 - Interview vs. Diary

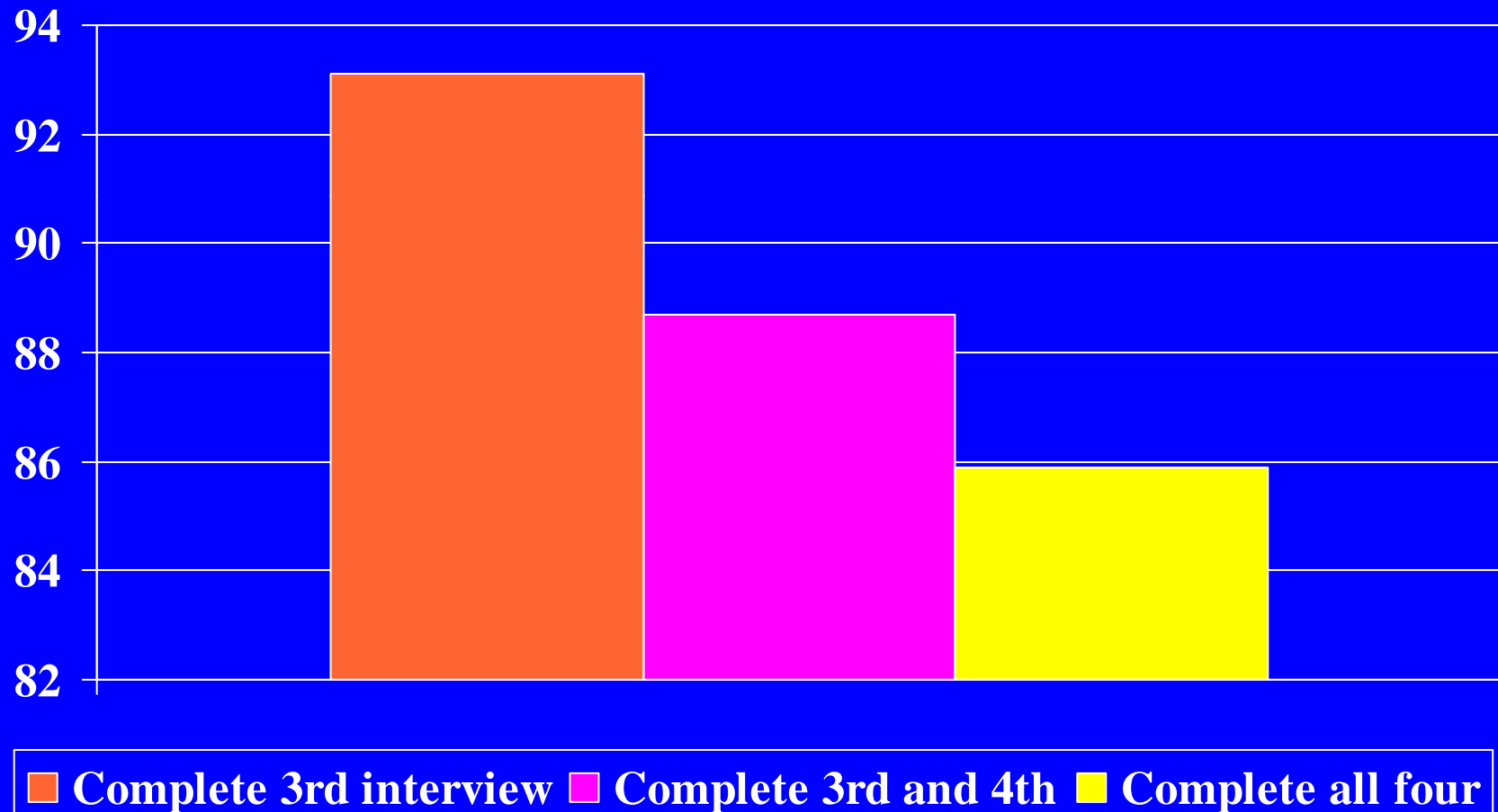
Attrition in the Interview survey

- ◆ Structure of Interview Survey
 - up to five interviews; four expenditure quarters
 - quarterly data independent, weights adjusted
- ◆ Many researchers use “four quarter” CUs
 - adjust for age and tenure
- ◆ Recent study examined 1997-2000
 - With a 2nd through 5th interview
 - Accounted for type of non-interview

Percent of CUs who complete all four interviews, 1984-2000



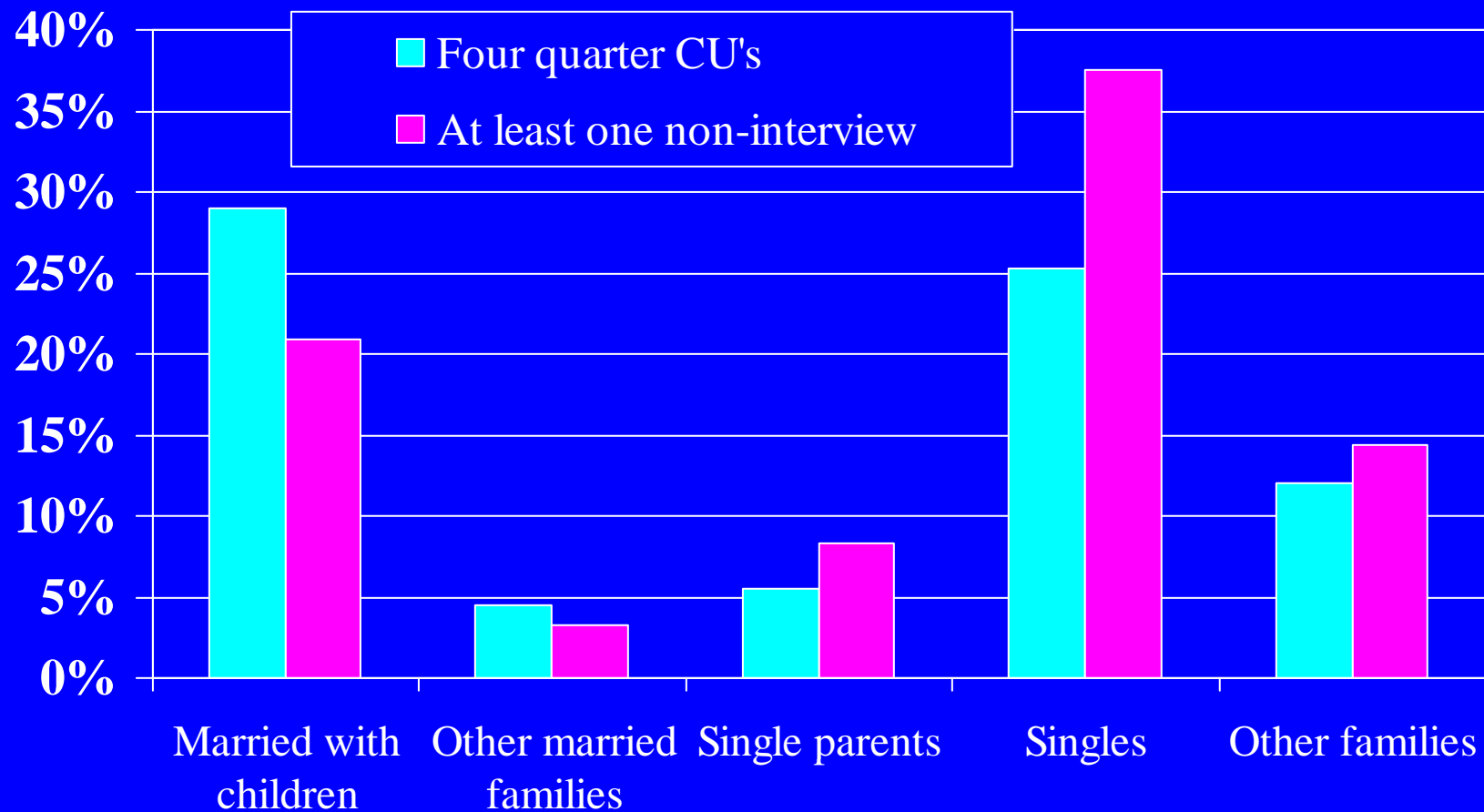
Probability of completing next interview for those completing 2nd



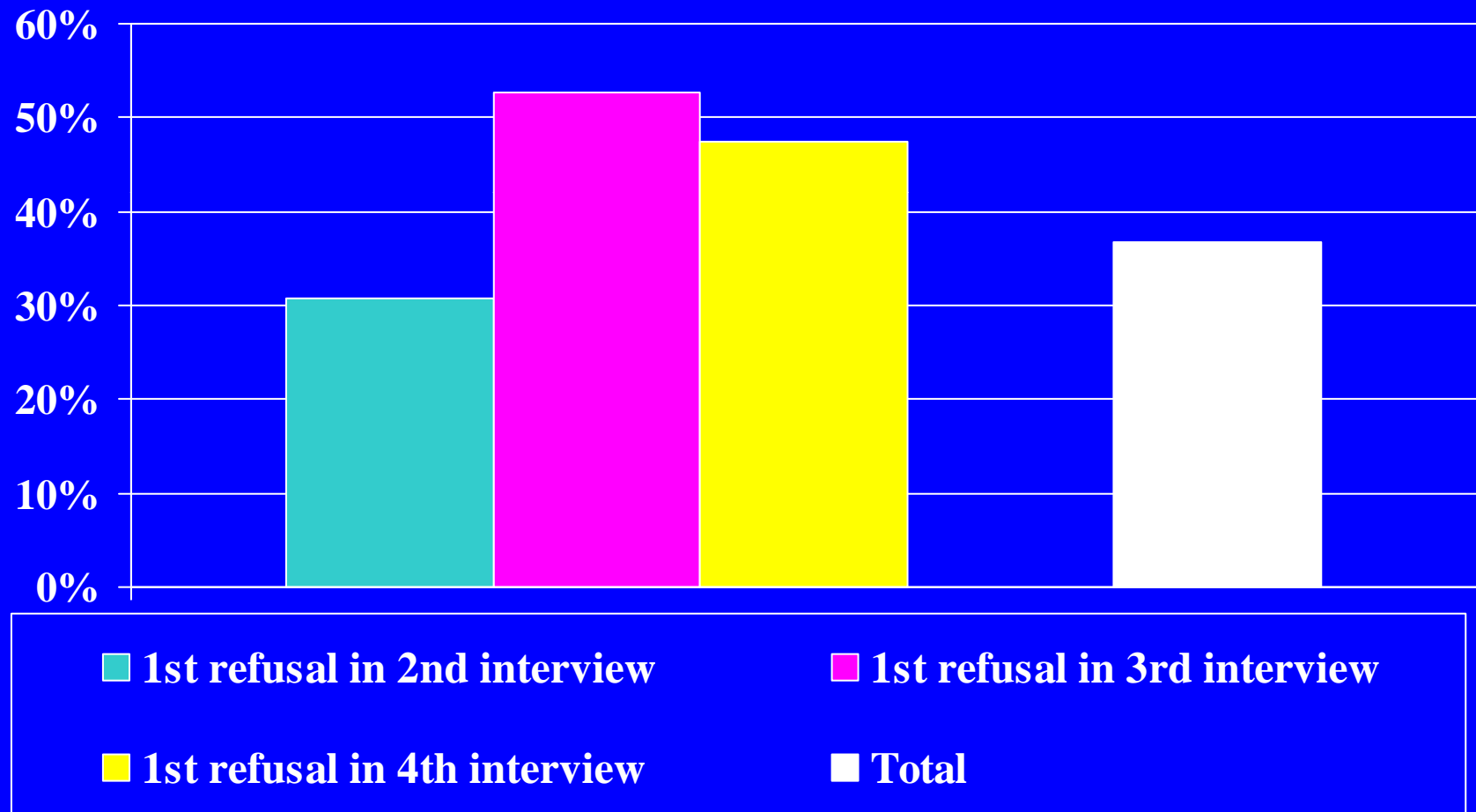
Four quarter CUs vs. non-interviews

	<i>Four quarter CUs</i>	<i>At least one non-interview</i>
Average age	50.6	40.9
Percent home-owner	83.2%	41.0%
Average size	2.6	2.3
Average quarterly expenditures	\$8,981	\$7,504
Average per-capita expenditures	\$3,442	\$3,212

