

# CONSUMER EXPENDITURE SURVEYS

---

“Construction and Research Use of the Consumer Expenditure Survey”



# Outline

---

- ◆ Overview
- ◆ Recent Research
- ◆ PCE/CEX Comparisons
- ◆ Wrap - Up

# The survey is designed to represent a

---

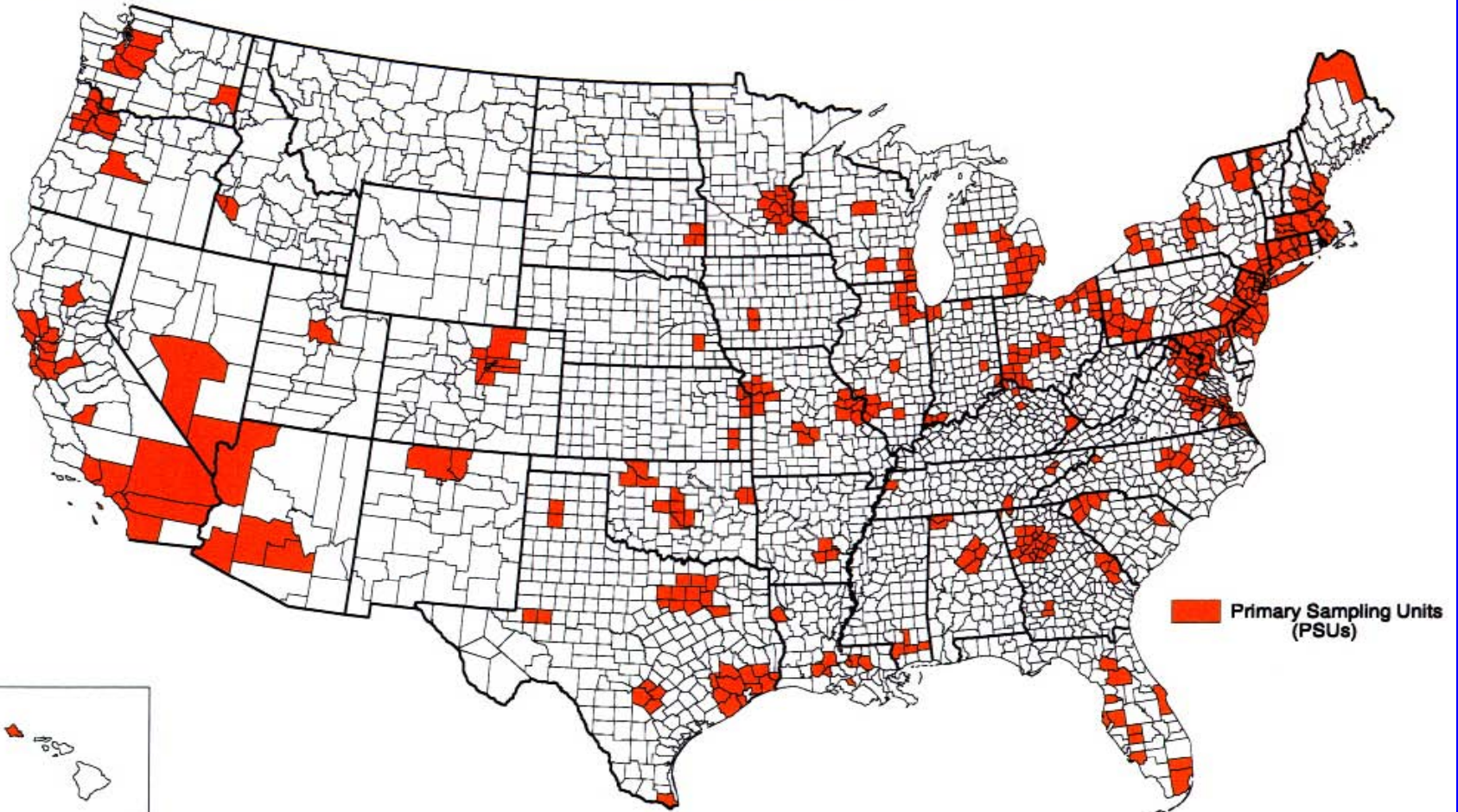
- ◆ National Probability Sample
  - using the most recent decennial census, augmented by new construction permits
  - consisting of primary sampling units (PSU)
  - based on probabilities proportional to population size
  - consists of counties, group of counties, or independent cities

# 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

---

- ◆ CEX 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



- 
- ◆ Although we have slightly different definitions - the CEX 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

---

- ◆ CEX - 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

***NO QUANTITIES***

## ◆ 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

***LIMITED  
QUANTITIES***

# Socio-demographic Variables

---

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

- 
- ◆ 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.
- ◆ Cases can be 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 5400 households completing 5 quarterly 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

---

- ◆ SIPP fields about 119,000 cases each year
- ◆ CPS fields about 722,000 cases each year

# Average Time per Case

---

- ◆ CEX

- Diary 6.1 hours

- Interview 4.0 hours

- ◆ SIPP 2.6 hours

- ◆ CPS 51.2 minutes

- ◆ All hours include travel time

# Cost per Case

---

◆ CEX	\$268.00
◆ SIPP	\$193.00
◆ CPS	\$51.00

# Census Budgets

---

◆ CEX	\$24,653,000
◆ SIPP	\$23,050.231
◆ CPS	\$36,658,251

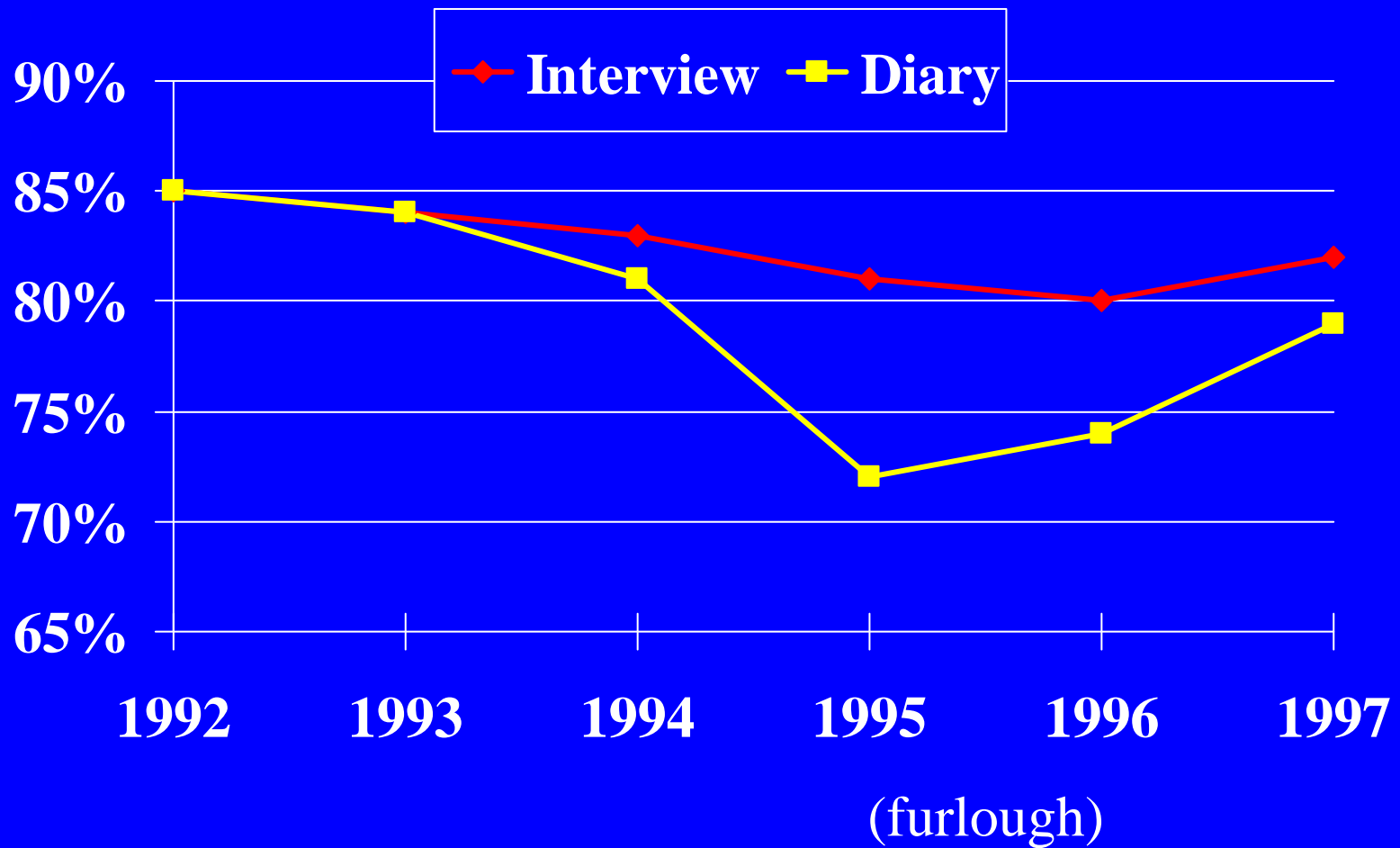
- 
- ◆ If sample size of CEX interview were increased to the size of SIPP, the Census budget would be about:

\$32,000,000



- 
- ◆ To increase the sample from its current 5400 households to size of CPS, which is approximately 50,000 households.....
  - ◆ We would need to collect about 370,000 cases, at \$268 a case = about \$100,000,000

# Response Rates



---

◆ How many households completed all 5 interviews?

↓ about 75%

◆ How many households completed both diaries?

↓ about 92%

# Consumer Price Index Initiative

## CPII

---

- ◆ Provides for:
  - 50% expansion in urban PSU's - in 1999
  - Development of CAPI instrument
    - » slated for implementation in 2003

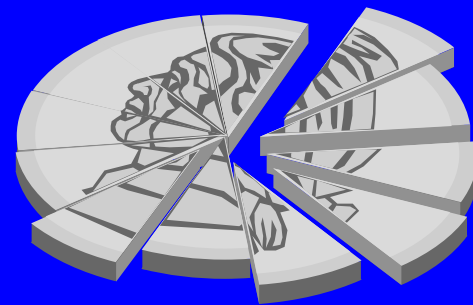
# Survey Expansion

---

- ◆ A 50% increase in urban PSU's requires
  - about 57,000 cases for Interview
  - about 23,000 cases for Diary
    - » This will yield approximately the equivalent of 7800 households of data for both the diary and interview

# Expenditure Data in the CEX

---



# Outline

---

- ◆ Defining consumption
- ◆ Data available in the CEX
- ◆ Processing of expenditure data
- ◆ Data comparisons

# Defining Consumption

---

## ◆ Expenditures

- Transaction costs, including taxes, for goods and services
- Flow of services from durables and owned housing

## ◆ In-kind transfers

- Private sources
- Public sources

## ◆ Home production



# Expenditure Definitions used in CEX Publications

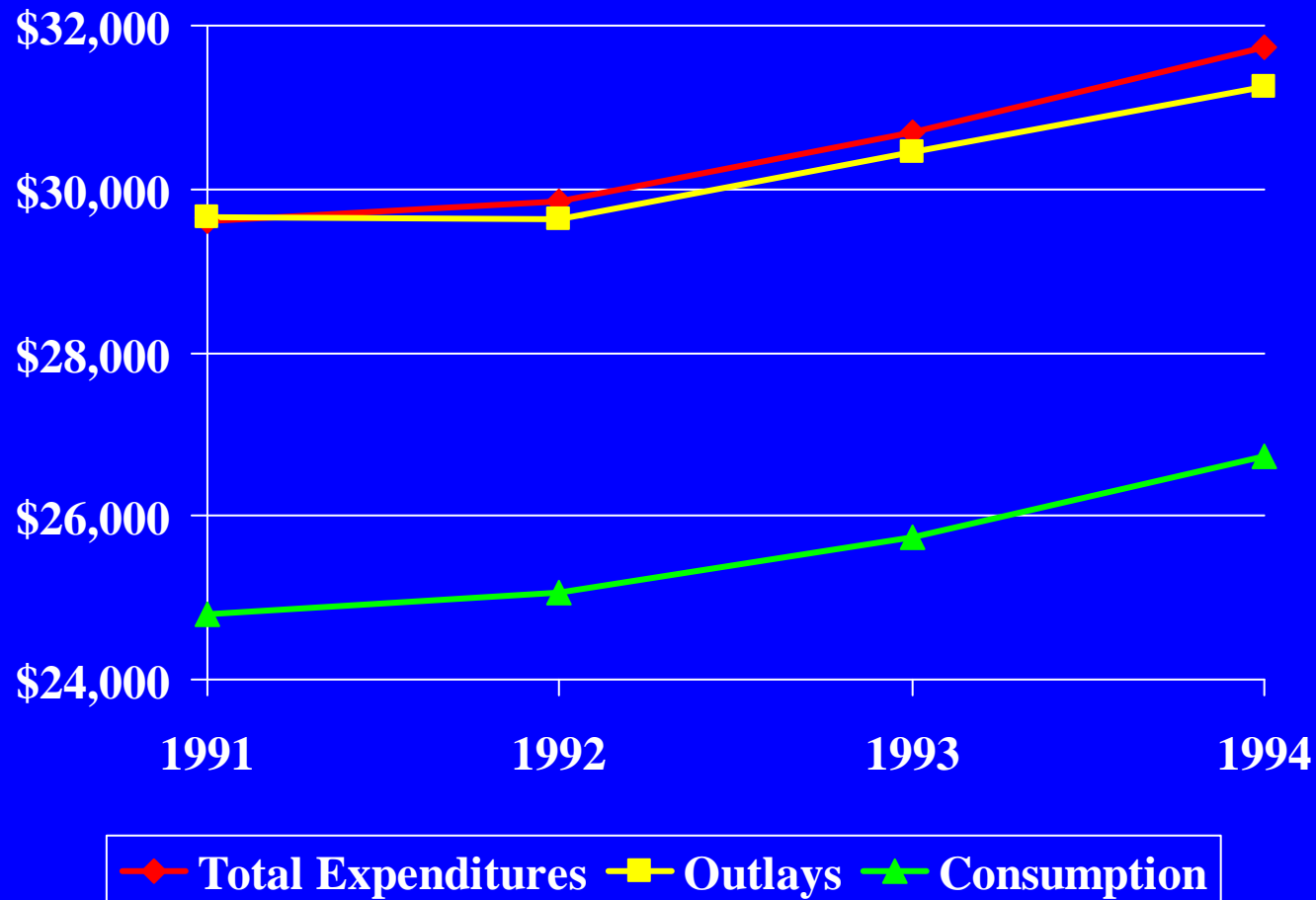
Item	Total expenditures	Current consumption	Outlays
Purchase price of all items but housing and vehicles	Yes	Yes	Yes
Mortgage principal payments	No	No	Yes
Mortgage interest payments	Yes	Yes	Yes
Purchase price of vehicles	Yes	Yes	Only those not financed
Vehicle loan principal payments	No	No	Yes
Vehicle loan interest payments	Yes	Yes	Yes
All other finance charges	Yes	Yes	Yes

