Comparing Approaches to Value Owner-Occupied Housing Using U.S. Consumer Expenditure Survey Data

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Outline

- Introduction
  - Importance
  - Purpose of this study
  - Summary of findings
- Methods and procedures
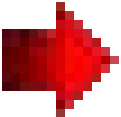- Results
- Conclusions

Introduction

- Prevalence of owner-occupied housing in U.S.
- Importance for economic well-being measurement
  - Consumption
  - Income
- Federal statistics
  - CPI
  - PCE and National Income Accounts
- Census Bureau, other agencies, and groups
  - Request for income statistics for poverty measurement
- International standard (ILO, SNA, EuroStat)

Purpose

- To explore how owner-occupied housing can be valued so that the flow of services from such housing can be captured in consumption expenditures and income
    - Hedonic regression models
        - Pooled sample of owners and renters (capitalization rate model)
        - Renter sample (renter hedonic model)
    - Reported rental equivalence (modeled)

    To compare predicted owner implicit rents
    To produce implicit net rental income

- To explore what might influence responses to the rental equivalence question in the CE

Caveats

- Preliminary results
  - *not to be quoted without permission*

- Statistical tests of differences across approaches not conducted

- Regression statistics do not reflect complex sample design of the CE although results are based on population weighting

Summary of Findings

- Implicit rents vary across geographic areas
- Implicit rents based on rental equivalence are higher than those based on
  - Hedonic regressions of renters' rents
  - Implicit capitalization rates

- Net implicit rental income
  - Highest with rental equivalence for MSA areas
  - Usually higher with cap rate model versus renter hedonic model

- Rental equivalence model with additional variables
  - Positive and statistically significant relationship
    - Out-of-pocket shelter spending
    - Education
  - Not statistically significant
    - Mortgage status
    - Age of respondent

Contribution to the Literature

- Exploratory study comparing approaches to derive implicit rents for owner-occupied housing

- First to use implicit rents from the three approaches in the production of net implicit rents that could be added to income using CE data

  (*Earlier work by Garner, Short, and Kogan (2006) was first to produce implicit rents using the three approaches*)

Valuing Owner-Occupied Housing Services

- Pooled-tenure hedonic model (renters and owners) - capitalization rate

$$Ln(price) = BX + \gamma Tenure + \varepsilon$$

- Renter hedonic model of rents

$$Ln(rent) = BX + \varepsilon$$

- Owner hedonic model of rental equivalence

$$renteq = BX + \varepsilon$$

Pooled-Tenure Hedonic Model

$$\ln(price) = BX + \gamma Tenure + \varepsilon$$

$$\ln(propertyvalue) = BX + \gamma + \varepsilon$$

$$\ln(rent) = BX + \varepsilon$$

$$\ln(rent) - \ln(propertyvalue) = -\gamma$$

Rewritten as:

$$\ln\left(\frac{rent}{propertyvalue}\right) = -\gamma$$

$$caprate = \left(\frac{rent}{propertyvalue}\right) = e^{-\gamma} * 12 * 100$$

CE Rental Equivalence

What would you say that your dwelling would rent for monthly unfurnished and without utilities?

Regressors

- Number of rooms not including baths
- Number of full baths
- Number of half baths
- Dwelling age
- *Dwelling age missing*
- Single detached home
- Mobile home
- Off-street parking
- Porch, balcony, patio
- Central AC
- Window AC
- Number of persons per room
- Median property value within PSU

- For pooled regression
  - Tenure
  - Energy utilities in rent
  - Water/trash utilities in rent

- For renter regression
  - Energy utilities in rent
  - Water/trash utilities in rent

- For rental equivalence
  - Value of property
  - Value of property squared

Net Implicit Rental Income

- Owner is a producer of housing services
- Defined as:

$$R_n = (R_g - C) + \rho V$$

$R_n =$ After tax net implicit rental income

$R_g =$ Gross implicit rent

$C =$ Operating costs net of tax preferences

$\rho =$ Expected appreciation

$V =$ Current market value

Operating Costs

- Owner-Producer pays to maintain the property, cost of financing, and depreciation
  - *Specifically*
    - Maintenance and repairs
    - Property insurance
    - Property taxes *(preferential treatment)*
    - Mortgage interest *(preferential treatment)*
    - Depreciation

Simplified Definition of Net Implicit Rental Income

- Property insurance *(0.5 * owners')*

- No adjustment for preferential treatment of
  - Property taxes
  - Mortgage interest
- No accounting for
  - Depreciation
  - Appreciation

CE Interview Data

- Collected using personal interviews *(and telephone)*
- Nationally representative of non-institutionalized consumer units (CUs)
- Sampling frame: 1990 Census with augmentation
- Collected on continuing basis since autumn 1979 with panel rotation (CUs in and out in 5 consecutive quarters)

- Introduction of CAPI 2003Q2
- Study variables - *caveat*
  - *Property value of owned home and dwelling unit characteristics*: **asked in first interview only for "today"**
  - *Rental equivalence*: **asked each quarter for "today"**
  - *Rents paid (not adjusted for business expenses)*: **asked each quarter for last three months**