Family type composition



CUUs who return after an initial refusal



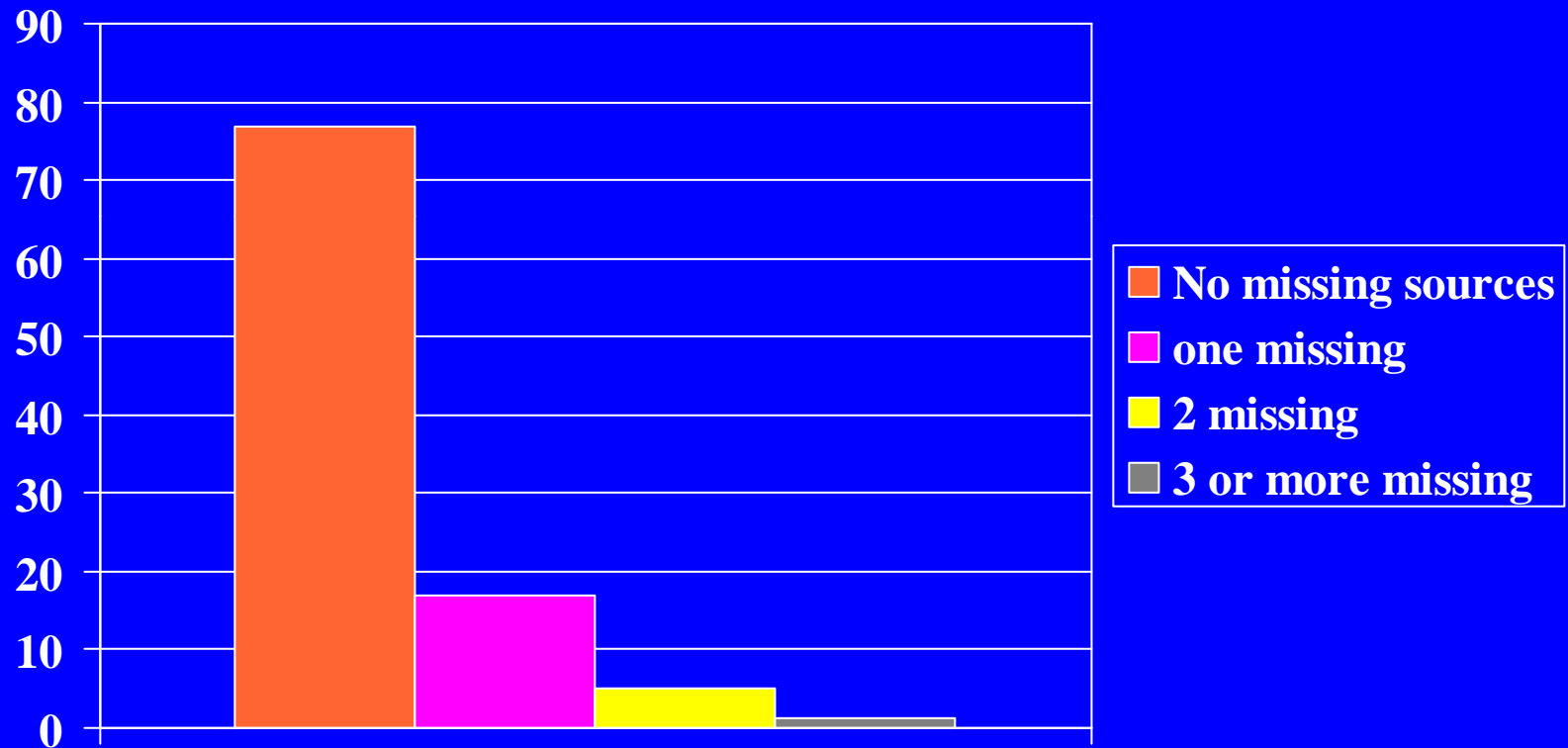
Next steps

- ◆ Continue to examine “intermittent” responders
- ◆ Examine non-responders for 1st interview

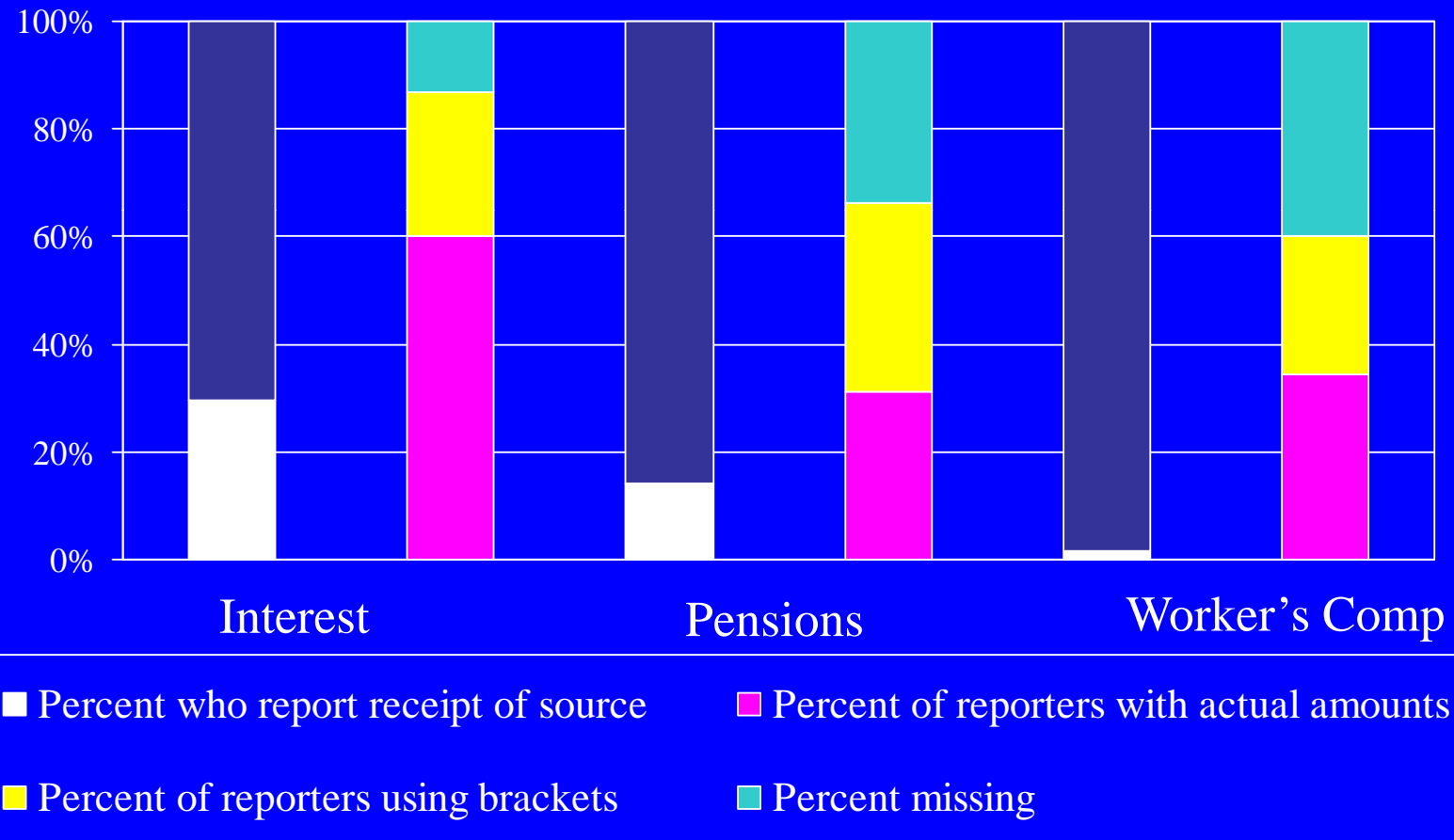
The use of brackets in collecting income data

- ◆ Structure of income component
 - 5 member level income sources; 14 CU level sources
 - 2nd and 5th interview, annual recall
 - many missing
- ◆ Many researchers use complete income reporters
- ◆ Conducted study of using brackets
 - cognitive results suggested use of ranges
 - Data generated ranges
 - Initiated brackets in April 2001

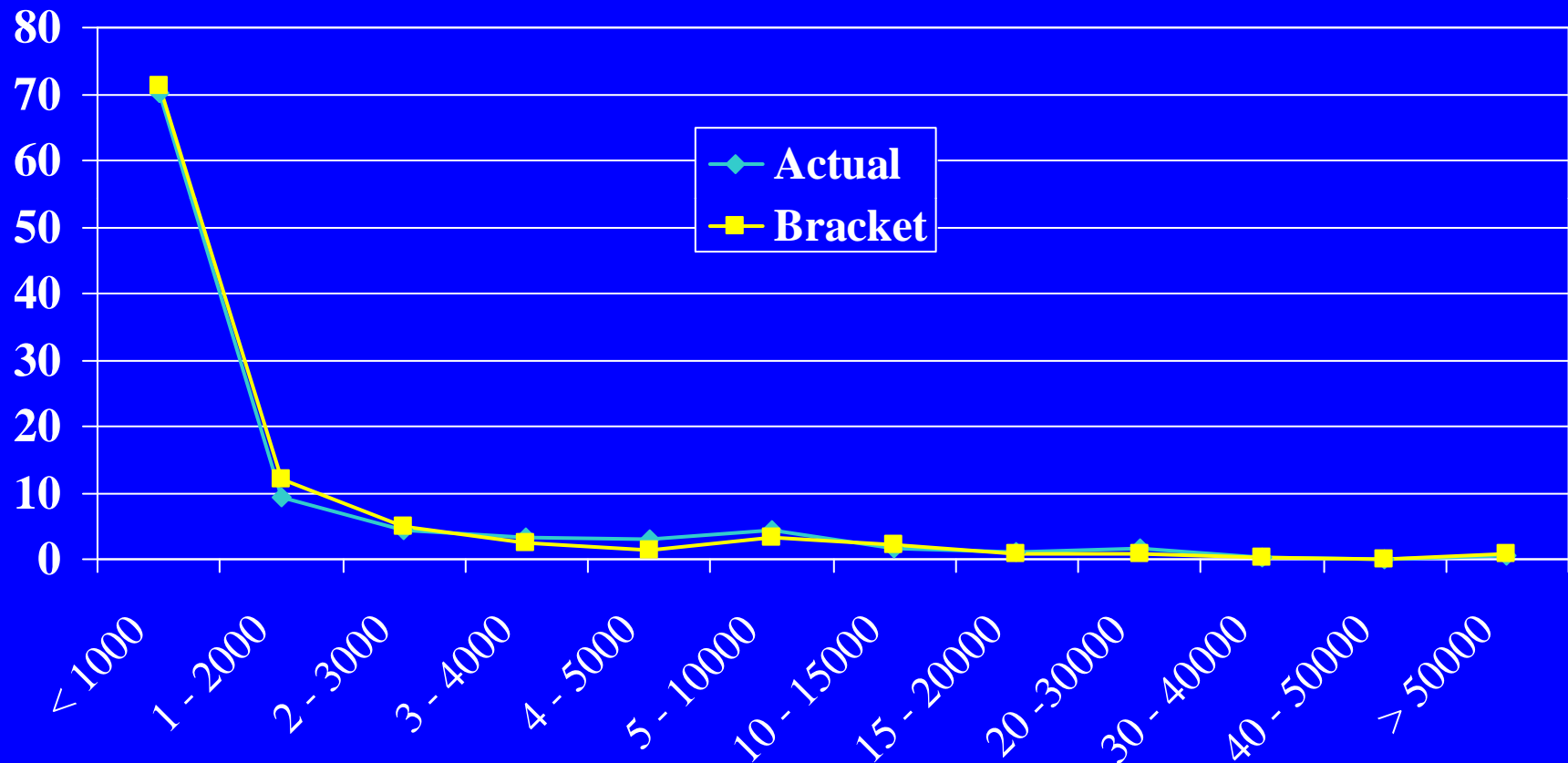
Percent of CUs with missing CU level income sources, 2001 (April - Dec)