# Expenditure Definitions used in CEX Publications - (cont.)

<b>Item</b>	<b>Total expenditures</b>	<b>Current Consumption</b>	<b>Outlays</b>
<b>Business purchases</b>	No	No	No
<b>Occupational expenses</b>	Yes	No	Yes
<b>Gifts given outside household</b>	Yes	No	Yes
<b>Cash contributions</b>	Yes	No	Yes
<b>Life, annuity, and other personal insurance</b>	Yes	No	Yes
<b>Pension and retirement contributions</b>	Yes	No	Yes

# Comparison of Expenditures

(annual means in nominal dollars)



# Expenditure Data in the Interview

---

## ◆ Quarterly

- purchase of nondurables
  - » global food
  - » detail for other items
- gifts given outside household
- global cash contributions

## ◆ Annually in 5th interview only

- detailed cash contributions
- occupational expenses

# Durables in the CEX

---

<b>Initial Inventory (1st Interview)</b>	<b>Purchases (2nd-5th Interviews)</b>	<b>Disposals (2nd-5th Interviews)</b>	<b>Current Inventory (2nd-5th Interviews)</b>
owned vehicles	owned vehicles	owned vehicles	owned vehicles
owned property	owned property	owned property	owned property
other durables	other durables	<i>not collected</i>	<i>not available</i>

# Additional Information on Durables

---

- ◆ Method of acquisition and characteristics of
  - owned property  
(not updated for new construction, alterations, or remodeling)
  - owned vehicles  
(not updated for changes in options)
- ◆ Method of acquisition for other durables  
(1st interview only and not updated)

# In-Kind Private Transfers

## Cash Values

---

- ◆ Meals as pay
- ◆ Rent as pay
- ◆ Employer contribution to purchased or leased vehicles (personal use)
- ◆ Educational expenses reimbursed by agency, employer, or person outside the CU

# In-Kind Private Transfers

## Cash Values (cont.)

---

- ◆ Reimbursements from insurance company, medical provider, business, or person outside the CU for
  - Vehicle services, parts, and equipment
  - Medical expenses
  - Repairs, maintenance, alterations, and new construction of property



# In-Kind Private Transfers

## Receipt Only

---

- ◆ Major appliances received as gifts (inventory)
- ◆ Vehicles received as gifts
- ◆ Real property received as gifts or inheritance
- ◆ Health insurance premiums partially or entirely paid by employer, agency or person outside the CU

# Other In-Kind Transfers

---

## ◆ Public Transfers

- Cash values
  - » Food Stamps (counted in income)
- Receipt only
  - » Medicaid
  - » Public housing project or subsidized housing

## ◆ Public/Private Transfers

- Receipt only
  - » Food, beverages or meals through public or private welfare agencies, including religious organizations

# Data Processing for Expenditures

---

## ◆ Imputation

- About 5% of all cost records
- Over half of records for finance charges (excl. auto and mortgage)
- About one-fourth of mortgage payment and home ownership cost records

## ◆ Allocation

- About 6% of all cost records
- Over one-fourth of fuel and utility cost records

# Data Processing for Expenditures (cont.)

---

- ◆ Allocation (cont.)
  - Over one-fifth of records for clothing of persons 2 and over
- ◆ Time adjustment
- ◆ Sales taxes
- ◆ Additional processing for public use data
  - topcoding
  - geographic restrictions

# Topcoding and Geographic Adjustment for Public Use Data

---

- ◆ Subject content cannot present unusual risk of disclosure
  - rent > \$3,000
  - property or medical expenses > \$200,000
  - airplane purchases and ownership deleted
- ◆ Geographic areas with fewer than 100,000 inhabitants cannot be identified
  - region (urban CU's only)
  - population size (not for rural CU's and CU's in West)
  - limited information for states

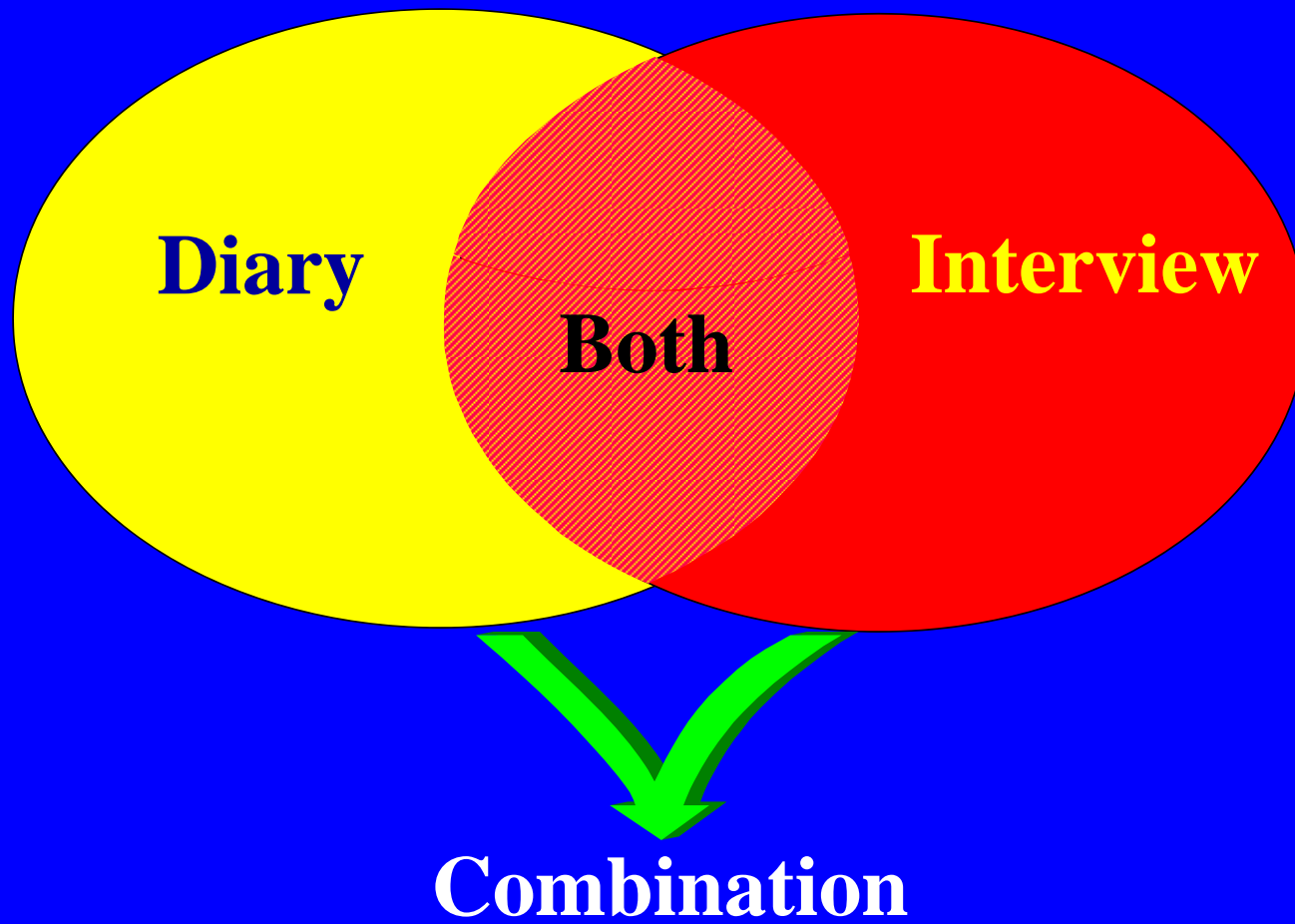
# Data Comparisons

---

- ◆ Diary and Interview
- ◆ CEX and external sources

# Data Available by Instrument

---



# Comparability of Selected Items

<b>Item code (UCC)</b>	<b>Description</b>	<b>Survey instrument</b>
<b>330110</b>	<b>Soaps and detergents</b>	<b>Diary only</b>
<b>640110</b>	<b>Hair care products</b>	<b>Diary only</b>
<b>190903</b>	<b>Food on out-of-town trips</b>	<b>Interview only</b>
<b>470113</b>	<b>Gasoline on out-of-town trips</b>	<b>Interview only</b>
<b>320340</b>	<b>Glassware</b>	<b>Both</b>
<b>320350</b>	<b>Silver serving pieces</b>	<b>Both</b>
<b>300210</b>	<b>Washing machines</b>	<b>Diary only</b>
<b>300211</b>	<b>Washing machines, owner</b>	<b>Interview only</b>
<b>300212</b>	<b>Washing machines, renter</b>	<b>Interview only</b>



## Sample Statistics for Selected Items, 1993-95

Item	Interview mean	Interview CV	Diary mean	Diary CV
Sofas	\$75.40	4.58	\$52.72	15.76
Bedroom linens	33.10	2.87	44.60	7.98
Legal fees	99.43	7.52	33.34	16.54
Washing machines			38.10	30.21
Washing machines (renter)	5.21	6.89		
Washing machines (owned)	14.27	5.52		
<i>Physicians' services</i>	160.86	3.11	216.08	8.98

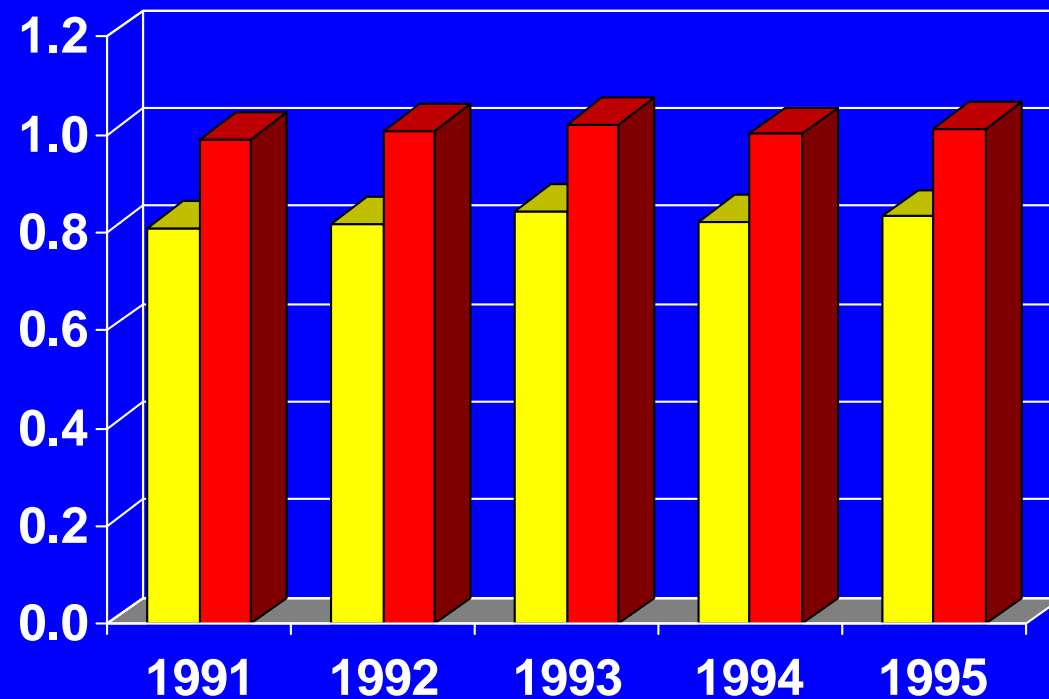
# How do CEX expenditure data compare between surveys and to other sources, such as PCE?