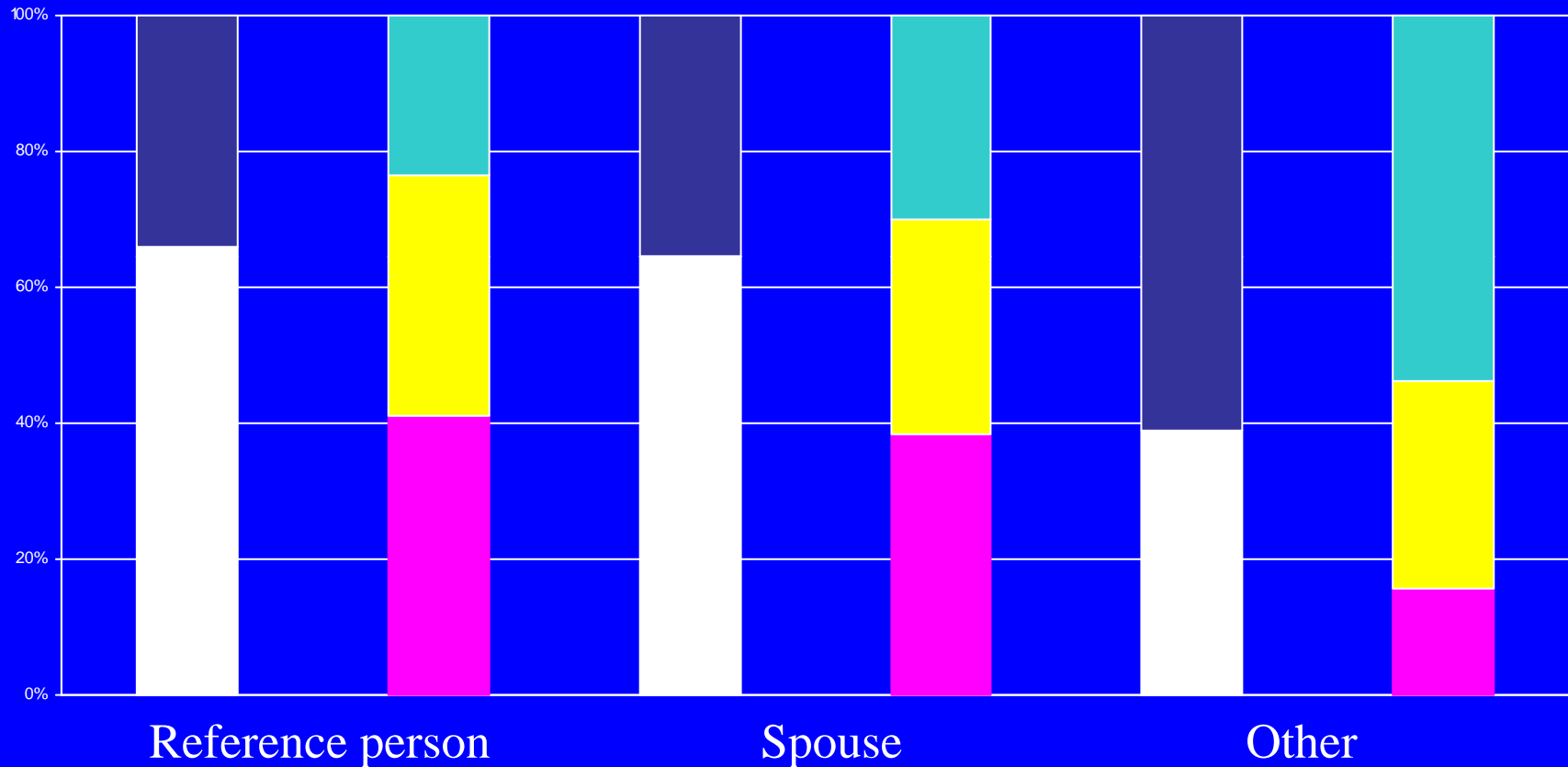
Reporters and Use of Brackets, selected CU level income sources, 2001



Distribution of Interest income, Actual vs. bracket, 2001



Reporters and use of brackets for salary income, 2001



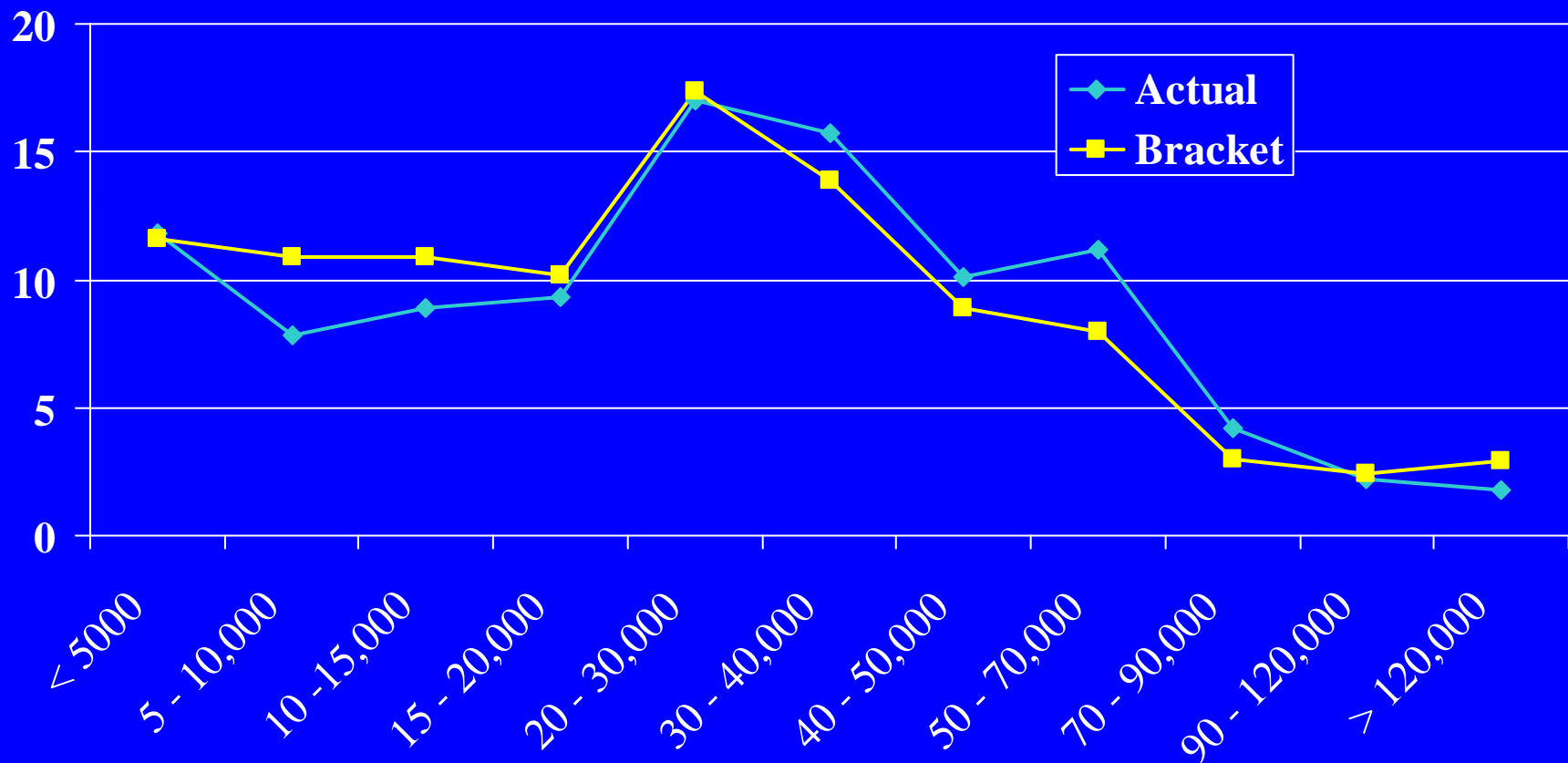
■ Percent who report receipt of salary

■ Percent of reporters with actual amounts

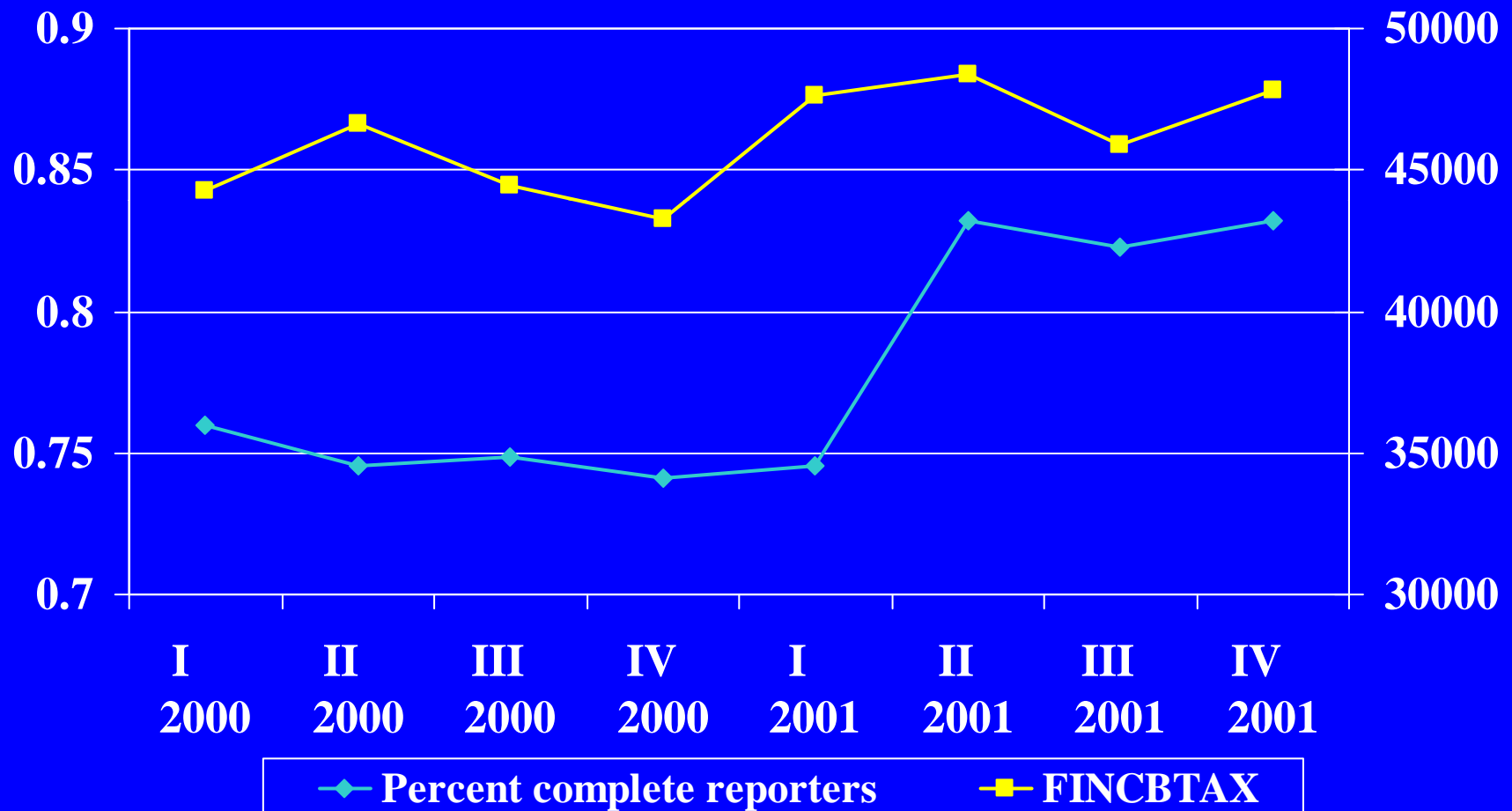
■ Percent of reporters using brackets

■ Percent missing

Distribution of Salary Income, Actual vs. bracket, 2001



Percent complete reporters and average income, by quarter



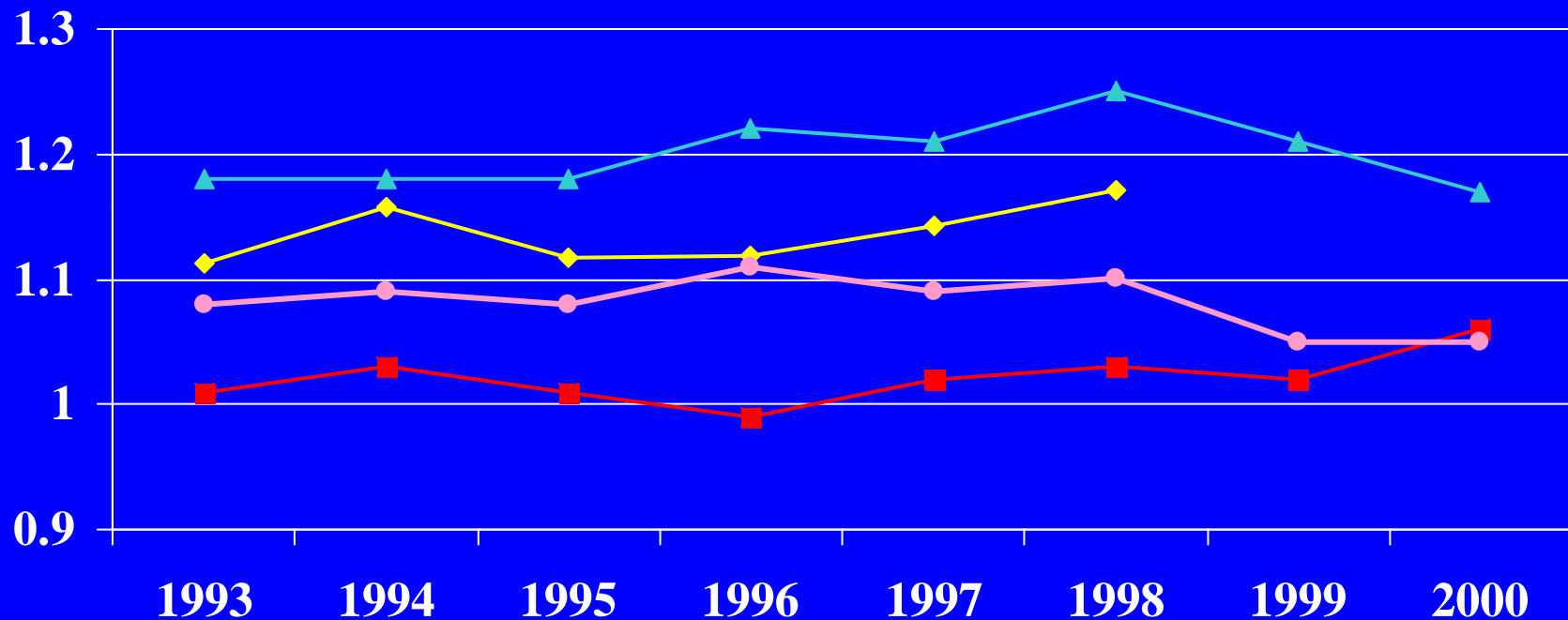
Next steps

- ◆ Examine effect on complete reporters and total income
- ◆ Examine the effect on response
 - Do responders use brackets more often
- ◆ Consider using brackets for Assets and Liabilities
- ◆ Income imputation

Global vs. Detail Food Expenditures

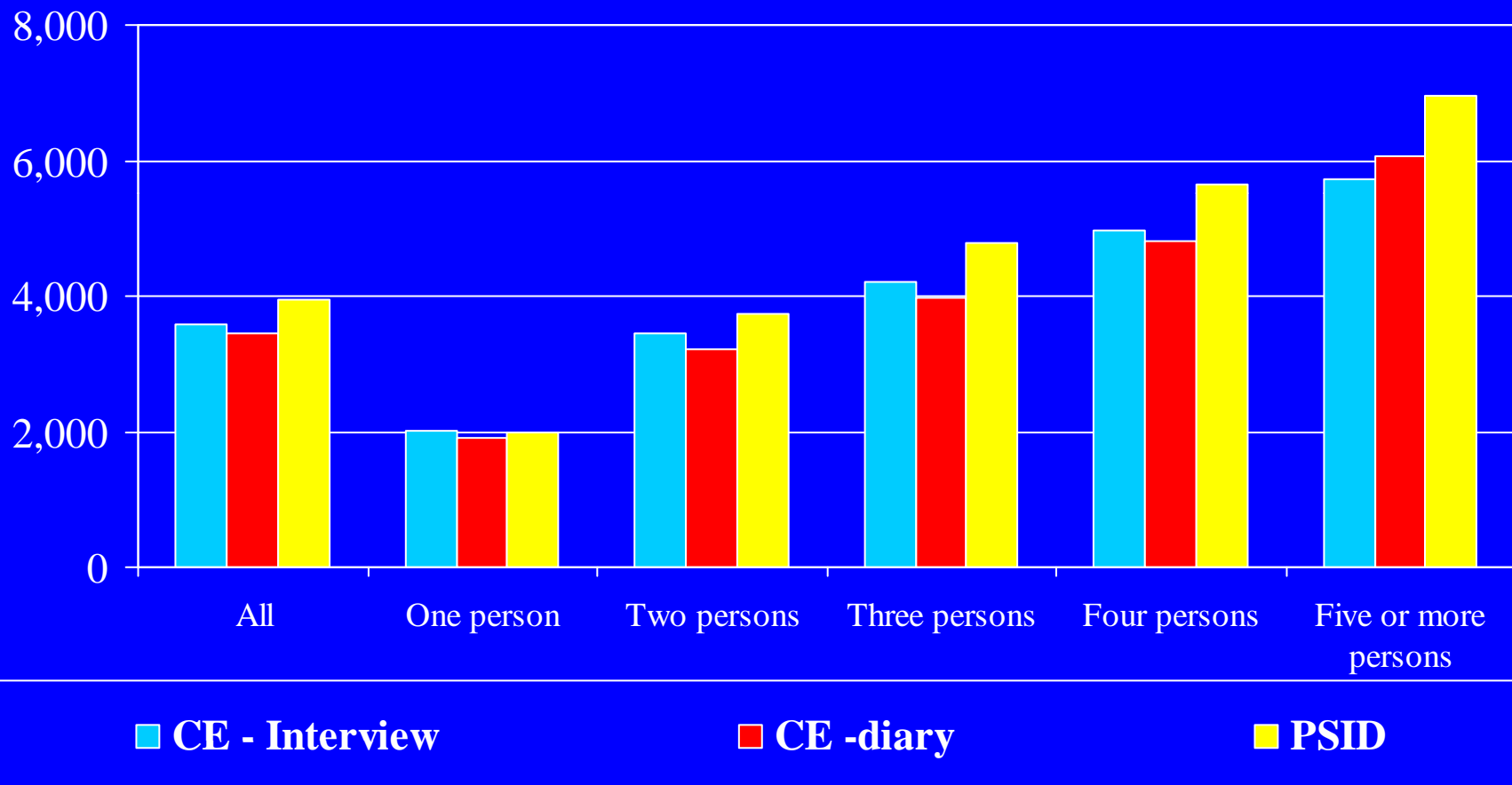
- ◆ Interview vs. Diary
- ◆ Use Diary in published tables
- ◆ Global questions on both
 - what has been your usual weekly expense at the grocery store or supermarket?
 - About how much of this amount was for non-food items?

Trend in ratios, Global vs. Detail

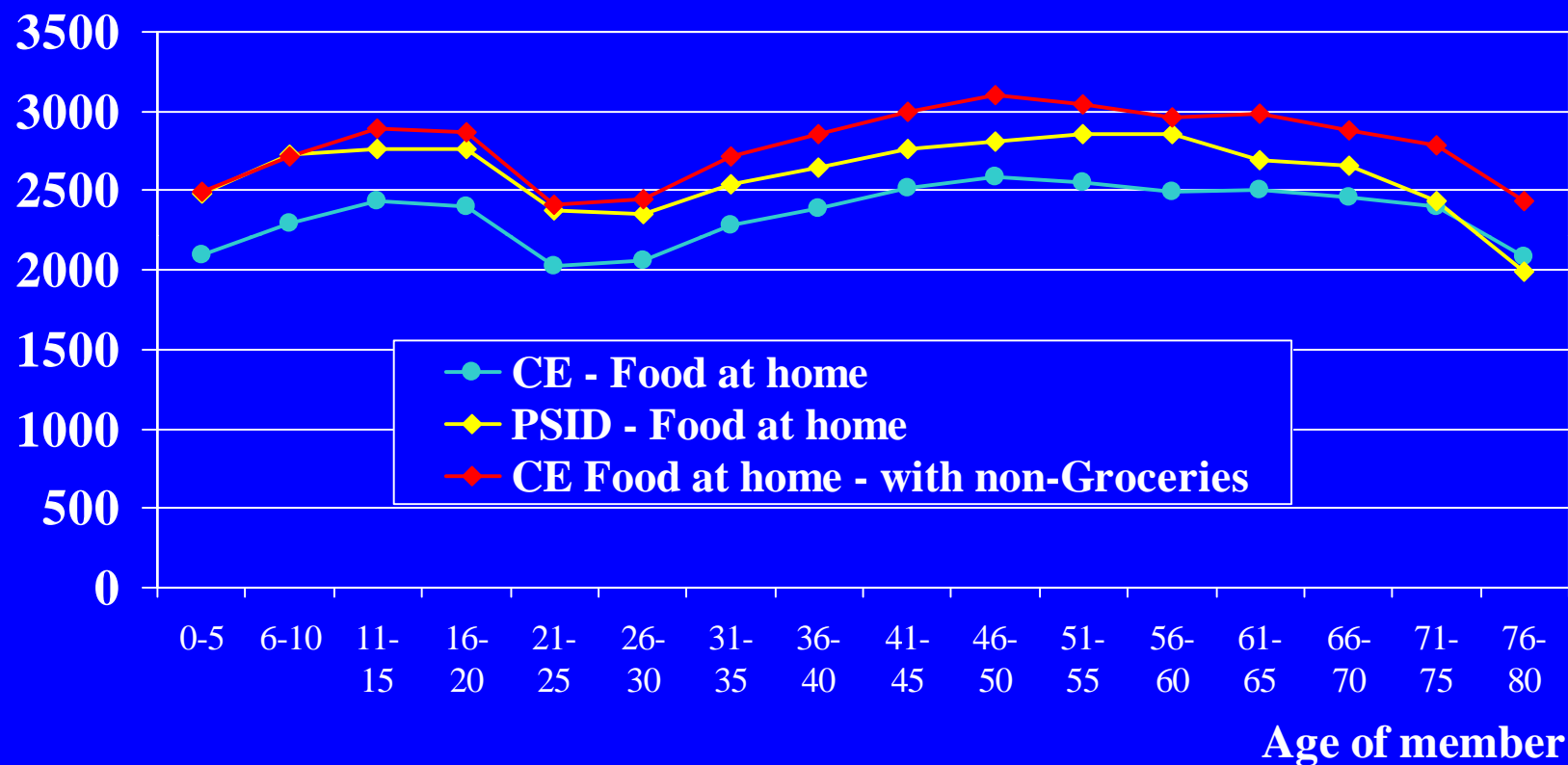


- ◆ Battistin (Interview Global/Diary Detail)
- Interview Global/Diary Global
- ▲ Diary Global/Diary Detail
- Diary Global/Diary Detail (no recalls)

Comparison of Food-at-home global questions, 1999



Equivalent Interview Food-at-home expenditures (global); CE vs. PSID by age cohort, 1999



NOTE: Use “four quarter” CUs and adjust weights by age and tenure.
 Expenditures are adjusted using equivalence scale of square root of family size
 Allocate equivalent expenditures to all members of CU.

Next steps

- ◆ Examine the diary global and detail questions
- ◆ Recall vs. Complete
- ◆ Continue comparison of CE and PSID
- ◆ New Diaries