---

“Reporting ratios” ( $\$CEX/\$PCE$ ) show how many dollars are reported by CU’s in the CEX for every \$1 reported by PCE.

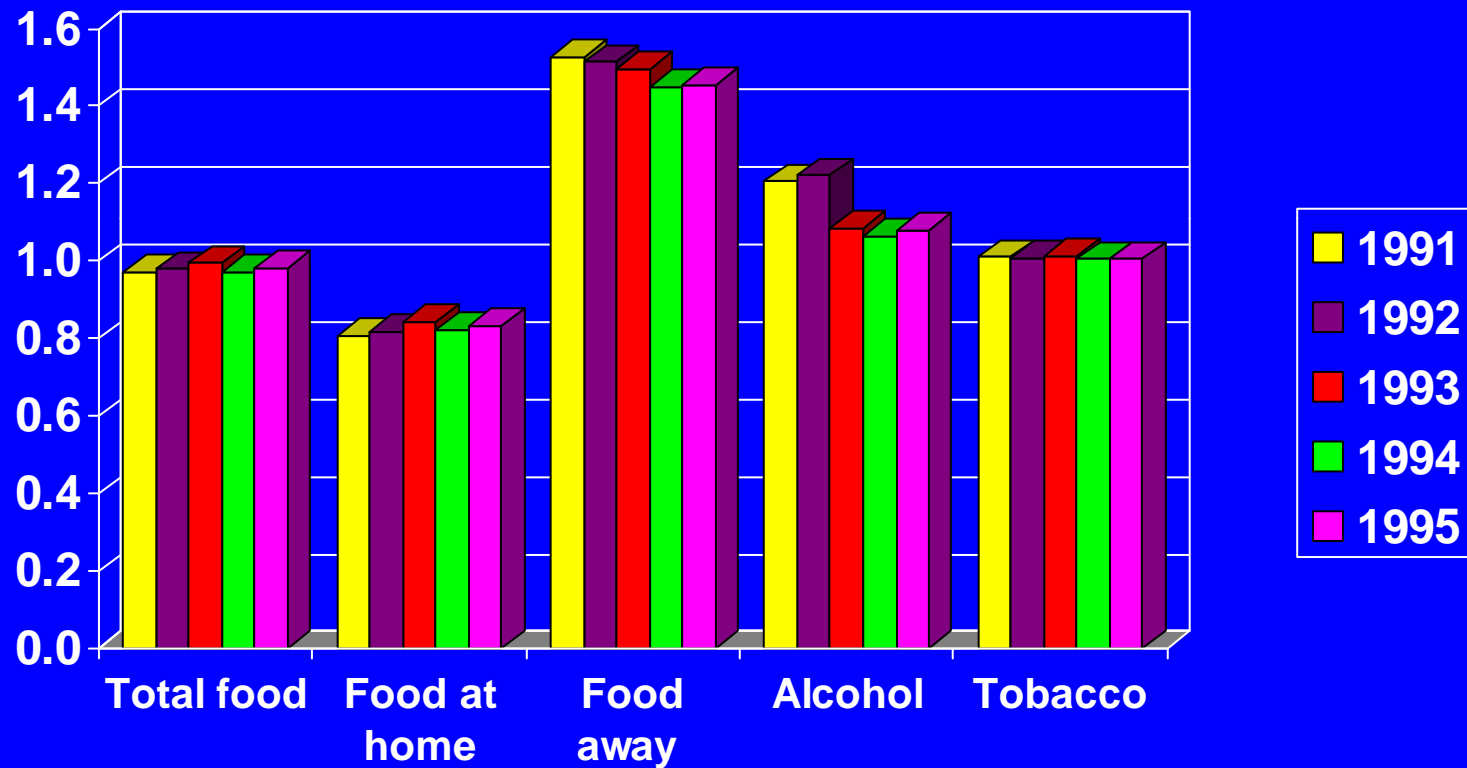
# Food at Home Ratios using Diary and Interview based on Means

---

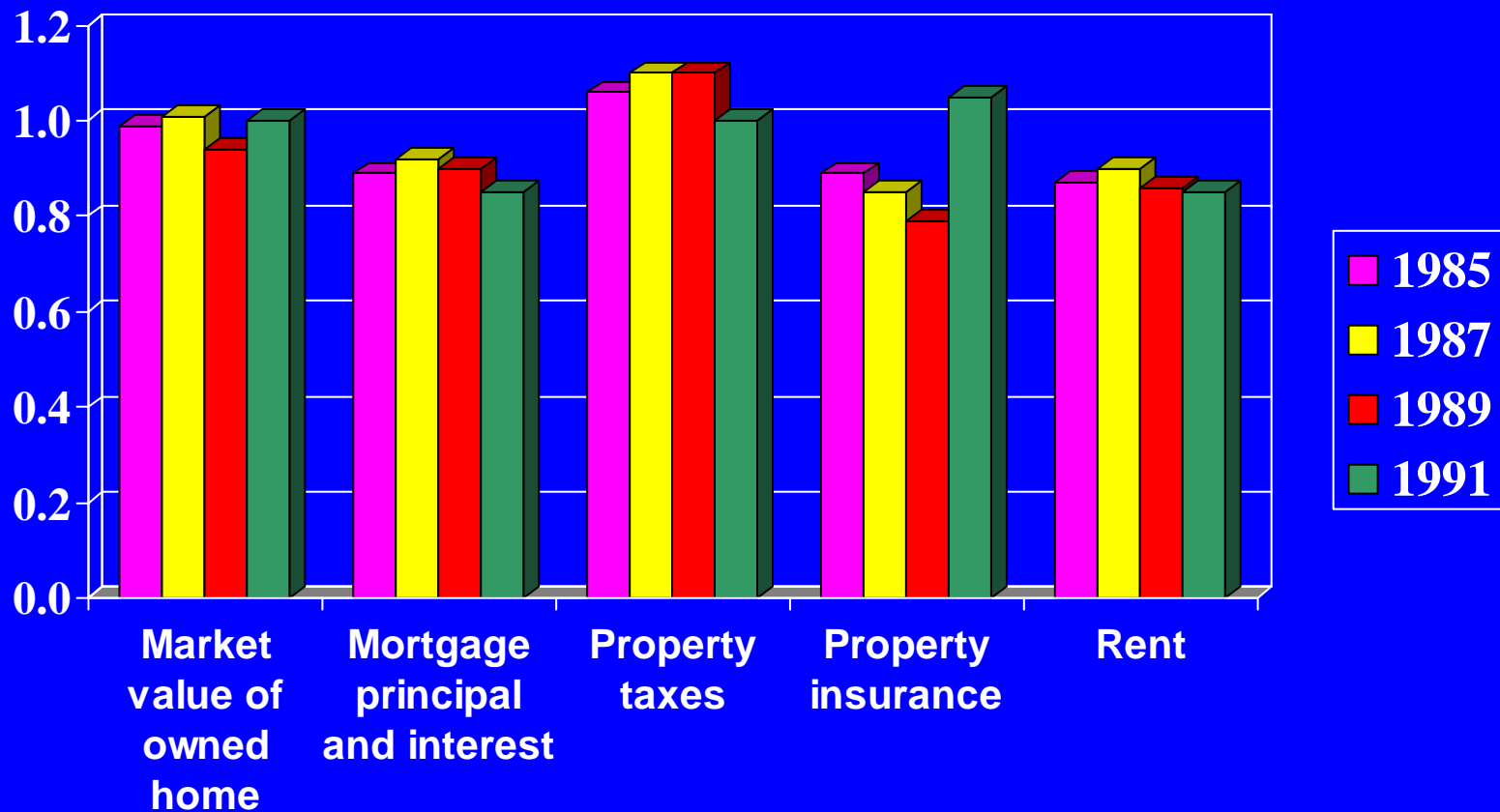


■ Diary detail/Interview ■ Diary global/Interview

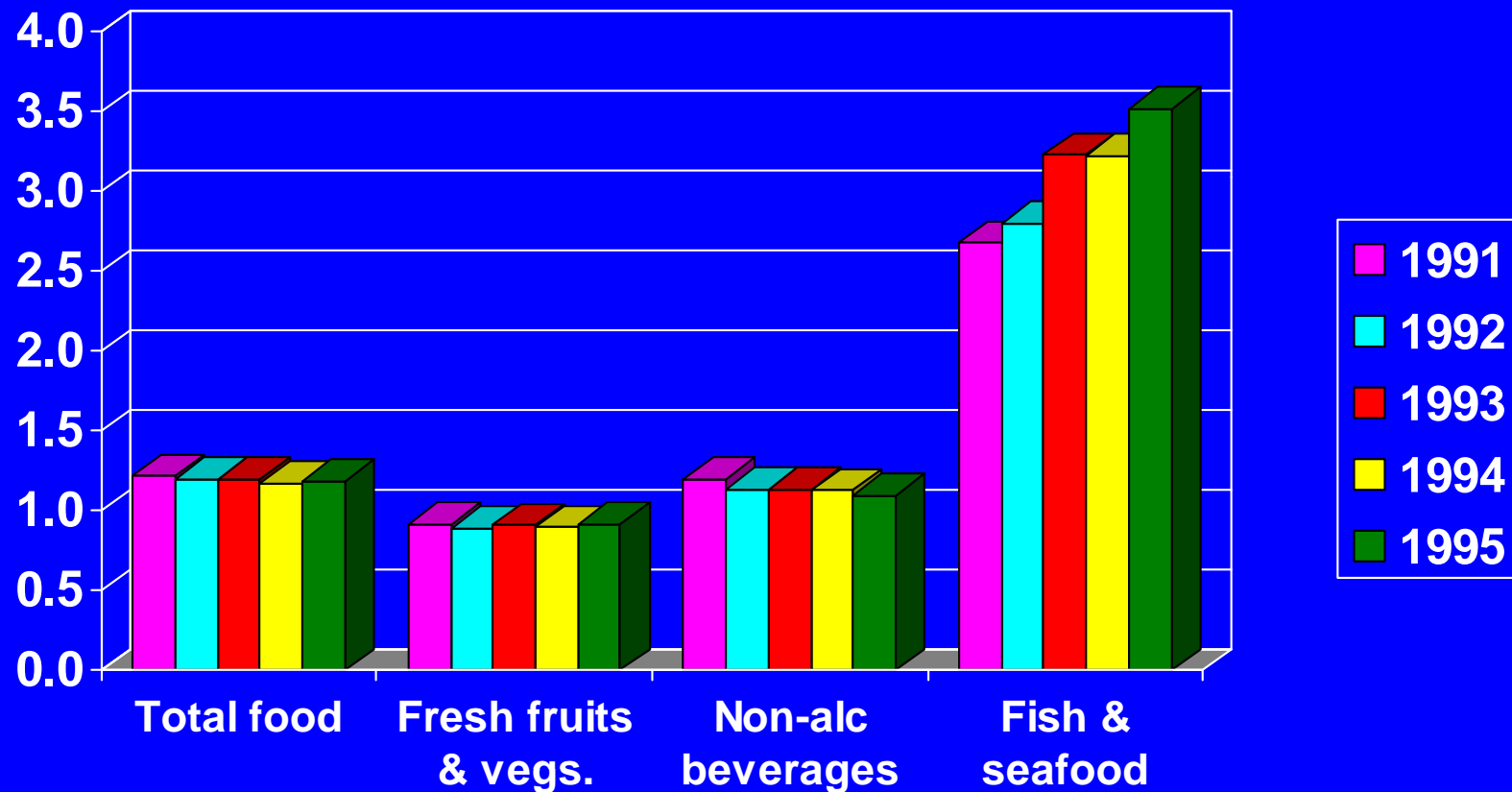
# Detailed Diary to Interview Ratios based on Means