Comparing CE Expenditure Estimates with Data from Other Sources

To monitor consistency of results

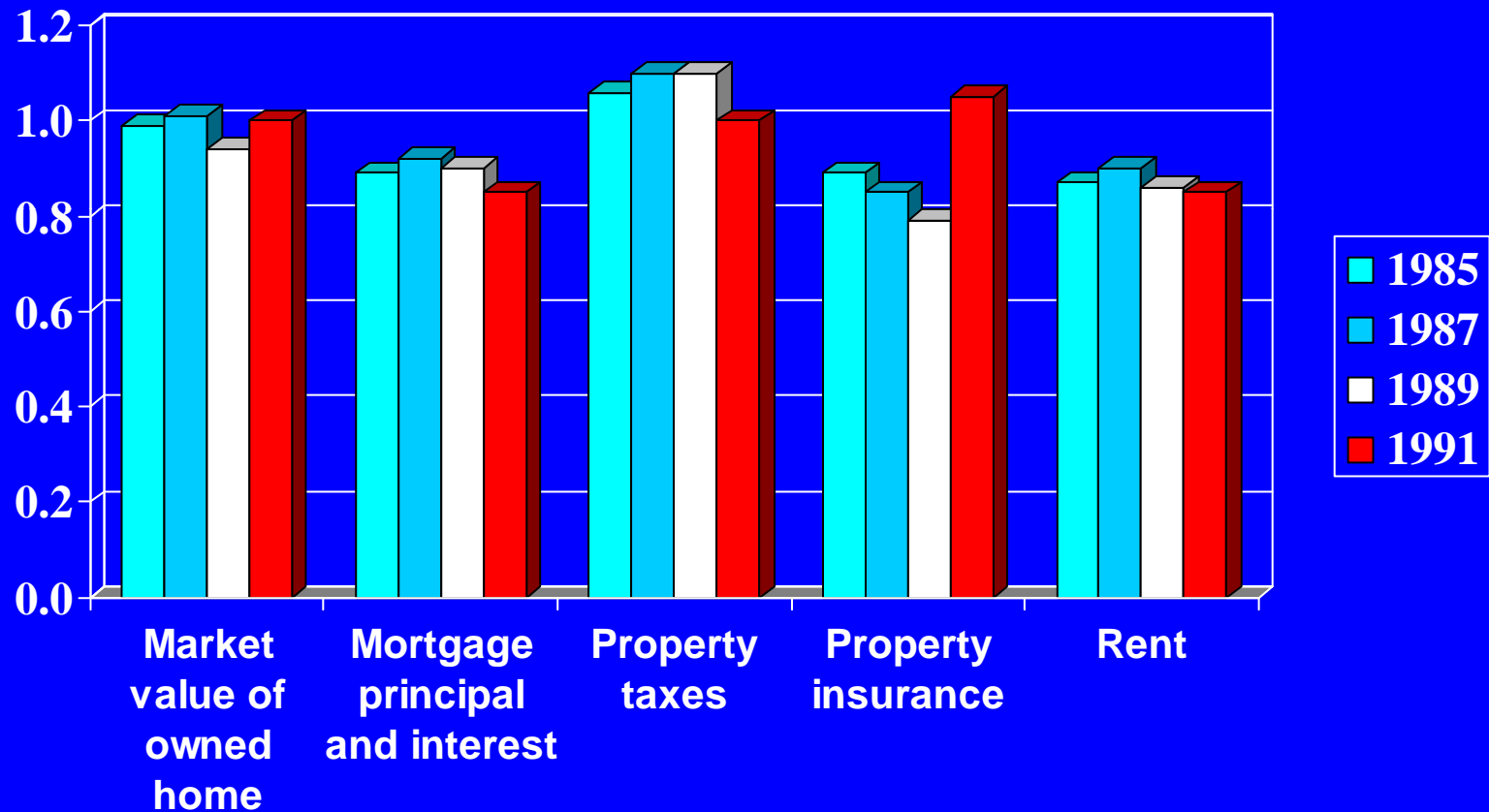
and

*To help identify areas where CE data collection
and methods might be improved*

Issues to Consider

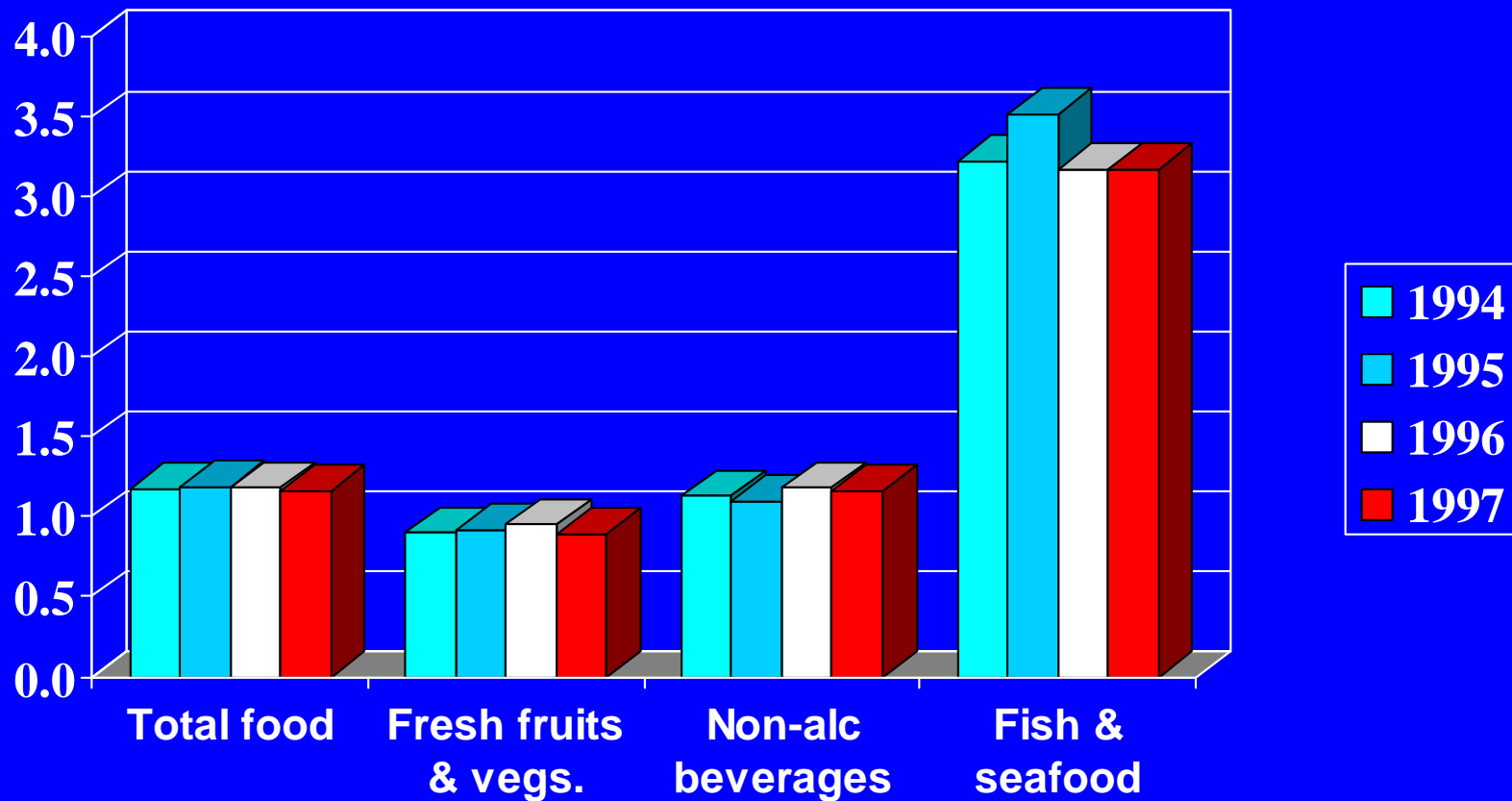
- ◆ Account for differences in content or concept (*focus on components*)
 - can be reconciled
 - cannot be reconciled
- ◆ Source of data
 - Household survey
 - Census
 - Administrative
 - Trade association publications

CE Interview/American Housing Survey Ratios based on Medians

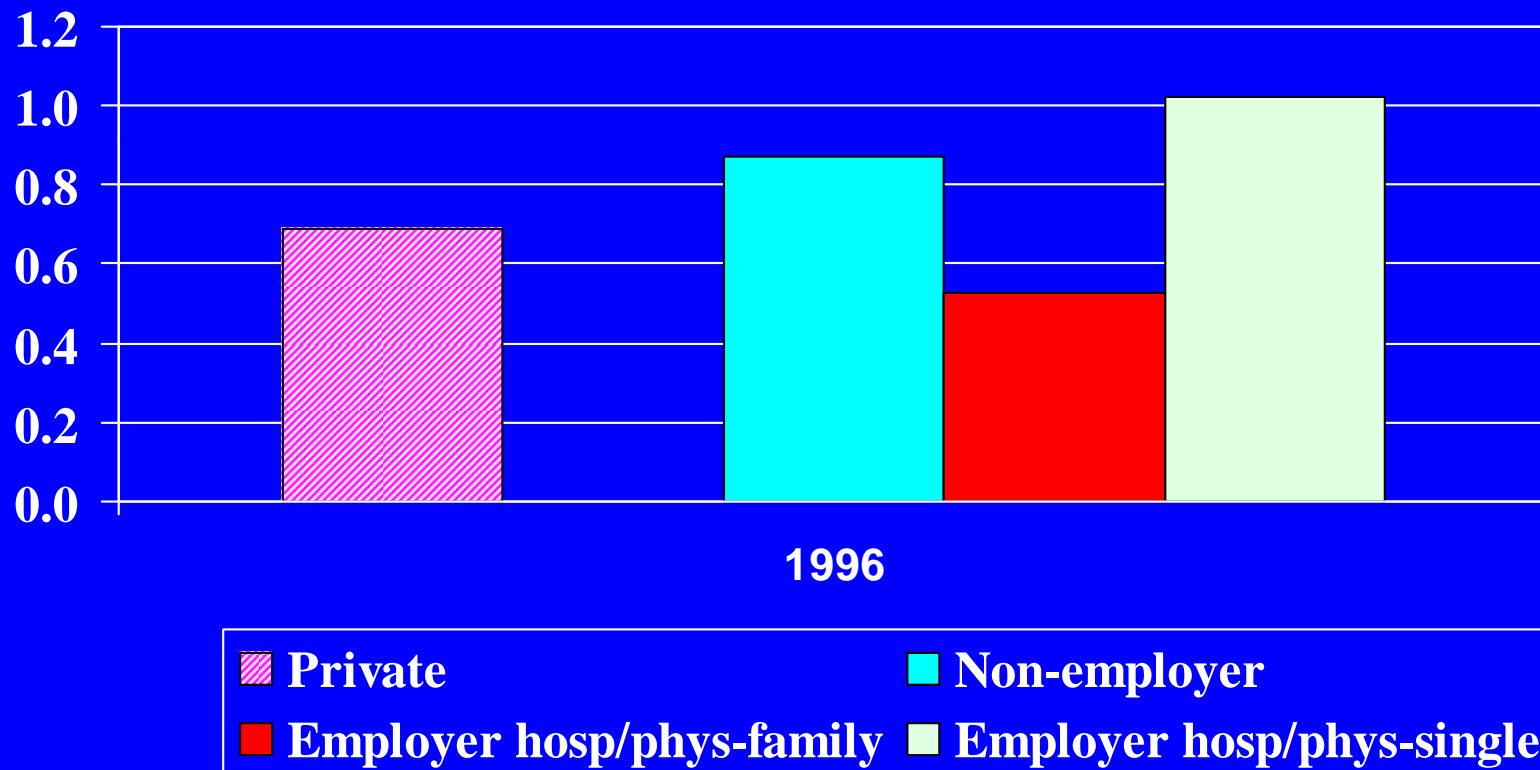


CE Diary/Progressive Grocer Ratios

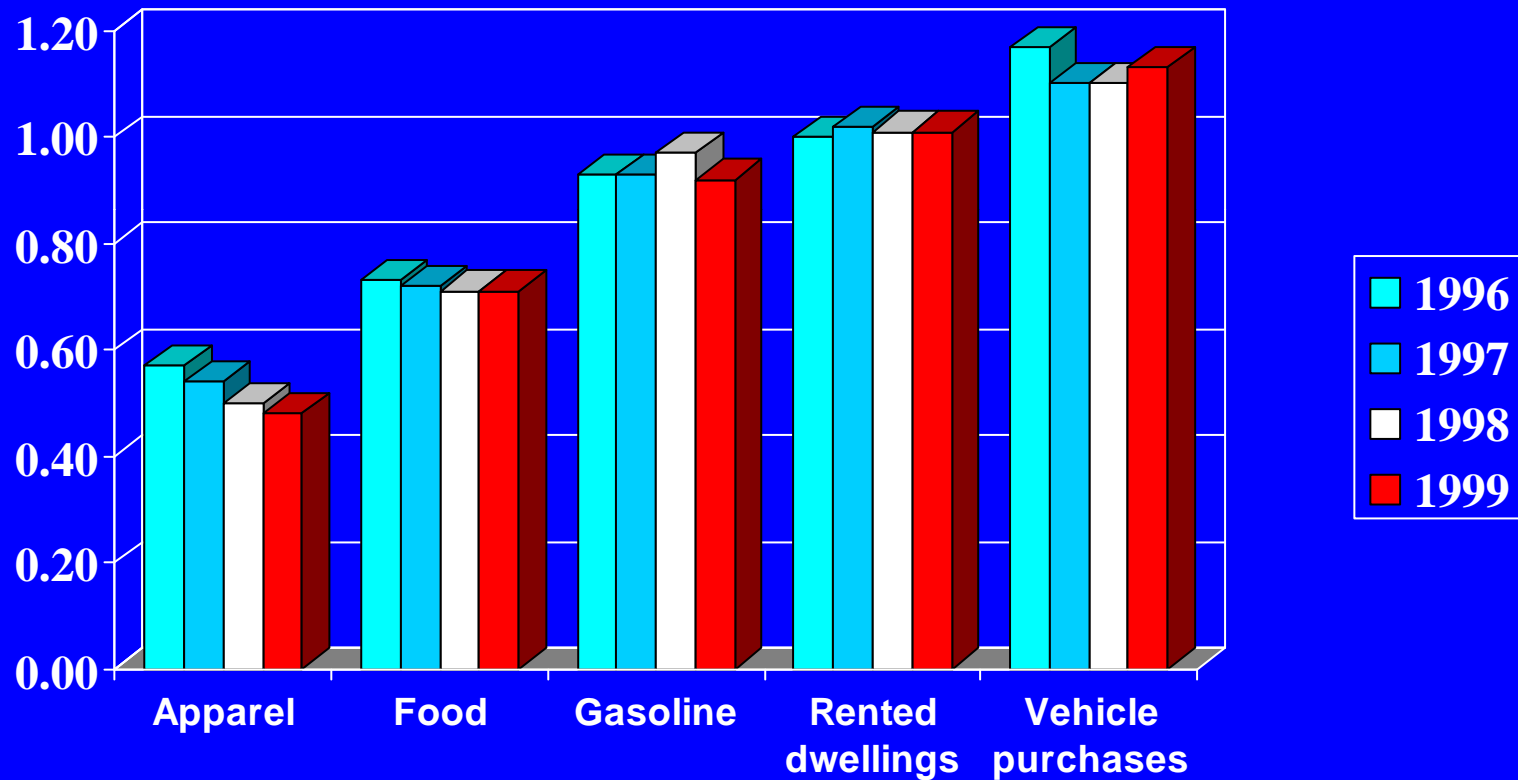
based on Aggregates



CE Interview/MEPS Interview Health Insurance Premiums based on Aggregates



CE Integrated/Personal Consumption Expenditures Ratios based on Aggregates



Attention on CE and PCE

- ◆ Definitions of populations and expenditures
- ◆ Data sources and periodicity
- ◆ Trends over time in ratios
 - CE/PCE aggregates
- ◆ Example for total expenditures with adjustments for select differences

- ◆ *BLS-CE Project*: focus of one commodity group

Populations

◆ CE: *consumer units and persons*

- Civilian non-institutional population and some institutional
- Continental U.S., Alaska, and Hawaii
- Urban and Rural

◆ 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

Definitions

◆ CE

- 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 in kind food and rent as pay, and value of food stamps

◆ PCE

- Value of goods and services purchased by the personal sector (excludes intra-sector transactions) includes 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

Data Sources and Periodicity

◆ CE

- Household Surveys
 - » Interview
 - » Diary
- Periodicity
 - » Annual
 - » Quarterly
 - » Monthly
 - » Weekly

◆ PCE

- Sources
 - » Statistical reports primarily from Census Bureau (e.g., Censuses of Manufactures, Wholesale Trade, Retail Trade, Service Industries)
 - » Government administrative and regulatory agency reports
 - » Reports from private organizations (trade sources)
- Periodicity
 - » Benchmark (detailed)
 - » Annual
 - » Quarterly
 - » Monthly

Comparison of the CE/PCE Ratio Over Time (1984-97) for Selected Categories

Using PCE data based on the 1987
and 1992 Benchmark Estimates

Trends in CE/PCE Ratios

- ◆ Linear regressions using the 1987 benchmark PCE estimates are depicted in red (◆)
- ◆ Linear regressions using the 1992 benchmark PCE estimates are depicted in yellow (■)

Expenditure Categories Grouped Using 1992 Benchmark Trends

◆ *Stable*

- slope coefficient is close to zero (+ or -)

◆ *Decreasing*

- slope coefficient is negative

◆ *Increasing*

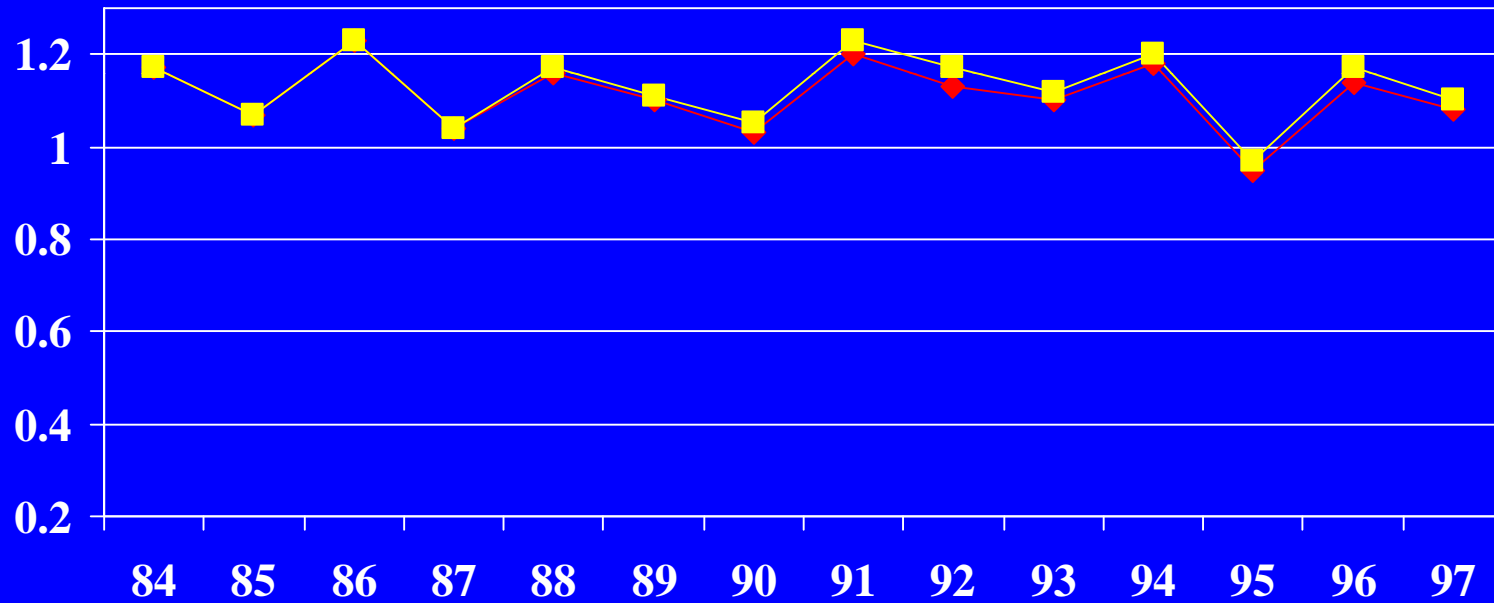
- slope coefficient is positive

◆ *Stable: Additional Groups*

- High
 - » $CE/PCE \geq 1.0$
- CE Moderately Lower
 - » $0.75 \leq CE/PCE < 1.0$
- CE Even Lower
 - » $CE/PCE < 0.75$