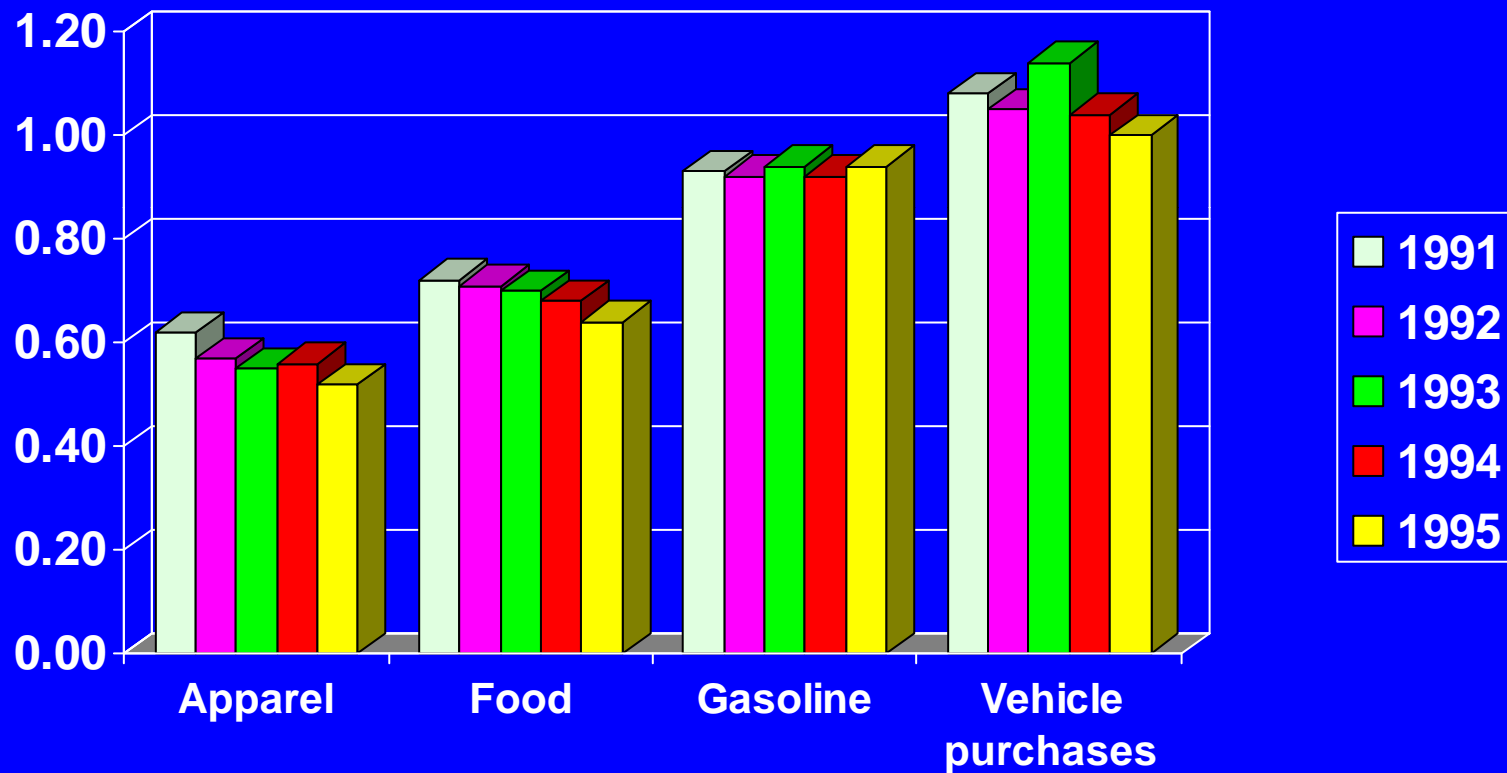
# CEX Interview/American Housing Survey Ratios based on Medians



# CEX Diary/Progressive Grocer Ratios based on Aggregates

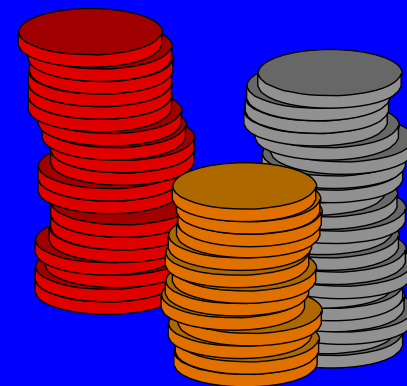


# CEX Integrated/Personal Consumption Expenditures Ratios based on Aggregates



# Income, Assets and Liabilities in the CEX

---





# Income Data

---

- ◆ Collection procedures
- ◆ Sources
- ◆ Reporting issues
- ◆ Data quality
- ◆ Imputation

---

**Income data are collected in  
both the Interview and Diary  
Surveys.**

# However, we will focus on Interview data.

---

- ◆ Questions are similar in both Interview and Diary.
- ◆ The Interview data are the data used in publications of “integrated” (Diary and Interview) results.
- ◆ The Interview survey provides information on total expenditures.

**Income data are collected during the second and fifth interviews, and cover the 12 months prior to the interview.**

---

This is done in part to minimize respondent burden.

Data are collected after the expenditure data.

# Income data are collected at both the member level and consumer unit level

---

## Member level (Major sources; All persons at least 14 years old)

- ◆ Wages and Salaries
- ◆ Self-employment - farm
- ◆ Self-employment - non-farm
- ◆ Social Security and Railroad retirement
- ◆ Supplemental Security

## Consumer unit level

- ◆ Interest Income
- ◆ Dividend Income
- ◆ Rental of property
- ◆ Pensions and annuities
- ◆ Unemployment insurance
- ◆ Worker's Compensation and VA benefits
- ◆ Alimony and regular contributions
- ◆ Child support
- ◆ Public Assistance/welfare
- ◆ Food Stamps
- ◆ Other sources
- ◆ Lump sum receipts

# This is similar to the CPS, with the following exceptions:

---

- ◆ CPS collects most sources for each household member.
- ◆ Some sources in CEX (e.g., Social Security and Railroad Retirement) are collected as separate categories in CPS.
- ◆ Other sources in CEX (e.g., pensions and annuities) are collected as many separate categories in CPS (e.g., private pensions, Federal government pensions, U.S. military pensions, and black lung survivor income)

## **Based on reporting status,**

---

Consumer units are divided into  
“complete” and “incomplete”  
reporters of income.

# “Complete” income reporters....

---

- ◆ Report a value for at least one major source of income for their “reference person”
- ◆ Report a value for at least one major source of income for someone else (and the reference person reports having no major sources of income)
- ◆ Report a value for some family level income; members have no major sources of income

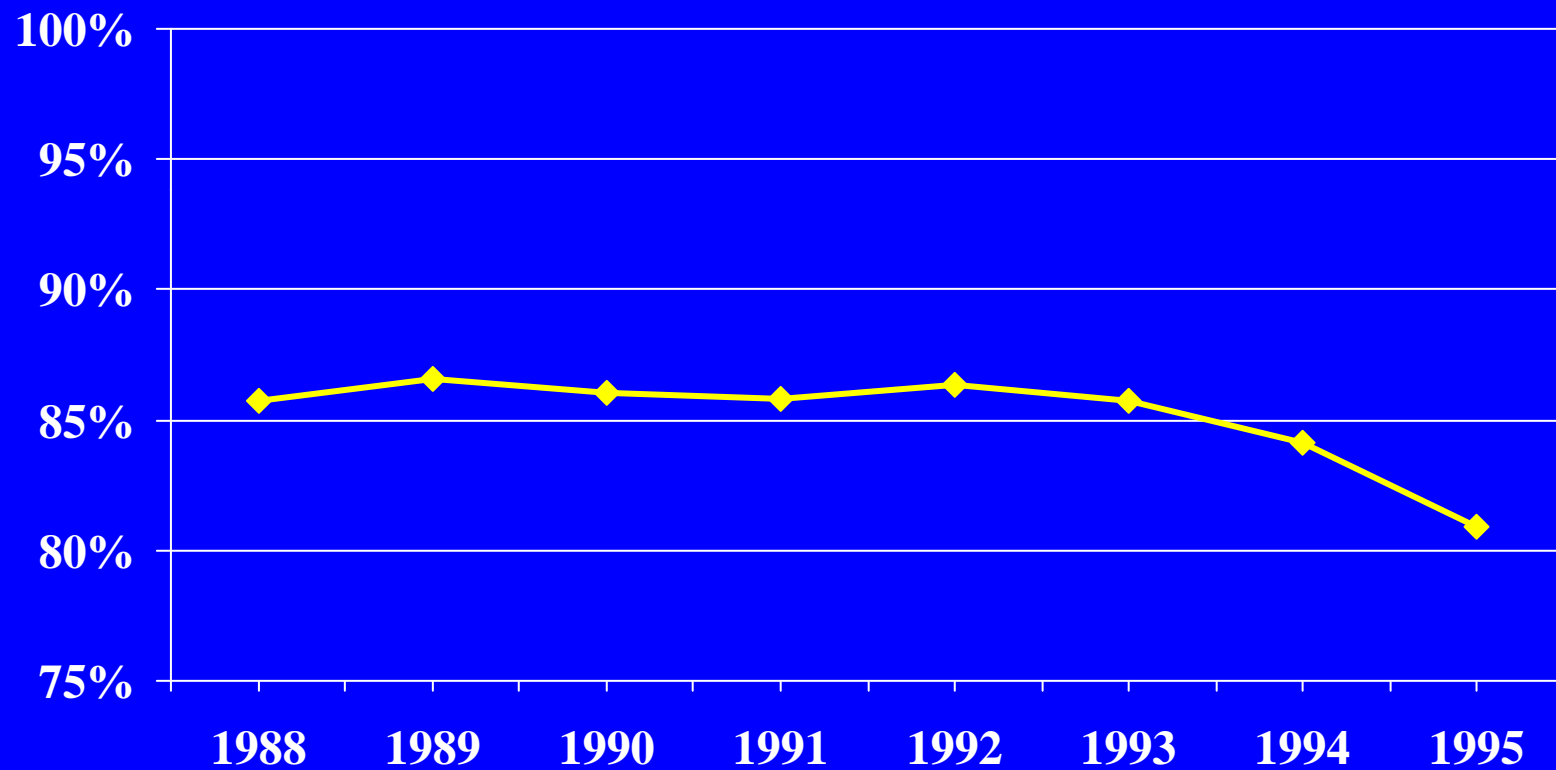


# Drawbacks of the definition:

---

- ◆ Not all complete reporters provide a full accounting of income from all sources.
- ◆ Studies have shown that “complete” reporters are not a random subset of all consumer units.
- ◆ The percentage of complete reporters has declined in recent years.

# Percent Complete Reporters: 1988-1995

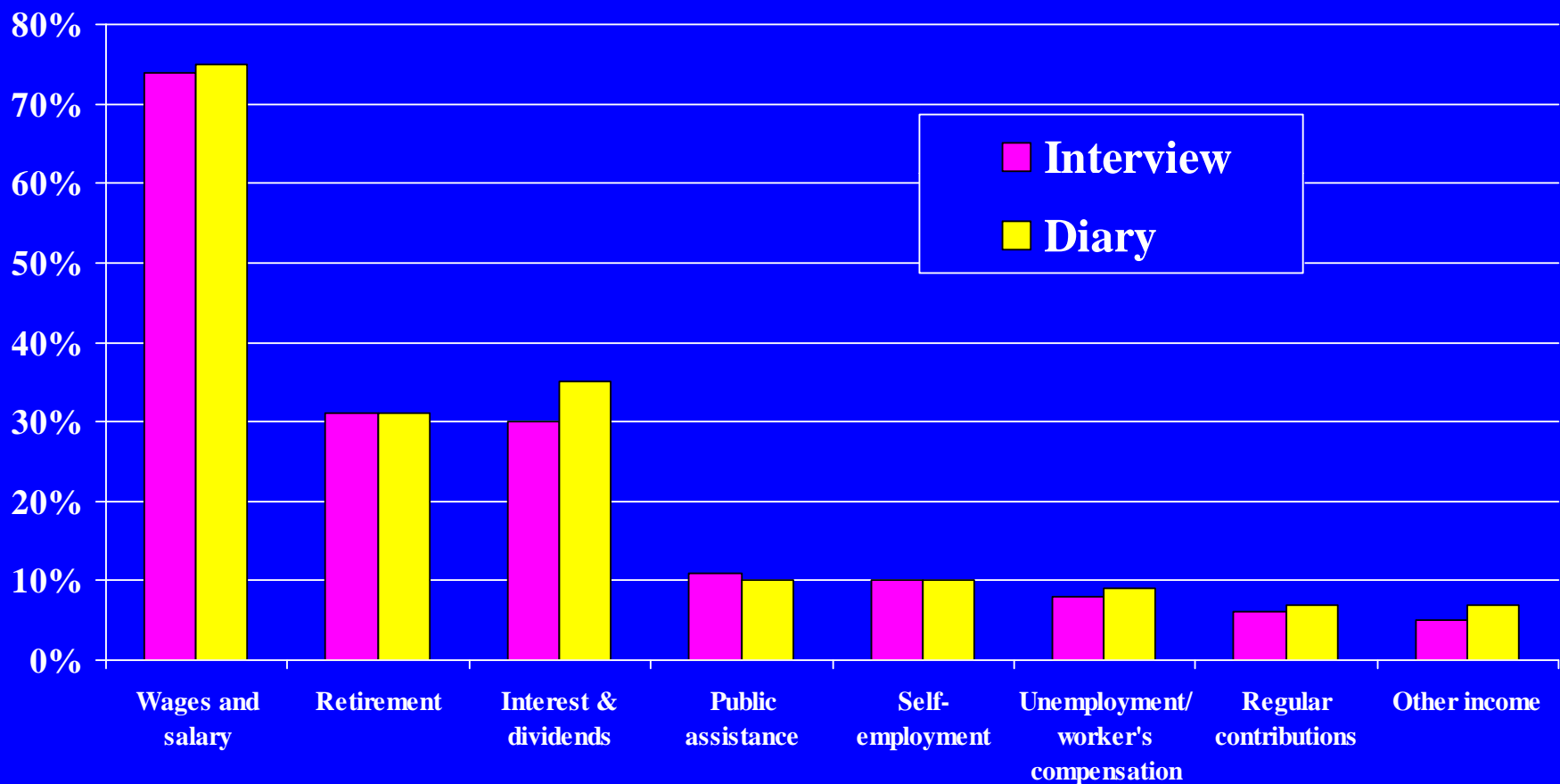


# Notes on Complete Reporters:

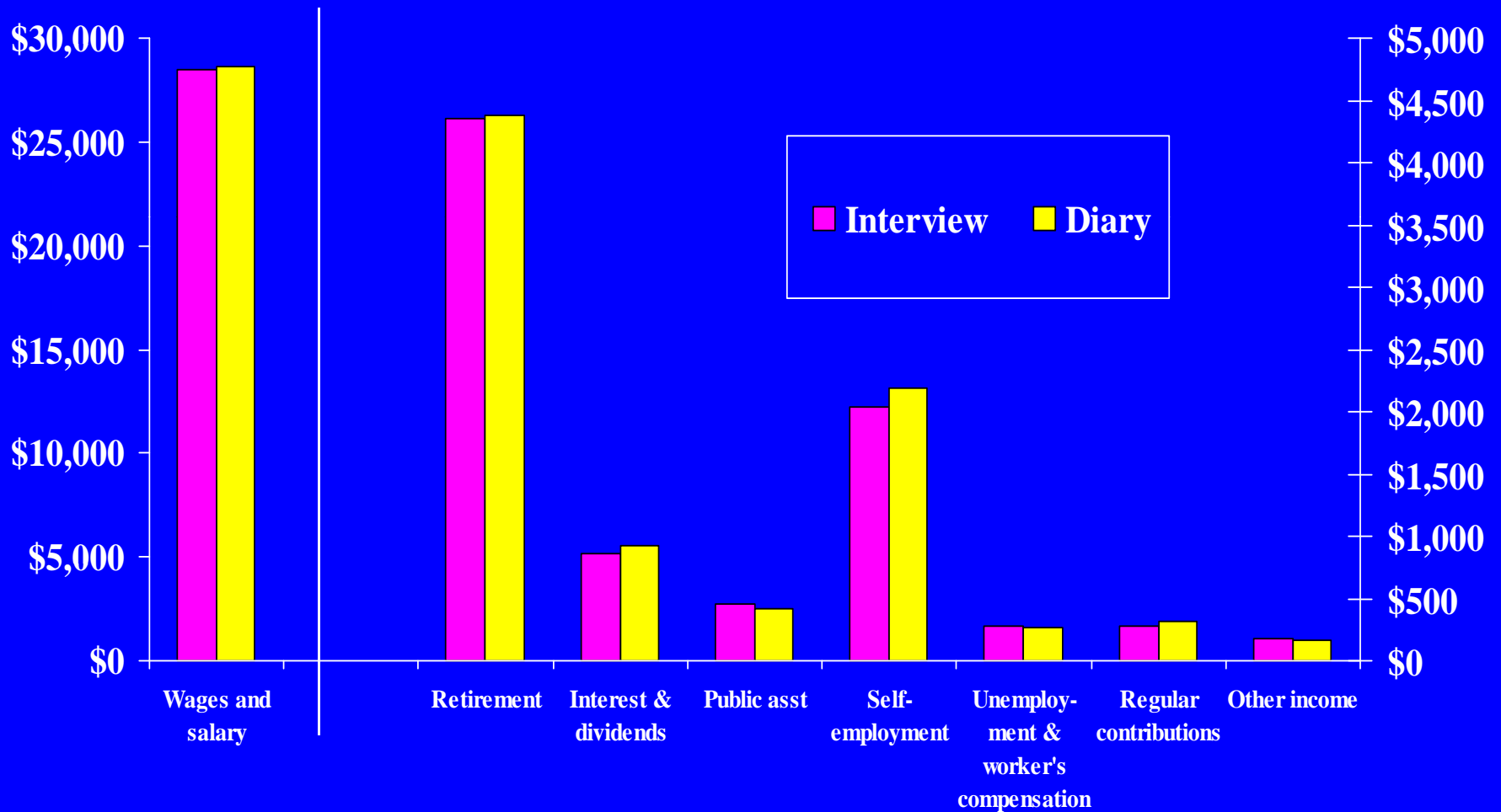
---

- ◆ Complete reporters provide a value for at least one major source of income.
- ◆ About 85 percent of the total sample for the Interview Survey.
- ◆ Most studies that use CEX income data rely on complete reporters.
- ◆ Using more restrictive definition of complete reporter yields a percent reporting comparable to the CPS.

# Percent reporting differs by source of income....



# ...as do means for all complete reporters (1995).



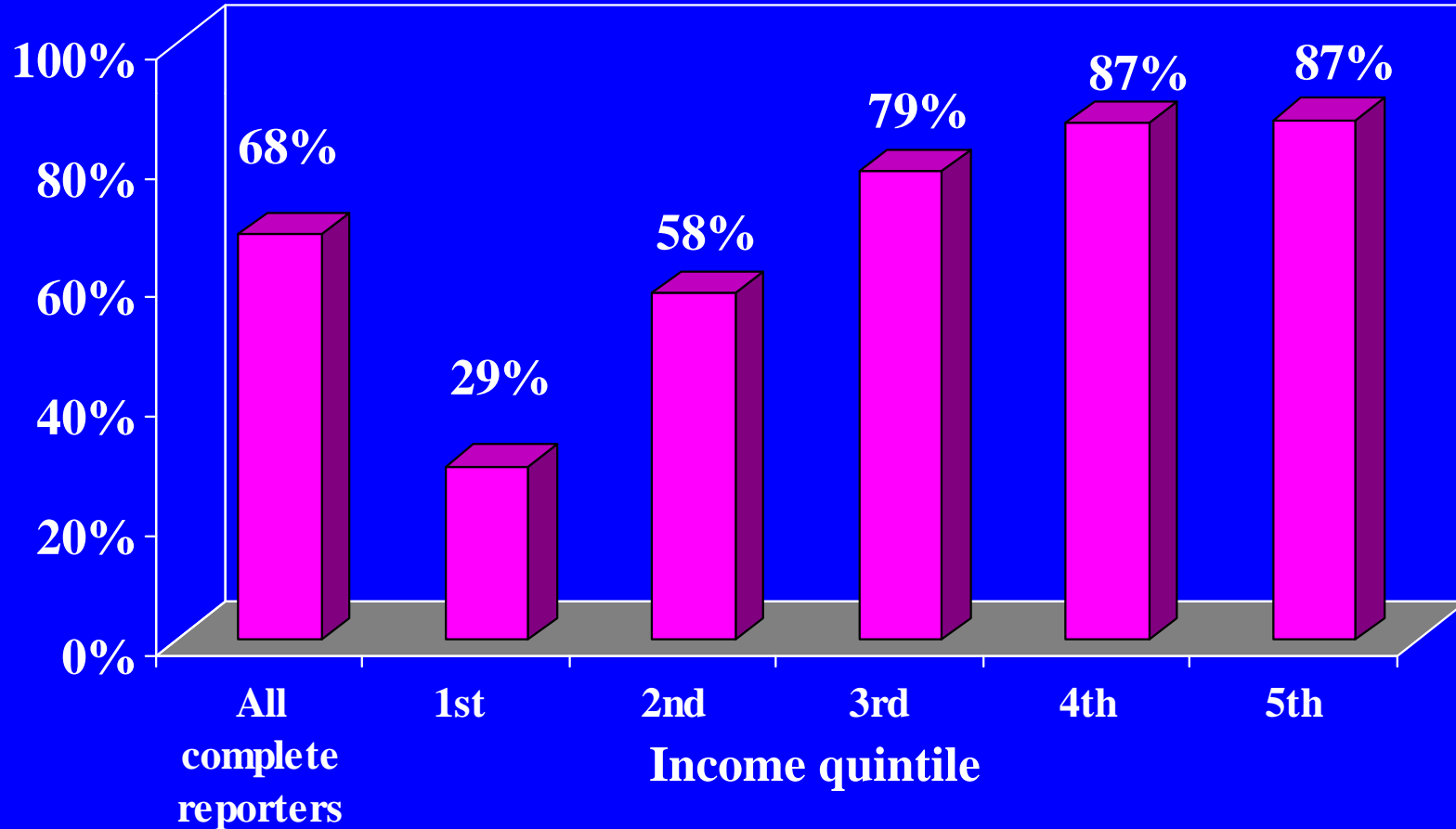
# Tax data are also collected in the Interview survey....

---

- ◆ Payroll tax
- ◆ Property tax
- ◆ Federal income tax
  - No separate value for EITC
- ◆ State and local income tax
- ◆ Personal property tax
- ◆ Other taxes

# However, as with income data, tax reporting is an issue.

Percent Reporting Federal Income Taxes:  
2nd and 5th Interview Complete Reporters: 1994-95



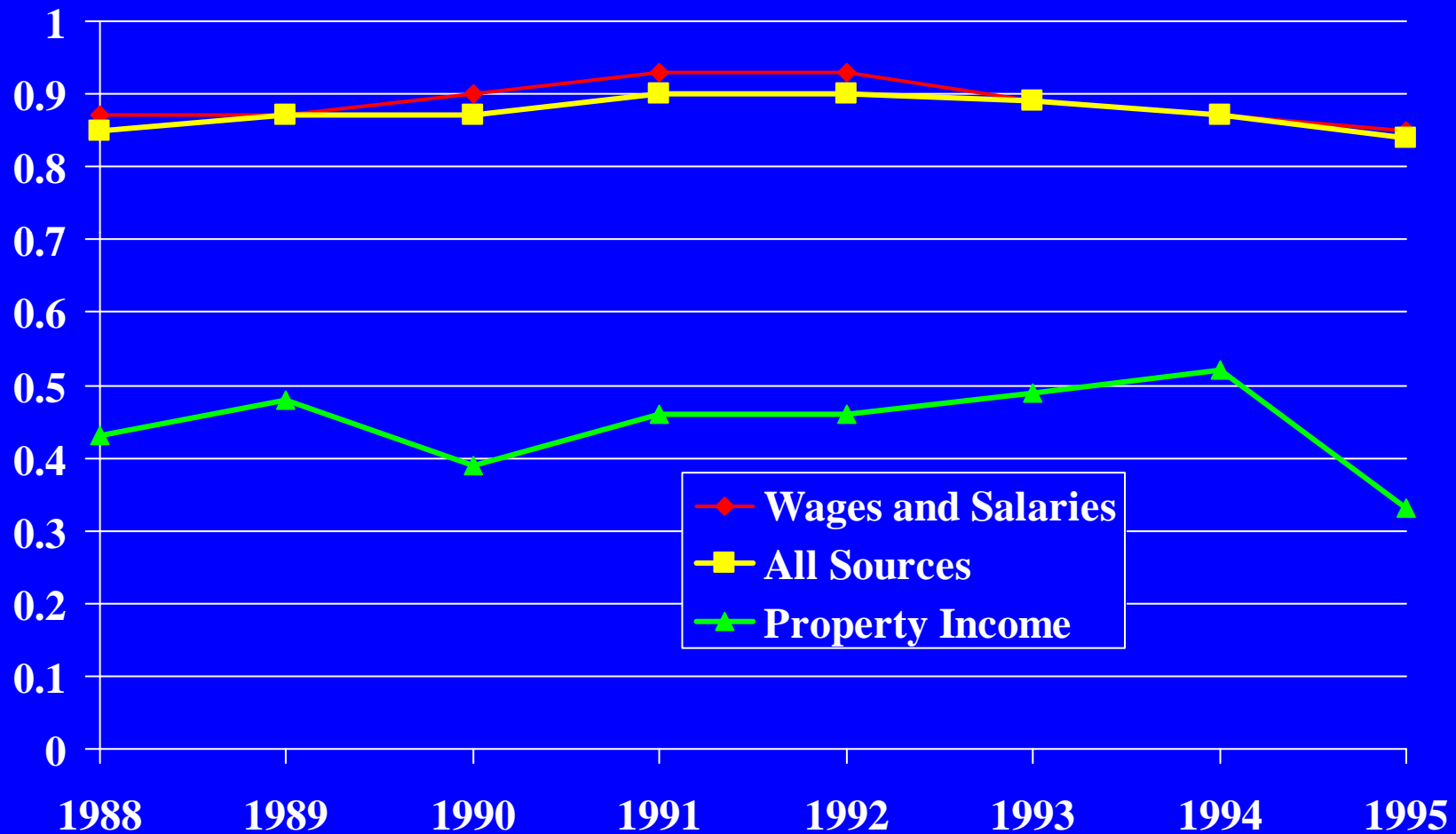
# How do CEX income data compare to other sources, such as CPS?

---

“Reporting ratios” ( $\$CEX/\$CPS$ ) show how many income dollars CEX collects for every \$1 CPS collects.