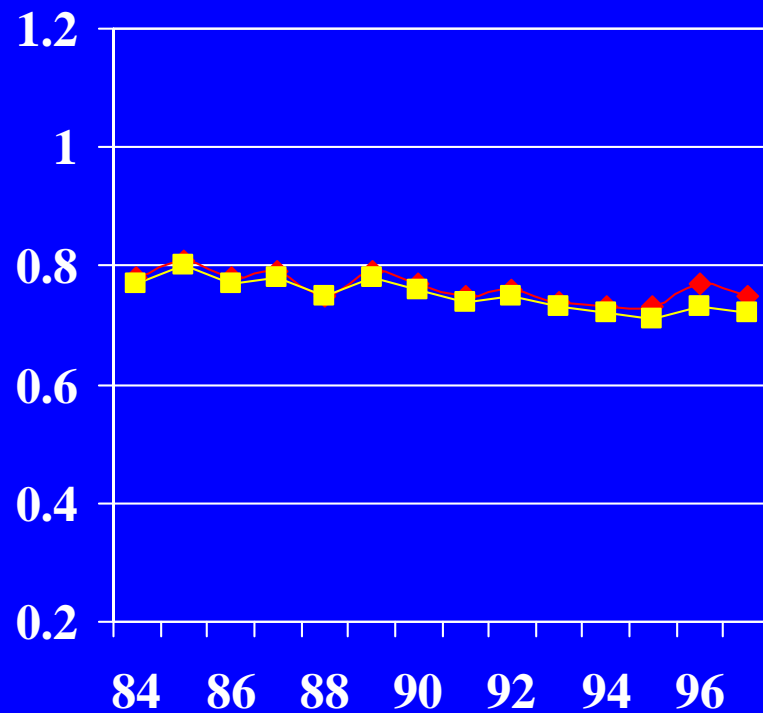
I. A. Stable, High Ratio

Vehicle Purchases

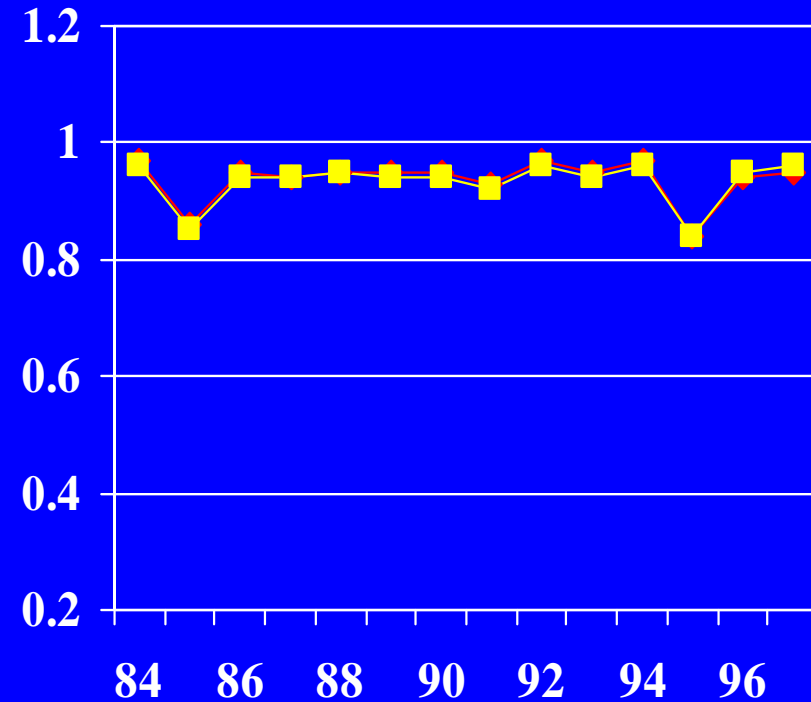


I. B. Stable, Mid Ratio

Total Food

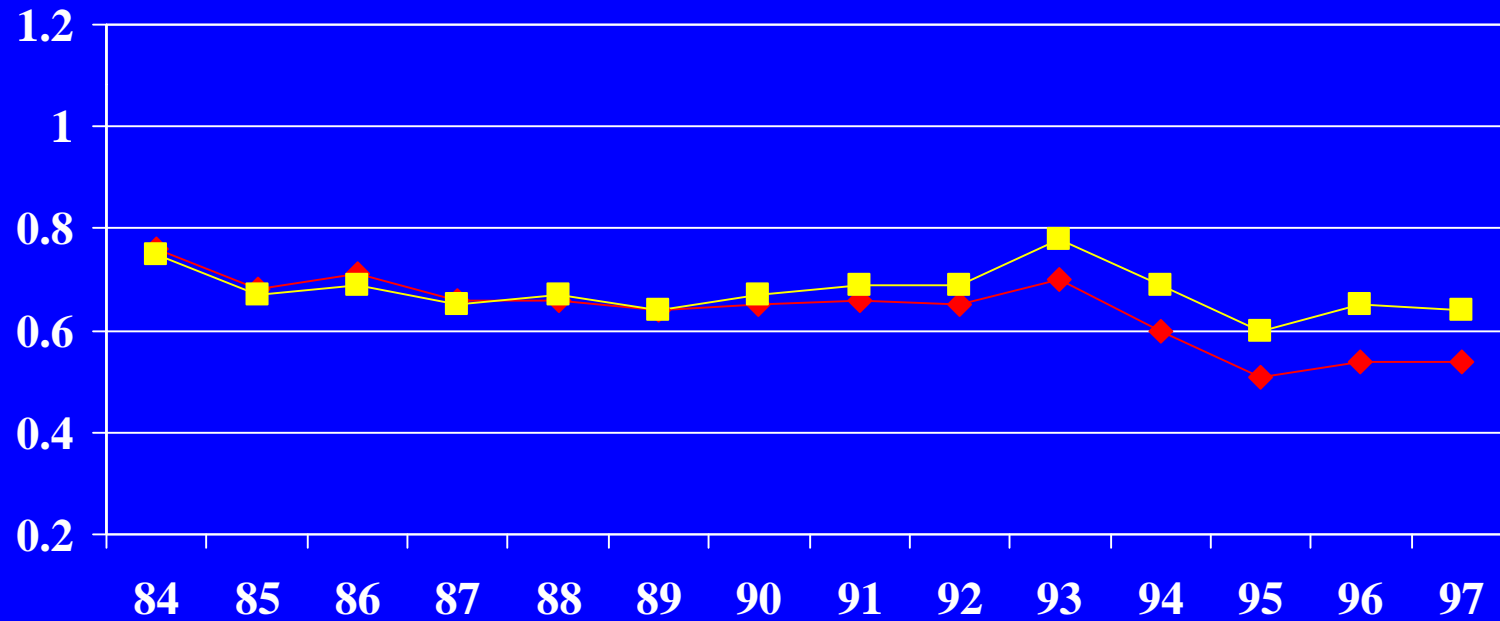


Rent, Utilities, and Public Services



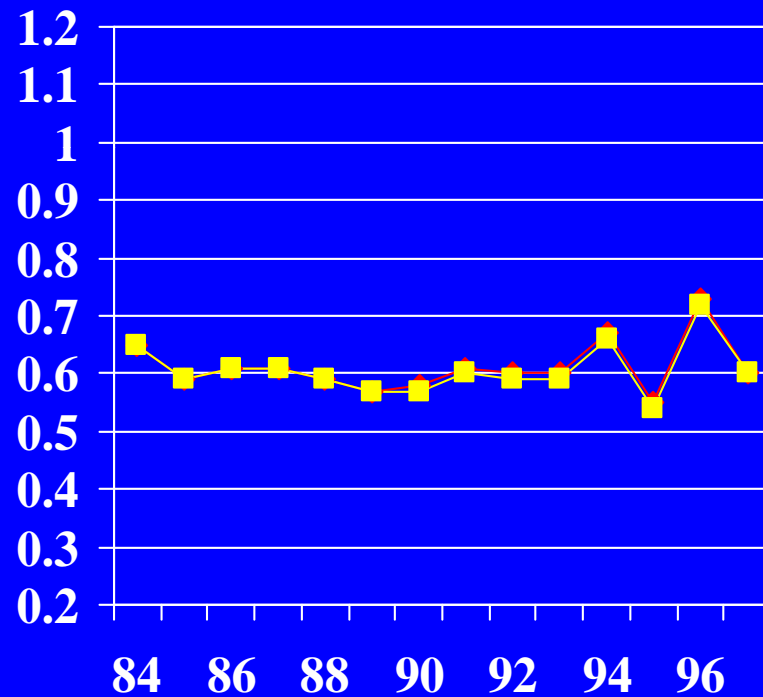
I. B. Stable, Mid Ratio

Televisions, Radios, Sound Equipment

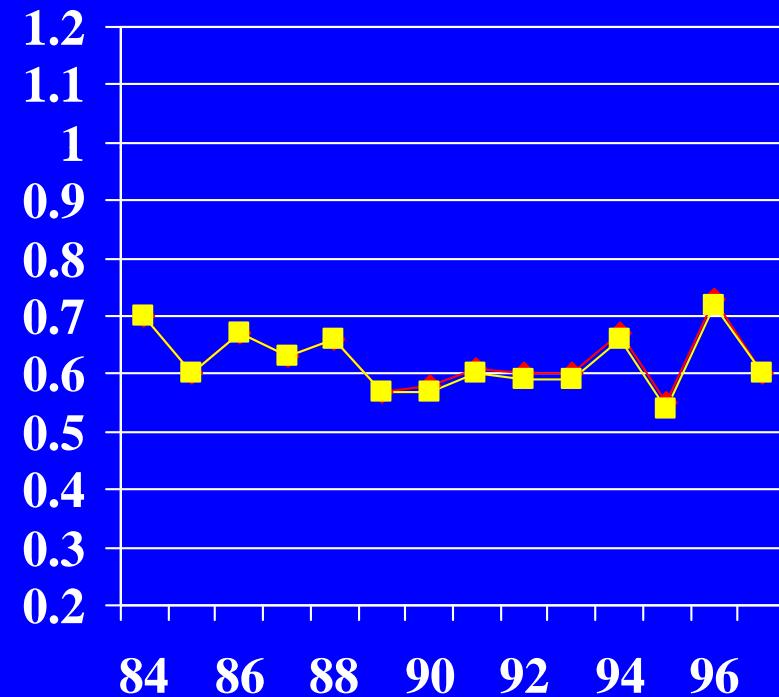


I. C. Stable, Low Ratio

Public Transportation

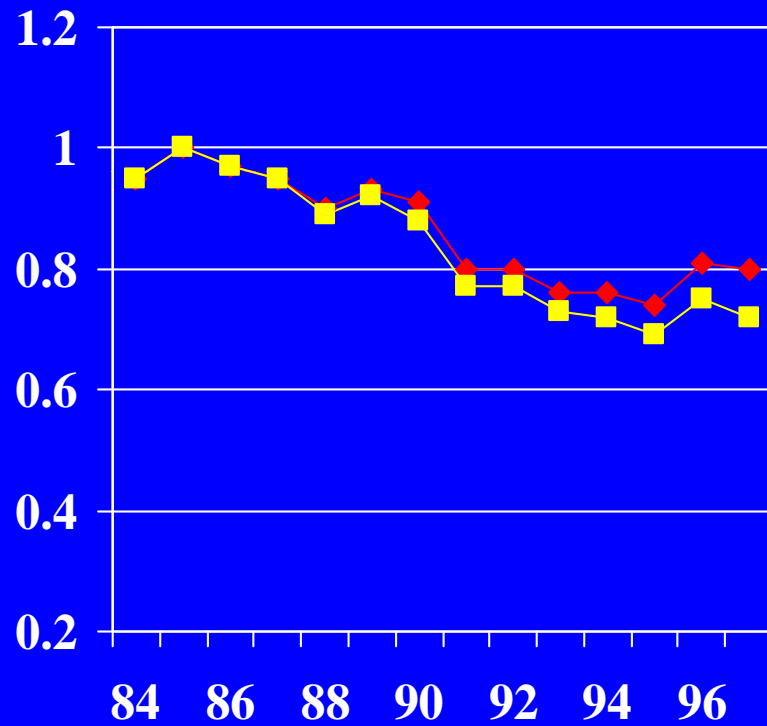


Tobacco Prods. & Supplies

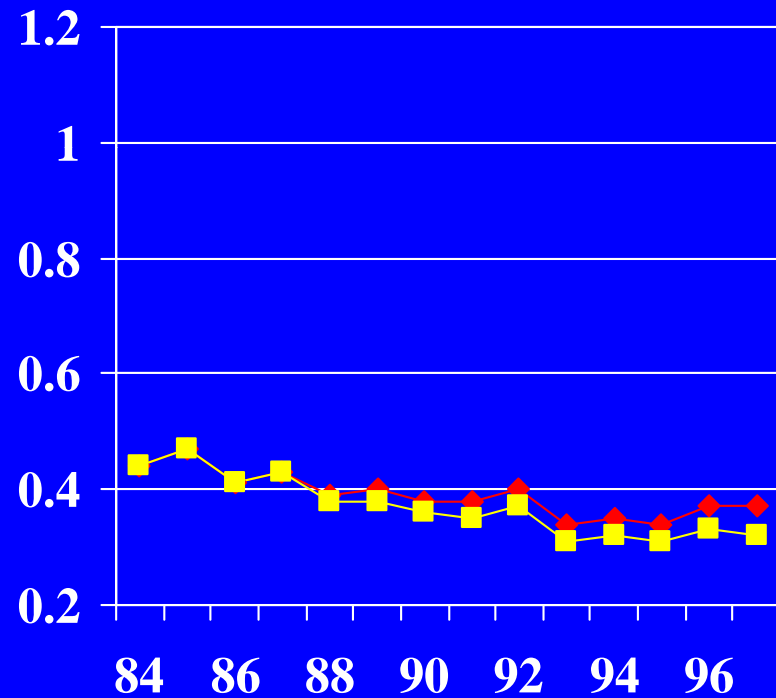


II. Decreasing

Food Away From Home

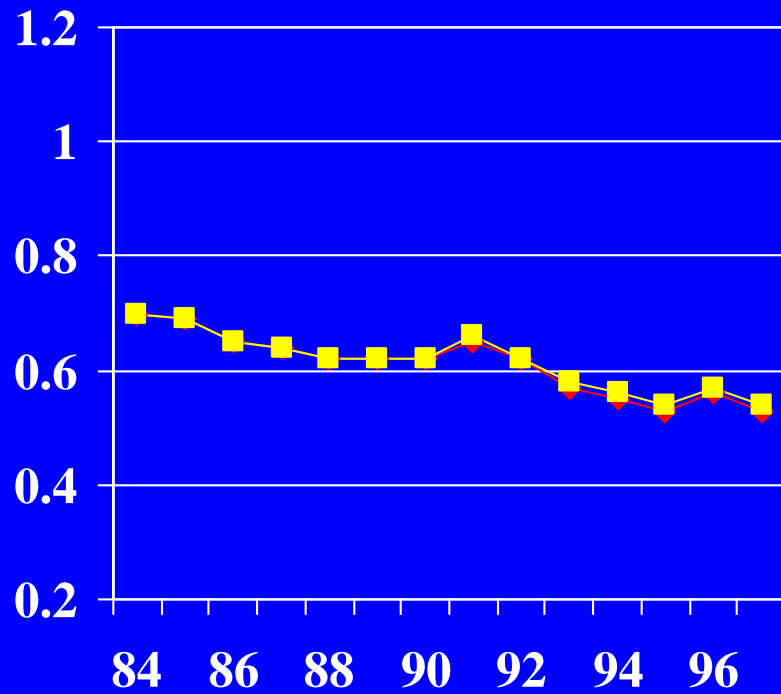


Alcoholic Beverages

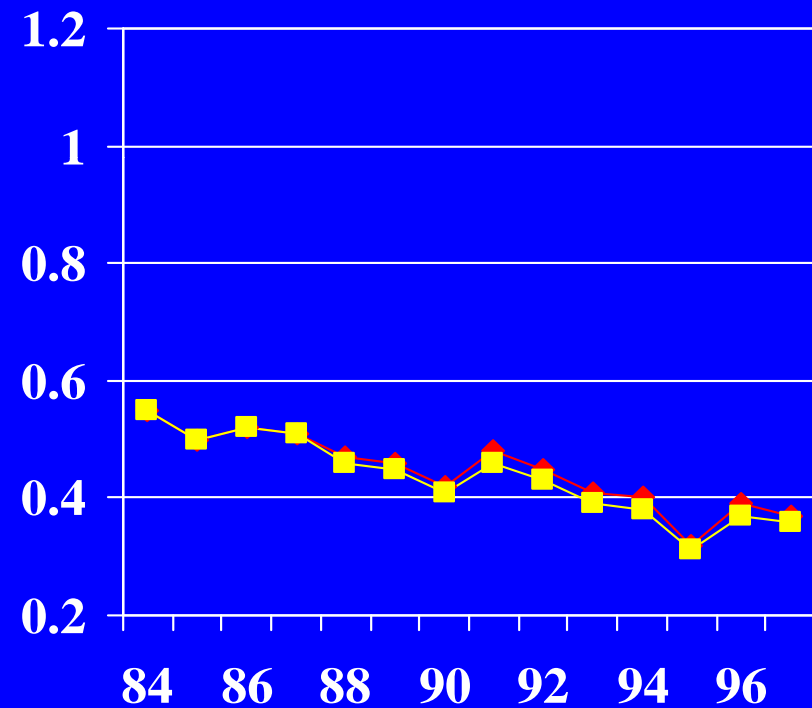


II. Decreasing

Apparel and Services

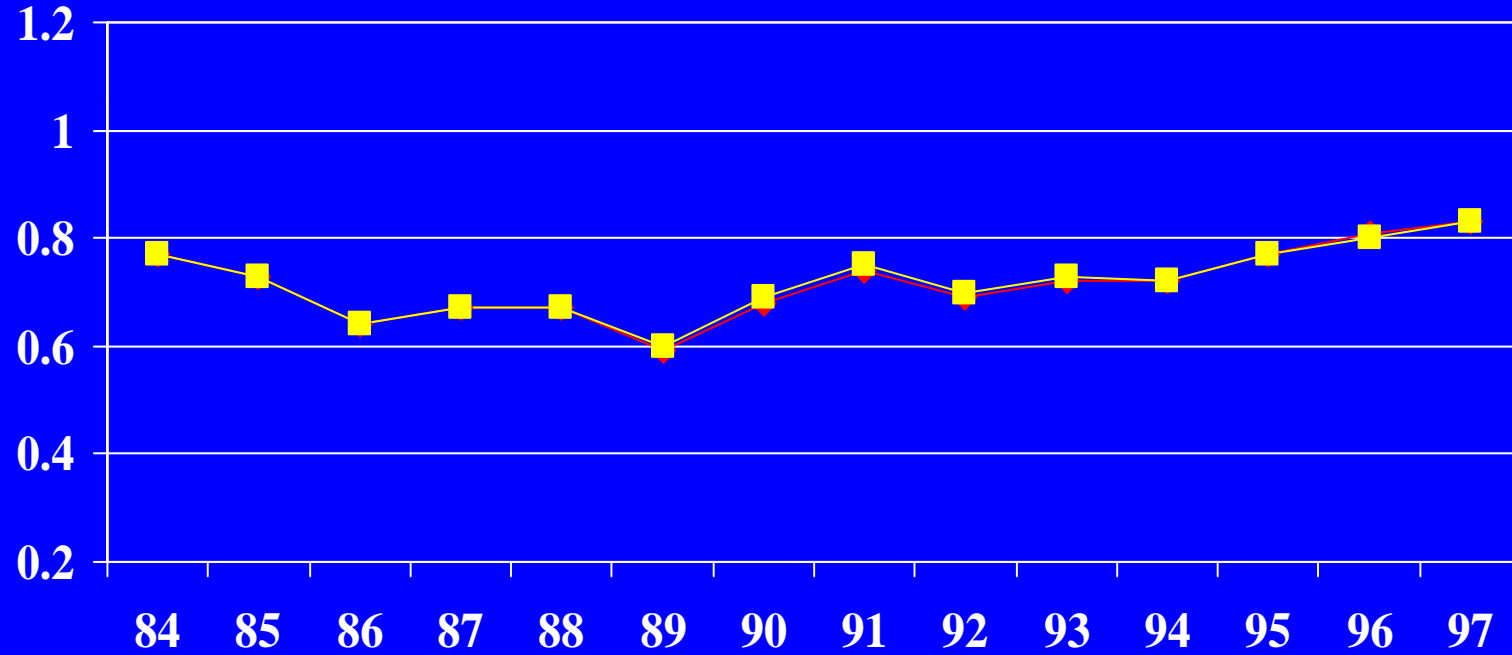


Other Apparel P & S



III. Increasing

Footwear



Sample Comparison of Aggregate CE vs. PCE

- ◆ Populations
- ◆ In PCE but out of scope for CE
- ◆ In CE but out of scope for PCE
- ◆ Partly out of scope for CE (e.g., non-profit institutions serving households and employer payments)
- ◆ Components operationally defined differently

In PCE but Out of Scope for CE

- ◆ Population - *Persons resident in U.S.*
 - Employees of U.S. businesses working abroad and U.S. government and military personnel stationed abroad
 - Military living on-base in the U.S.
 - All persons in institutions and the homeless for whom expenditures are made
 - Non-profit institutions serving households
- ◆ Expenditures
 - 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

In CE but Out of Scope for PCE

◆ Expenditures

- Transaction from household to household (includes used vehicles purchased from another CU)
- Social Security contributions

Partly Out Of Scope For CE and Partly Defined Quite Differently

◆ Health Care Expenditures

- CE medical care OOP; PCE medical care expenditures made by households, insurance companies, employers, and non-profits (=current expenditures of non-profits+payments by patients to profit and government facilities)

◆ Religious and Welfare

- CE cash contributions; PCE religious and welfare not including child care (for nonprofits=current expenditures net of receipts for commodities; for profit and gov't=receipts from users)

Defined Quite Differently

◆ Education Expenditures

- CE education OOP
- PCE education and research expenditures made by households and for profit and non-profit institutions serving households (for private=current expenditures net of receipts for meals, etc. and for gov't=student tuition payments; fees paid to other schools plus current expenditures)

◆ Life Insurance and Pension Plans

- CE premiums paid and consumer contributions OOP
- PCE expense of handling: operating and administrative expenses, premiums paid net of benefits and dividends, profits of some companies

◆ Owner-Occupied Housing Expenditures

- CE expenditures for owner occupied housing (interest and charges, property taxes, maintenance and repairs, and other expenses)
- PCE imputed space rent

Aggregate and Ratio Comparison

Source	Original (\$billions)	Expenditure “Comparable” (\$billions)	Flow “Comparable” (\$billions)
Consumer Expenditures	\$2,985	\$2,069 (0.69)	\$2,568 (0.86)
Personal Consumption Expenditures	\$4,211	\$2,553 (0.61)	\$3,001 (0.71)
<i>Ratio CE/PCE</i>	<i>0.71</i>	<i>0.810</i>	<i>0.856</i>

Reasons for Differences

◆ Overall

- Populations differ
- Expenditures defined differently
- Items in scope versus out of scope
- Sources of data differ (household survey vs. business and tax reports)
- Expert judgement
- Proxy response

◆ Component

- Content

◆ Trends

- Benchmarks and adjustments each year between benchmarks

Analytical Example

1992 Expenditures for
Footwear in the CE and PCE

Rationale for Year and Item Category

◆ Why 1992?

- Data are available at finer level of item detail
- Data represent latest benchmark year

◆ Why footwear?

- Apparel of which footwear is a component is a category where the difference in CE and PCE estimates is large and increasing
- Footwear has a small number of component items in both CE and PCE and is thus easier to handle.

Expenditures for footwear, total and by major item category, 1992 CE and PCE

Item category	Annual expenditures (millions of dollars)	
CE Total	\$23,124	
Men's footwear		\$7,182
Boys' footwear		3,050
Women's footwear		10,828
Girls' footwear		2,064
PCE Total	\$32,903	
Men's footwear, except athletic		\$6,267
Women's footwear, except athletic		9,452
House slippers		555
Rubber and plastic		8,376
Footwear, except rubber, n.e.c.		8,210
Used footwear		41
Boot and shoe cut stock and findings		2

Derivation of CE Estimates

- ◆ Diary survey is the source for all footwear data though both Interview and Diary collect expenditures for footwear.
- ◆ 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 purchase value of goods and services is calculated to determine allocable output.
- ◆ Total purchase value is allocated among intermediate and end users.

Amount of value added to total footwear estimate by factor, 1992 PCE

Factor	Value added (millions of dollars)	
Total	\$32,903	
Basic value		\$14,926
Wholesale margin		3,371
Transportation cost		121
Wholesale taxes		11
Retail margin		13,153
Retail taxes		1,321

Production and allocation of footwear, 1992

I/O Accounts *(Millions of dollars)*

Production		Basic value	Whole. margin	Trans. cost	Comm & whole. taxes	Retail margin	Retail taxes	Purchase value
Shipments	4,727							
Adjustments:								
Secondary production	1							
Nonemployer receipts	9							
Filer misreporting receipts	9							