# Over time, the following ratios are observed for selected sources:



# The following other patterns are observed:

---

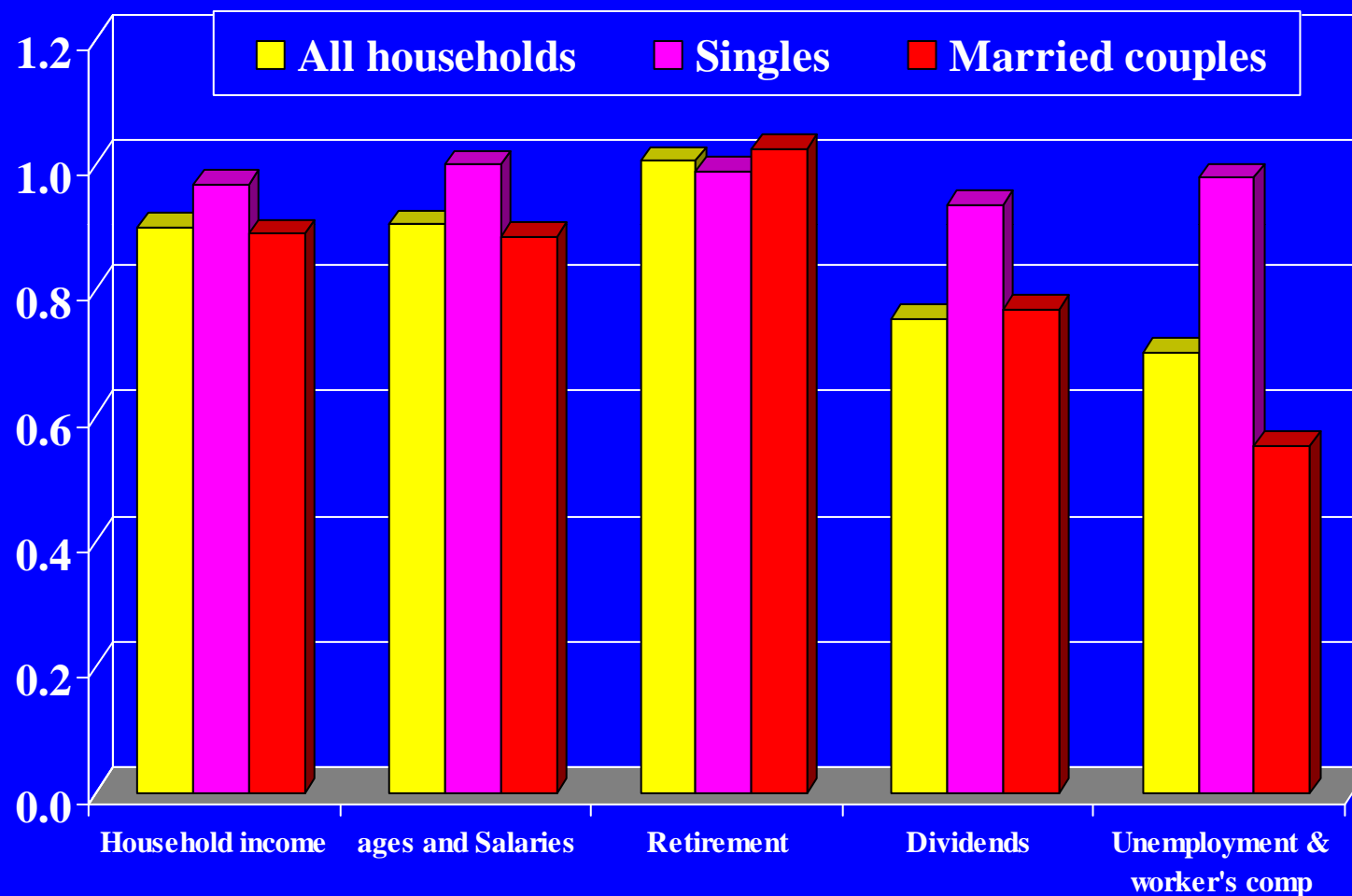
## “High” Ratio Items:

- ◆ Wage and salary
- ◆ Self-employment
- ◆ Social security
- ◆ Public assistance

## “Low” Ratio Items:

- ◆ Property income
- ◆ Unemployment/  
Worker’s Compensation/  
Veterans’ benefits.
- ◆ Regular contributions  
and other income

# CEX/CPS ratios by income source and household type: 1994



**It is important to remember that income data in the CPS data are imputed for missing values, but they are not in the CEX.**

---

CEX is experimenting with imputation to fill in missing data. How might this affect outcomes?

# First, some background on methodology.

---

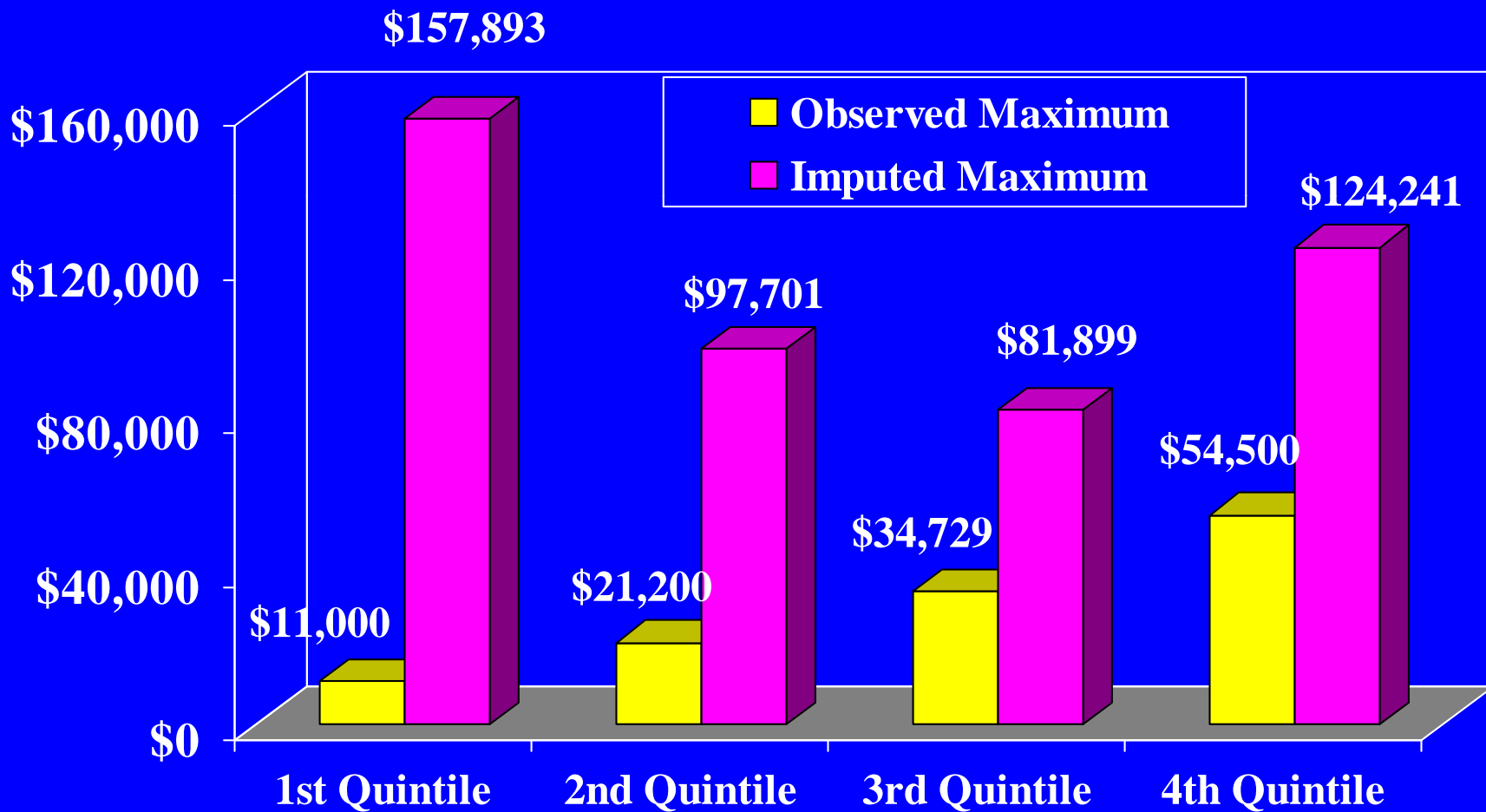
- ◆ We are examining “model-based” imputation.
- ◆ We are exploring “multiple” imputation. (Procedure involves estimating income several times and averaging the estimates.)
- ◆ We are considering the “hierarchical” approach (member 2’s income depends on member 1).

**As this work is still in progress, the following results are obtained from a “single” imputation model using the hierarchical method.**

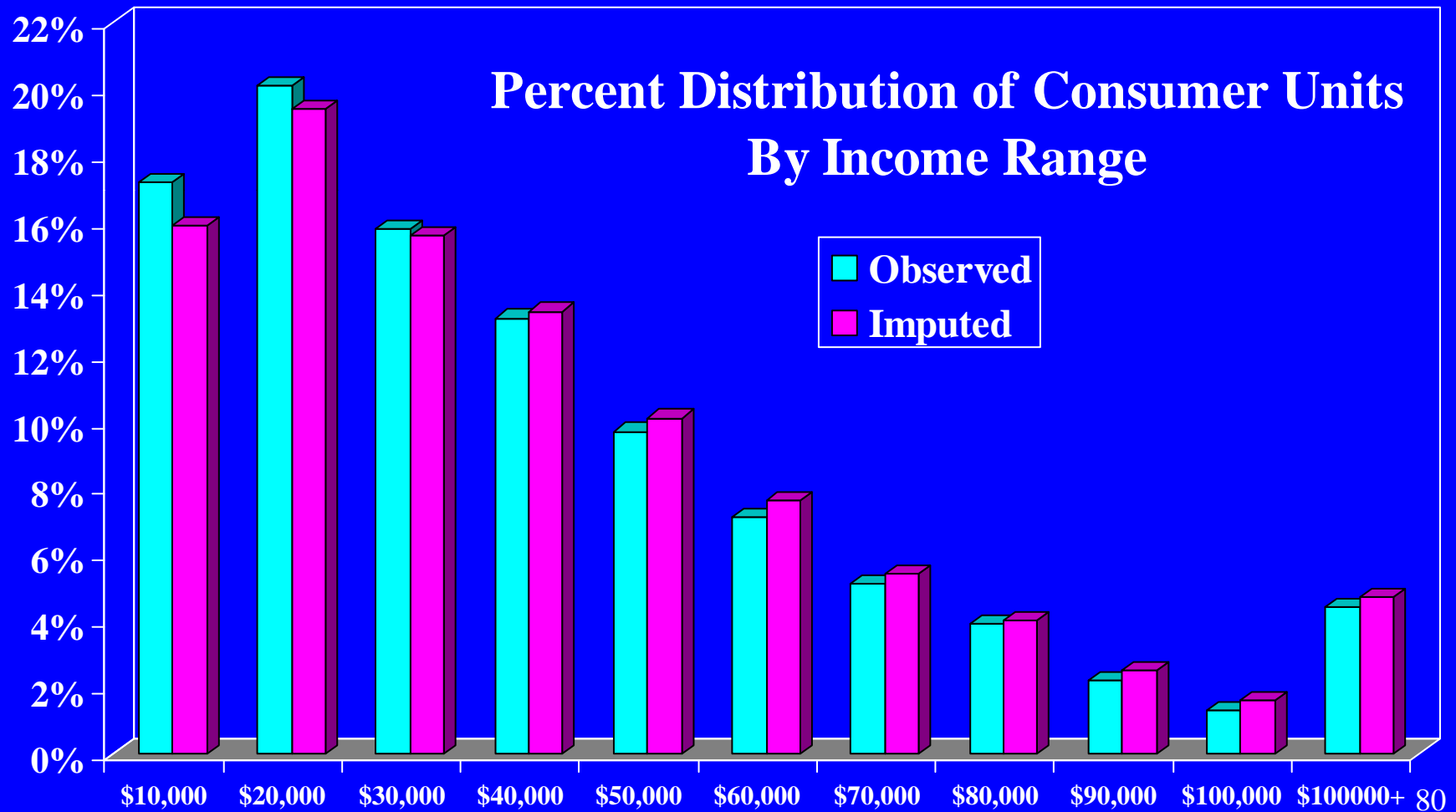
---

- ◆ Imputation is for complete reporters only
- ◆ Reported values preferred to imputed values
- ◆ Negative values are removed

**At least one family in every quintile is imputed to belong in the 5th quintile.**

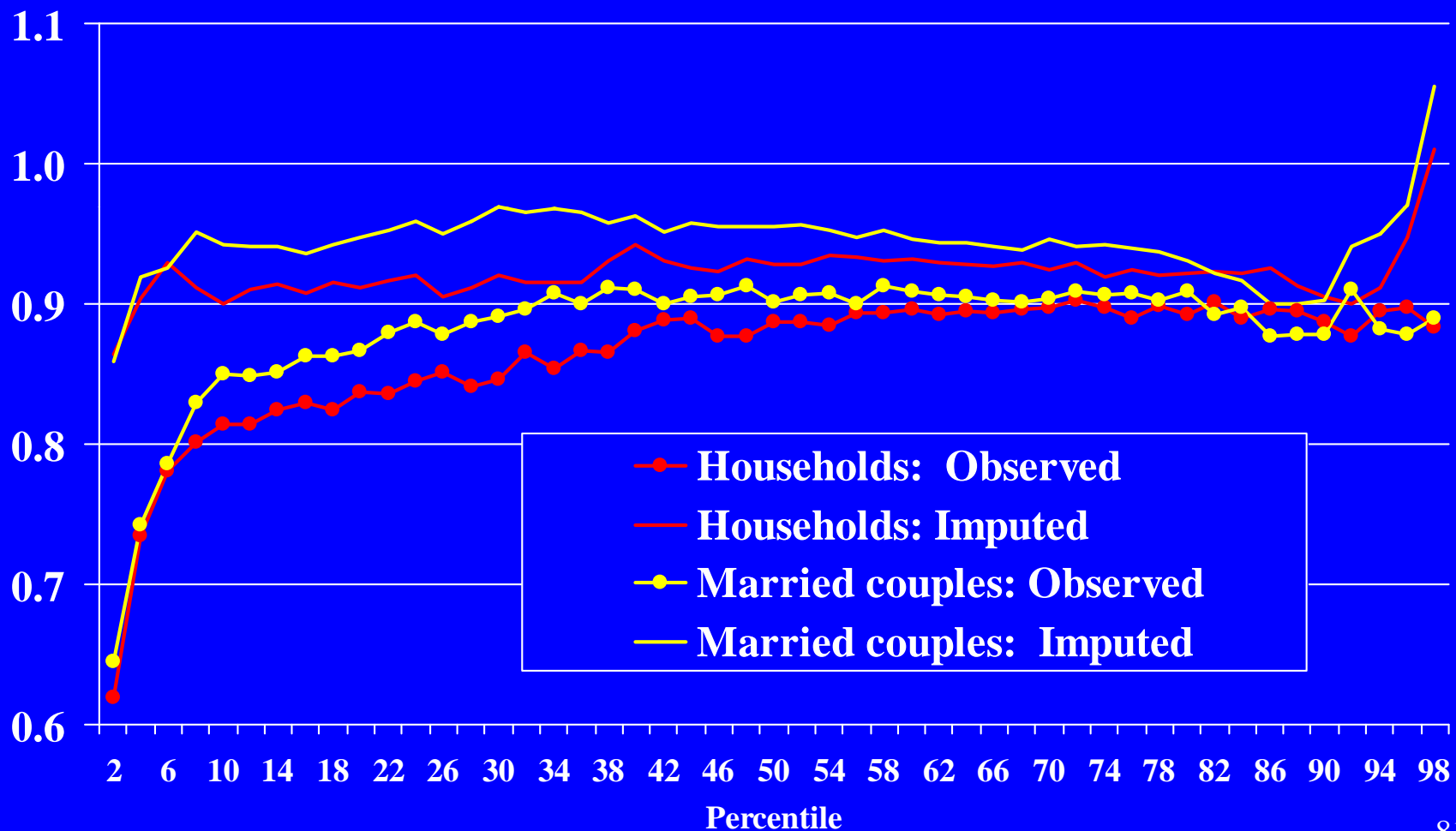


**Most of the movement is due to low-income reporters moving into higher (but not always the highest) income classes.**





# CEX/CPS ratio for total household income by percentile



# Assets and Liabilities

---

- ◆ Collection procedures
- ◆ Sources
- ◆ Reporting issues
- ◆ Data quality

## **Assets and Liabilities are collected in different interviews and sections of the survey.**

---

- ◆ Financial Assets are collected in the 5th Interview after income
- ◆ Consumer debt (other than home and vehicle) are collected in the 2nd and 5th Interview just before income
- ◆ Real property information is collected in the first interview in the home-ownership expenditure section
- ◆ Vehicle information is collected in the first quarter in the vehicle expenditure section

# Market values are collected for some items.

---

## Assets:

- ◆ Savings accounts
- ◆ Checking accounts
- ◆ U.S. Savings bonds
- ◆ Stocks, bonds, mutual funds
- ◆ Money owed to CU

## Liabilities:

- ◆ Estimated mortgage principal outstanding
- ◆ Vehicle principal
- ◆ Credit card debt
- ◆ Store Installment debt
- ◆ Other debt owed to:
  - Banks /savings and loans/credit unions, finance companies
  - Insurance companies
  - Health care providers

# Changes in values are also available for selected variables.

---

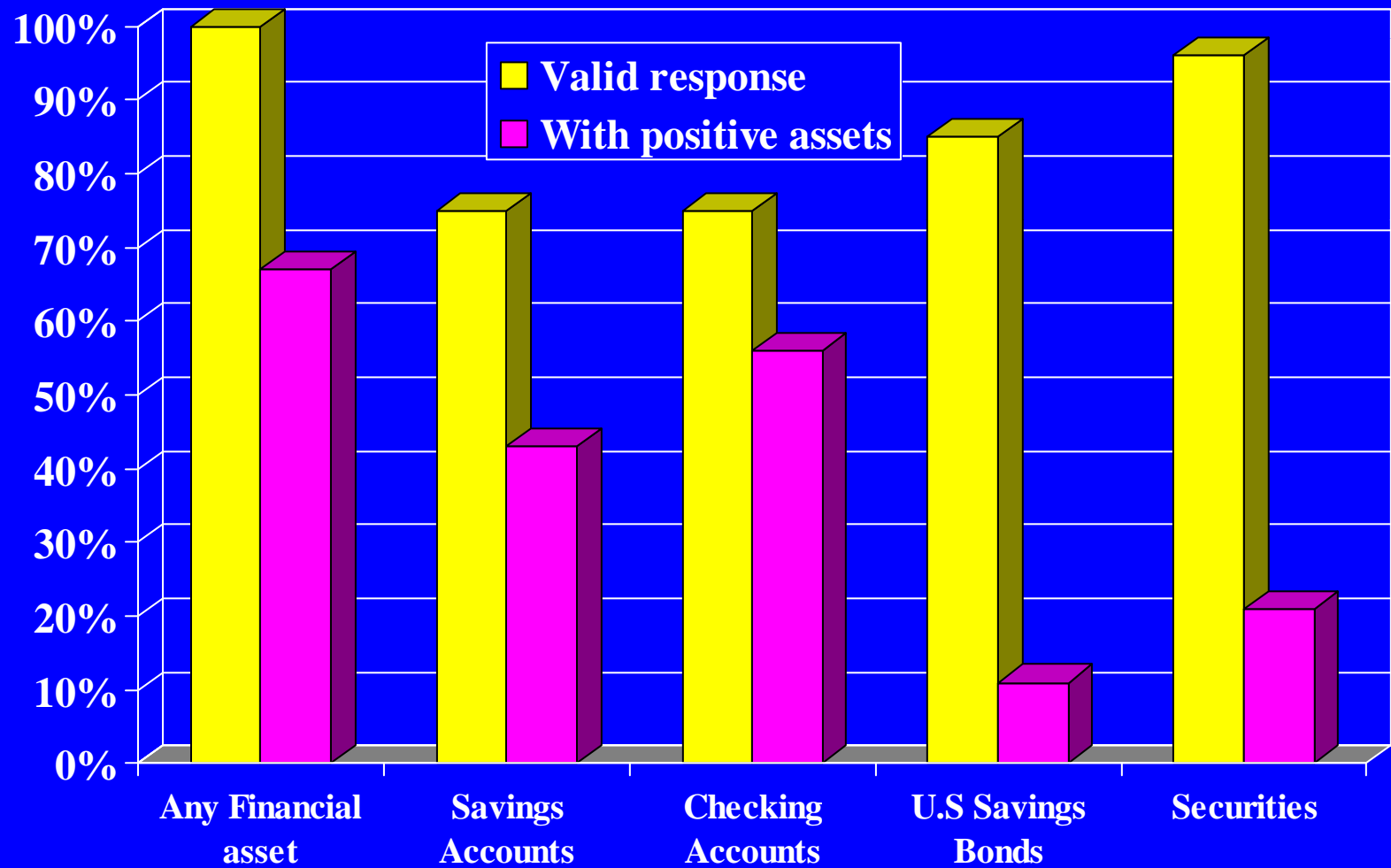
## Assets:

- ◆ Savings accounts
- ◆ Checking accounts
- ◆ U.S. savings bonds
- ◆ Securities (stocks, bonds, mutual funds)
- ◆ Money owed to CU
- ◆ Investments/withdrawals from farm/business
- ◆ Contributions/withdrawals from Pensions

## Liabilities:

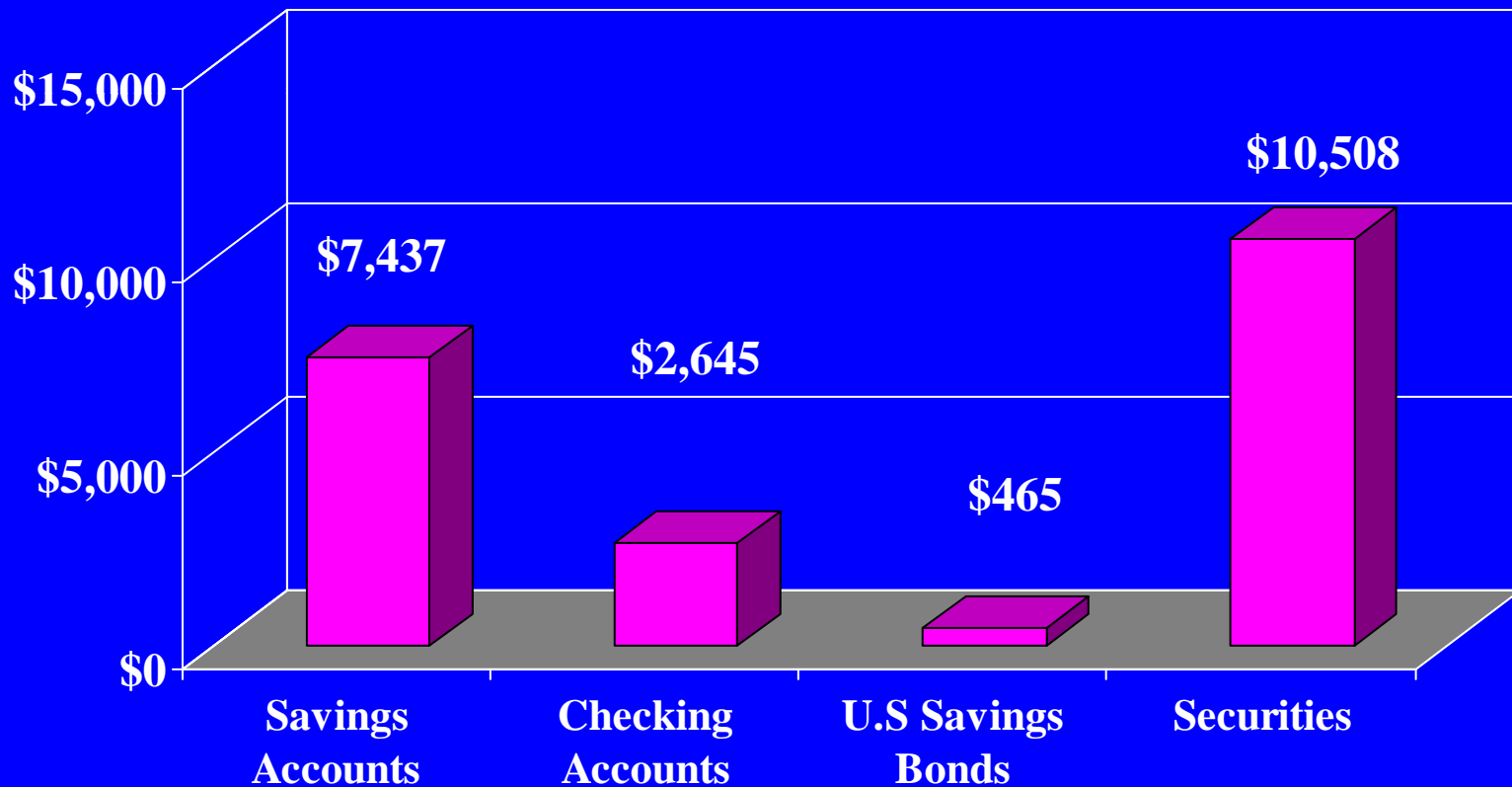
- ◆ Amount owed to other creditors
- ◆ Mortgage principal (special/lump-sum payments, regular reduction) for owned home/other properties
- ◆ Vehicle principal