Nonemployer misreporting receipts	2	21						
Adjusted shipments		4,748	3,589	143	12	13,153	1,321	22,966
Less: Balancing Record		201	7	8	0	0	0	216
Allocable shipments		4,547	3,582	135	12	13,153	1,321	22,750
Imports	11,638							
Adjustments:								
Census re-exports	-87							
NIPA territorial adj. to imports	204							
Allocable imports		11,755						11,755
Allocable shipments & imports		16,302	3,582	135	12	13,153	1,321	34,505

Production and allocation of footwear, 1992

I/O Accounts – cont. *(Millions of dollars)*

Allocation of Production	Basic value	Whole. margin	Trans. cost	Comm & whole. taxes	Retail margin	Retail taxes	Purchase value
Exports	603	109	6	0			718
Intermediate production	159	6	4	0			169
Government purchases – Federal	11	1	0	0			12
Government purchases – State & local	147	8	2	0			157
Other nondurables purchases	1	0	0	0			1
Change in intermediate goods inventories	31	2	0	0			33
Unspecified costs	30	1	0	0			31
Change in wholesale inventories	41	13	0	0			54
Change in retail inventories	314	68	2	1			385
PCE Military Clothing	39	3	0	0	0	0	42
<i>PCE Footwear</i>	<i>14,926</i>	<i>3,371</i>	<i>121</i>	<i>11</i>	<i>13,153</i>	<i>1,321</i>	<i>32,903</i>
	16,302	3,582	135	12	13,153	1,321	34,505

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 footwear expenditures, 1992 CE

Item	Value (millions of dollars)
Total footwear	\$23,124
Standard error	1,145
95% confidence intervals	
Upper limit	\$25,368
Lower limit	\$20,880

Expert Judgment

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

- ◆ Trade margin calculation in PCE
 - Wholesale
 - Retail

Impact of allocation procedures on footwear estimates, 1992 CE

Item	Total expenditure	Allocated expenditure	% Allocated
Total footwear	\$23,124	\$2,617	11.32%
Men's	7,182	692	9.63%
Boys'	3,050	674	22.09%
Women's	10,828	938	8.67%
Girls'	2,064	313	15.19%

Calculation of Wholesale Trade Margin in PCE Estimates

- ◆ Initial margin estimate is computed for wholesalers whose primary business is footwear.
 - Total sales receipts and the cost of purchases of footwear 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.

Calculation of Wholesale Trade Margin in PCE Estimates – cont.

- ◆ Margin estimate for wholesalers whose primary business is footwear is adjusted to account for two factors.
 - These wholesalers may also trade in other businesses.
 - Wholesalers whose primary business is not footwear may also have footwear operations.
- ◆ CWT data do not distinguish between footwear and non-footwear 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 footwear trade.
 - Trade margin rate (wholesale trade margin / sales receipts) is calculated for wholesalers whose primary business is footwear.
 - The trade margin rate is applied to footwear sales receipts of all wholesalers of footwear.
 - Trade margin rates for other commodities handled by footwear wholesalers are computed.
 - These rates are applied to non-footwear sales receipts of footwear wholesalers.

Calculation of Wholesale Trade Margin in PCE Estimates – cont.

- ◆ *Ideally*, the trade margin generated by applying these rates to commodity lines handled by footwear 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 \$3,635 million
 - Harmonized margin calculated by harmonization procedure is \$3,589 million
 - Procedure results in 1.3% drop in footwear margin.

Calculation of Retail Trade Margin in PCE Estimates

- ◆ Procedures are similar to those used in calculating wholesale trade margin due to data limitations.
- ◆ Overall retail trade margins can be computed by type of outlet
 - Department store
 - Hardware store
 - Grocery store

but not by merchandise line, like footwear.

Calculation of Retail Trade Margin in PCE Estimates – cont.

- ◆ *Ideally*, the trade margin generated by applying these rates to merchandise lines handled by each type of outlet = the trade margin derived by evaluating purchases, costs, and inventory adjustments for those outlets.
- ◆ *In practice*, the trade margins are not equal, so the harmonizing procedure is applied.

Calculation of Retail Trade Margin in PCE Estimates – cont.

- ◆ Effect of this harmonization procedure
 - Margin based on purchases, costs and inventory adjustments of shoe stores applied to all footwear sales is \$14,463 million.
 - Harmonized margin calculated from harmonization procedure is \$13,153 million.
 - Procedure results in 9.1% drop in footwear margin.

Examples of content differences in component categories of footwear

- ◆ PCE includes athletic footwear for participant sports in footwear, 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 footwear. CE does not include such a category in footwear. It is likely such expenditures are included in shoe repair services.

Research Summary

Issues we need to consider:

- ◆ Respondent Burden
- ◆ Household Underreporting
- ◆ Nonresponse
- ◆ Uses and Users
- ◆ Cost

Recent Developments

Introduction of the Computer Assisted Personal Interview instrument – April 2003

9 month field test underway – due to be completed in September 2002

Redesign of the Diary Instrument

4 month field test due to start in September 2002

implementation scheduled for January 2004

Ongoing Work

- ◆ Global vs. detail
- ◆ CE/PCE comparisons
- ◆ ACNielsen research
- ◆ Diary research
- ◆ Income imputation
- ◆ Study of teenage spending

Possible Areas for Research

- ◆ Individual Diaries
- ◆ Bracketing Assets and Liabilities
- ◆ Randomized Interview applications
- ◆ Targeted Interview applications
- ◆ Interview supplements
- ◆ Augmenting collected data with secondary source data