# Percent Reporting for Financial Assets (All 5th Interview CUs: 1994-95)

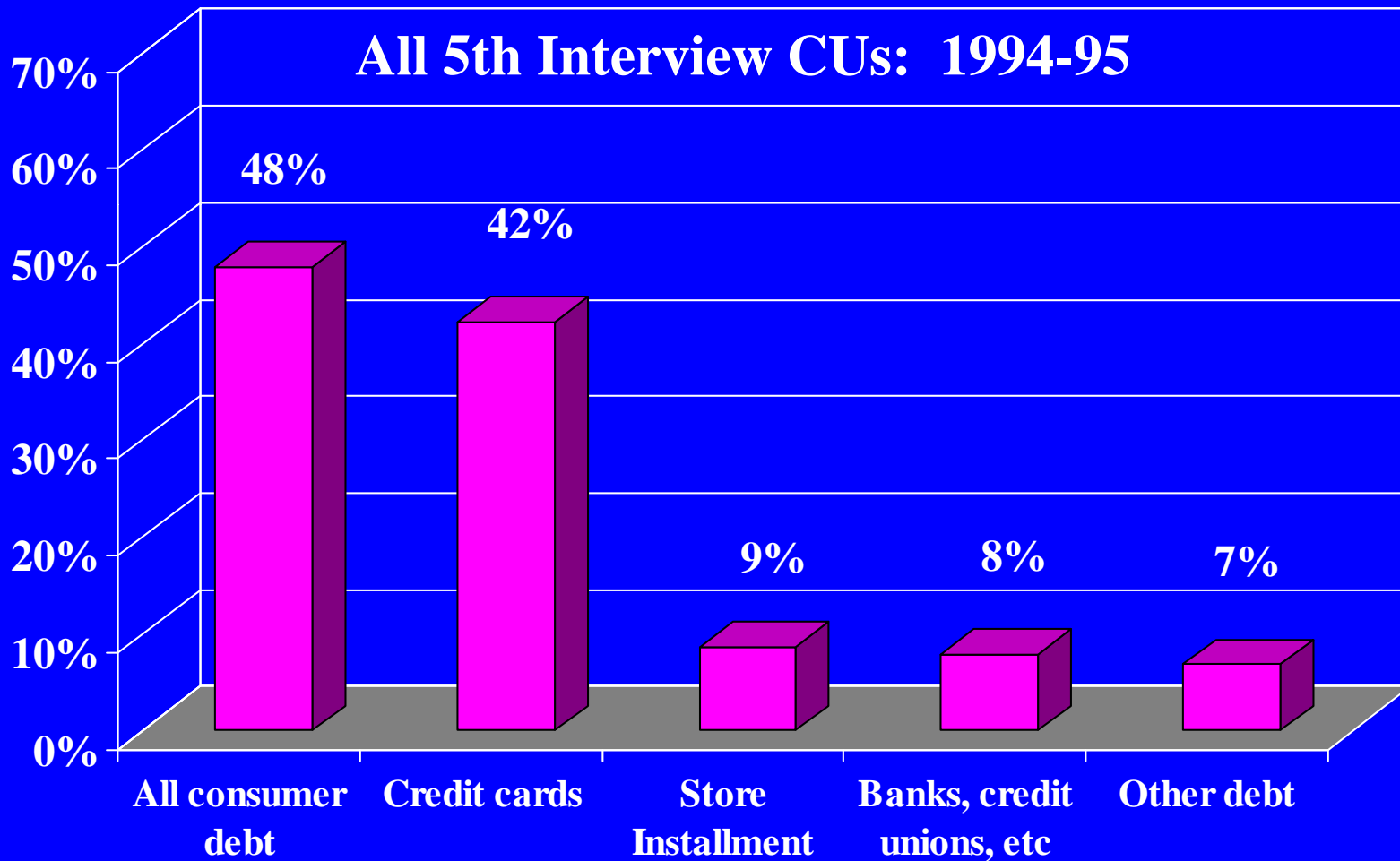


# Market value of financial securities

All 5th Interview CUs: 1994-95



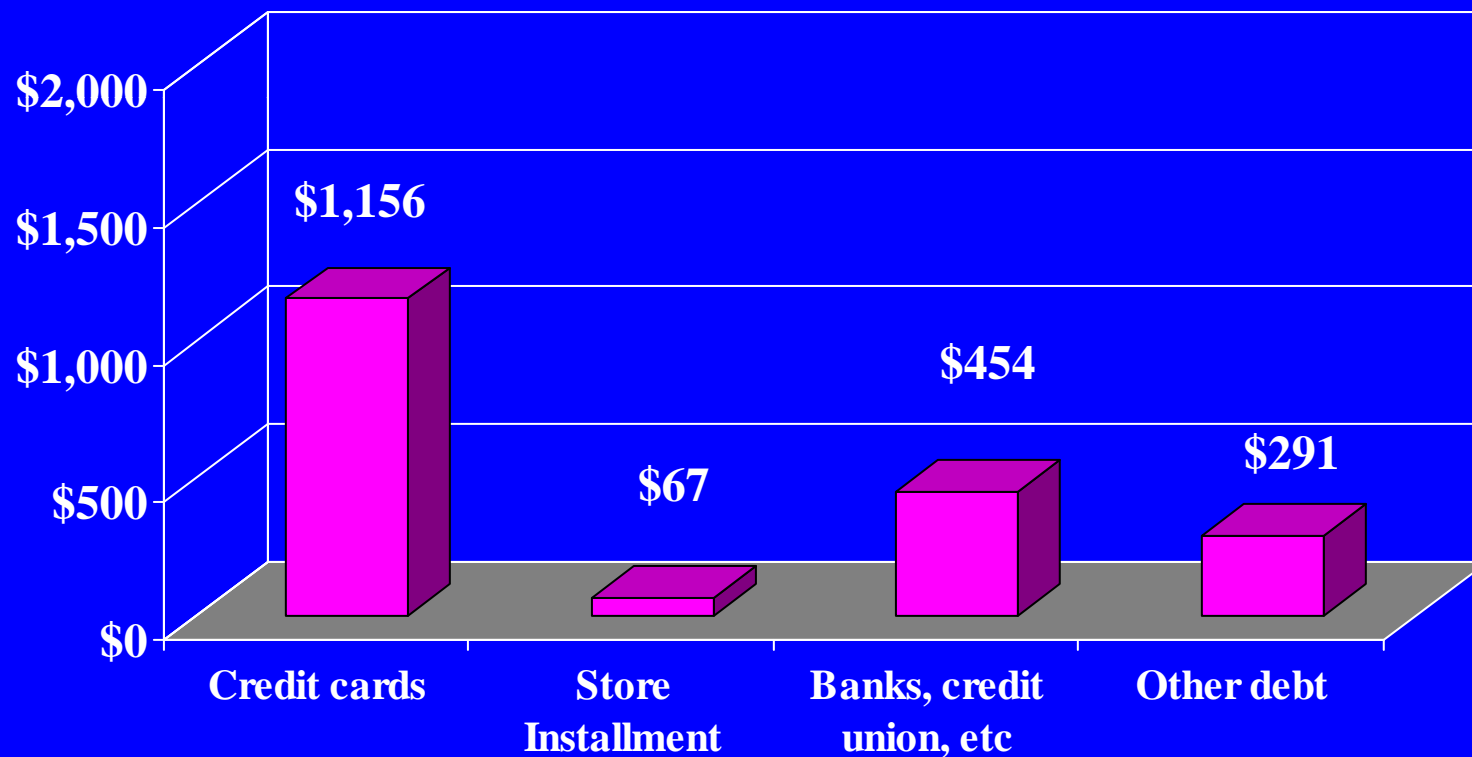
# Percent reporting values for financial liabilities





# Value of outstanding financial debt

All 5th Interview CUs: 1994-95



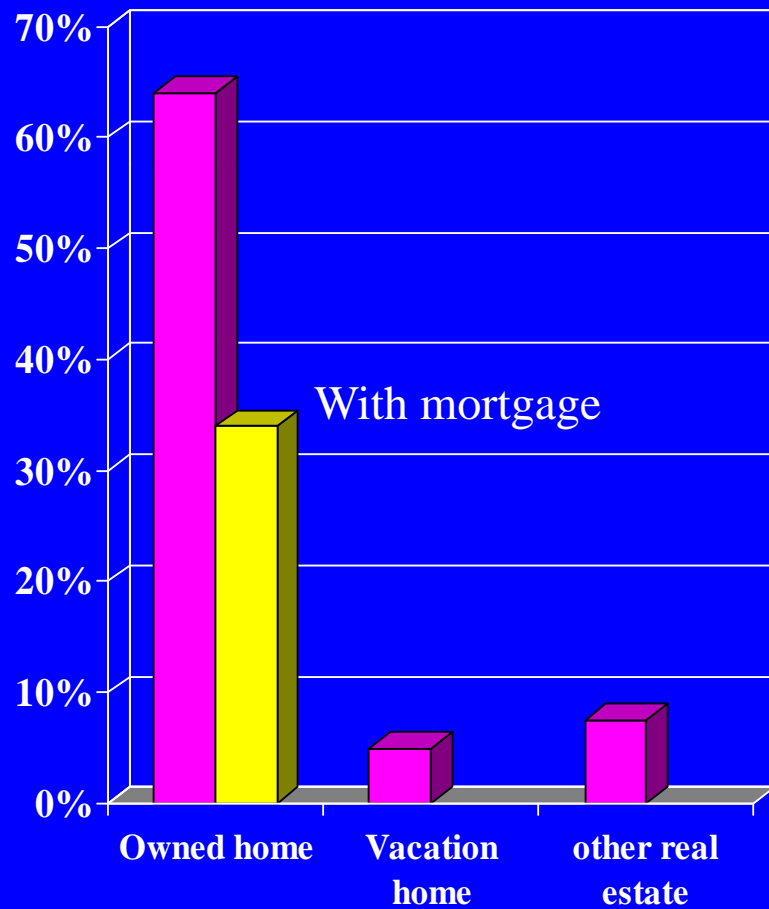
# Property assets and liabilities

---

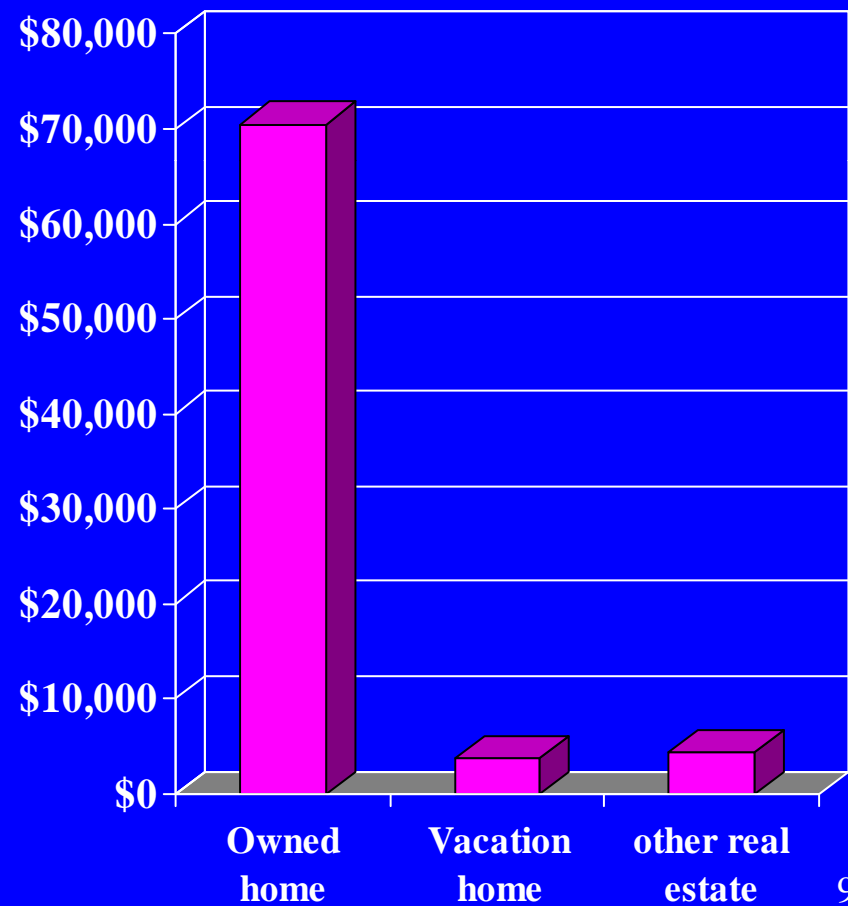
- ◆ Market value of owned home
- ◆ Market value of other property
- ◆ Mortgage
- ◆ Other property debt (home equity loans)
- ◆ Vehicles - ownership and purchase price
- ◆ Vehicle debt

# Real Property: 1995

Percent reporting



Average Market Value for all CUs



# Research Summary

---

# Recent Research

---

- ◆ How can we reduce respondent burden while improving the expenditure estimates?
  - We looked at one possible solution: reducing the number of questions for certain expenditures in the interview, replacing them with “globals”

---

◆ At the same time we looked at redesigning the diary.

- The diary could be segmented into “targeted” diaries with separate samples.
- One would be similar to our present diary -- asking for “everyday” expenditures
- Another would be asking for detailed expenditures for those areas we had earmarked for global questions in the interview

- 
- ◆ A very small field test was conducted of the two diaries.
    - Results showed that respondents were able to understand the concept of some versus all expenditures
    - But, the level of expenditures received in the diary were low

---

– We also reviewed other sections in the interview

- » Child Care
- » Business Expenses
- » Cash Contributions
- » Income



- 
- ◆ Changes with the introduction of CAPI
  - ◆ Business Expenses
  - ◆ Cash Contributions
  - ◆ Gifts

# Diary Research Project

---

- ◆ Chartered with providing:
  - Recommendations on previous Diary work
  - Recommendations on use of scanning data and technology
  - Recommendations on “User Friendly” diary research project
  - Costs associated with recommendations

# Proposed Research

---

- ◆ Request for funding in FY99
- ◆ “improve the reliability of expenditure estimates”

- 
- ◆ What is the most efficient, most accurate method for collecting expenditures and income data?

# Issues we need to consider:

---

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

# Credits

---

- ◆ Introduction and Research Summary
  - Mary E. McCarthy, DCEX Chief
- ◆ Expenditures in the CEX
  - Thesia I. Garner and William D. Passero
  - DPINR and DCEX
- ◆ Income, Assets, and Liabilities in the CEX
  - David S. Johnson and Geoffrey D. Paulin
  - DPINR and DCEX