CE Interview Data: Study Sample

- 2003Q2-2004Q1 (~30,000 interviews)
- Sample restrictions
  - Last interview
  - Not in student housing, government or subsidized housing
  - Renters
    - Positive rents
    - Did not receive rent as pay
  - Owners
    - Positive rental equivalence and positive property values
    - Lived in same owned property in last three months (issue for shelter expenses)
  - No imputations for dependent variables
    - Rents: 96% of unrestricted sample
    - Owners' rental equivalence: 75% of unrestricted sample
    - Owners' property value: 83% of unrestricted sample
    - Owners with both restrictions: 66% of unrestricted sample

Final Sample

n=~10,300 consumer units

70% of unrestricted sample

➢42% renters (31%)

➢58% owners (69%)

Results

- Analysis conducted at region-MSA status level
  - Pooled regression for capitalization rate hedonic

- Analysis conducted at region level with results shown at region-MSA status level
  - Renter hedonic
  - Reported rental equivalence hedonic

- All results are population weighted

- Present results for regional central cities
  - Derived capitalization rates
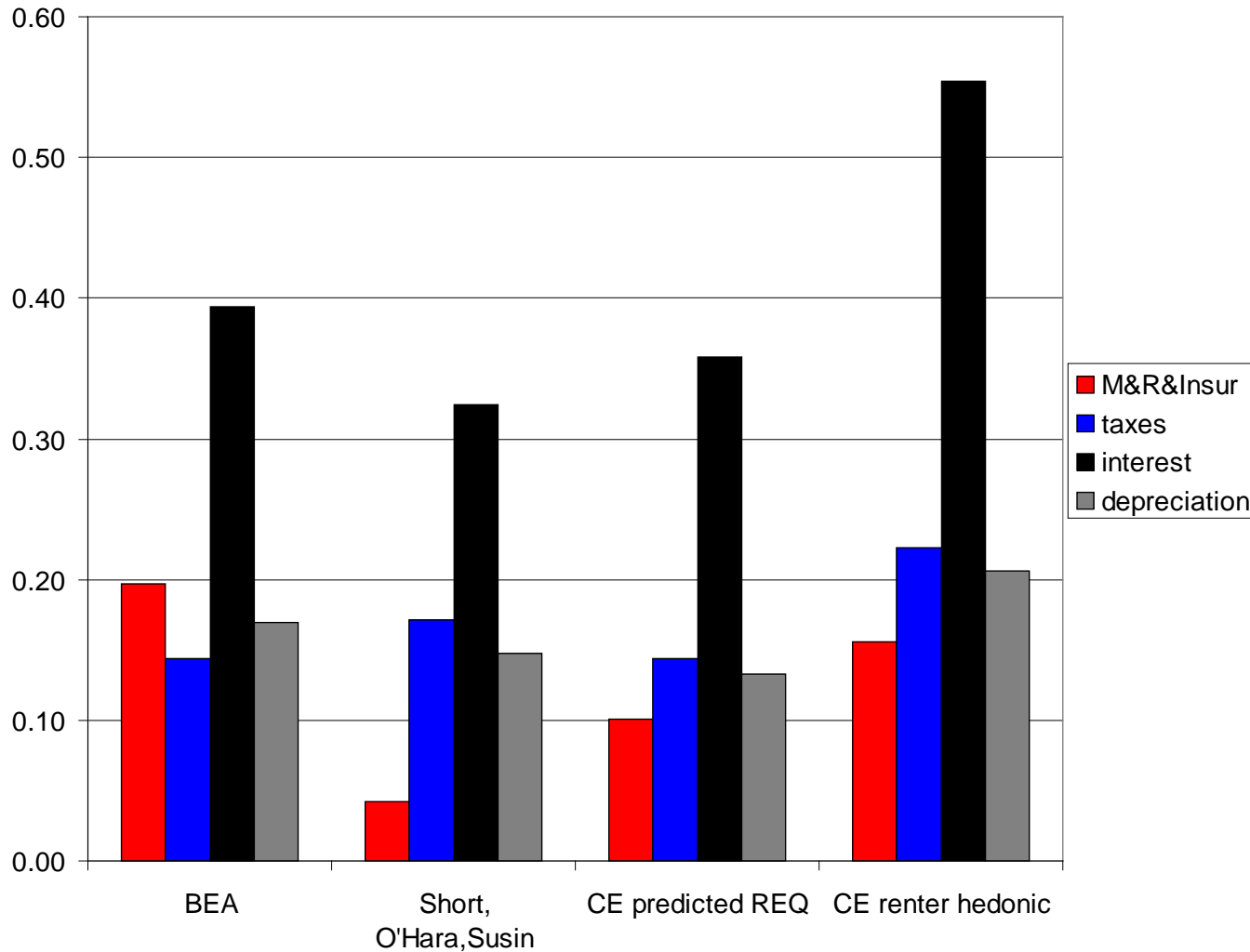 - Predicted implicit rents
  - Net implicit rental incomes

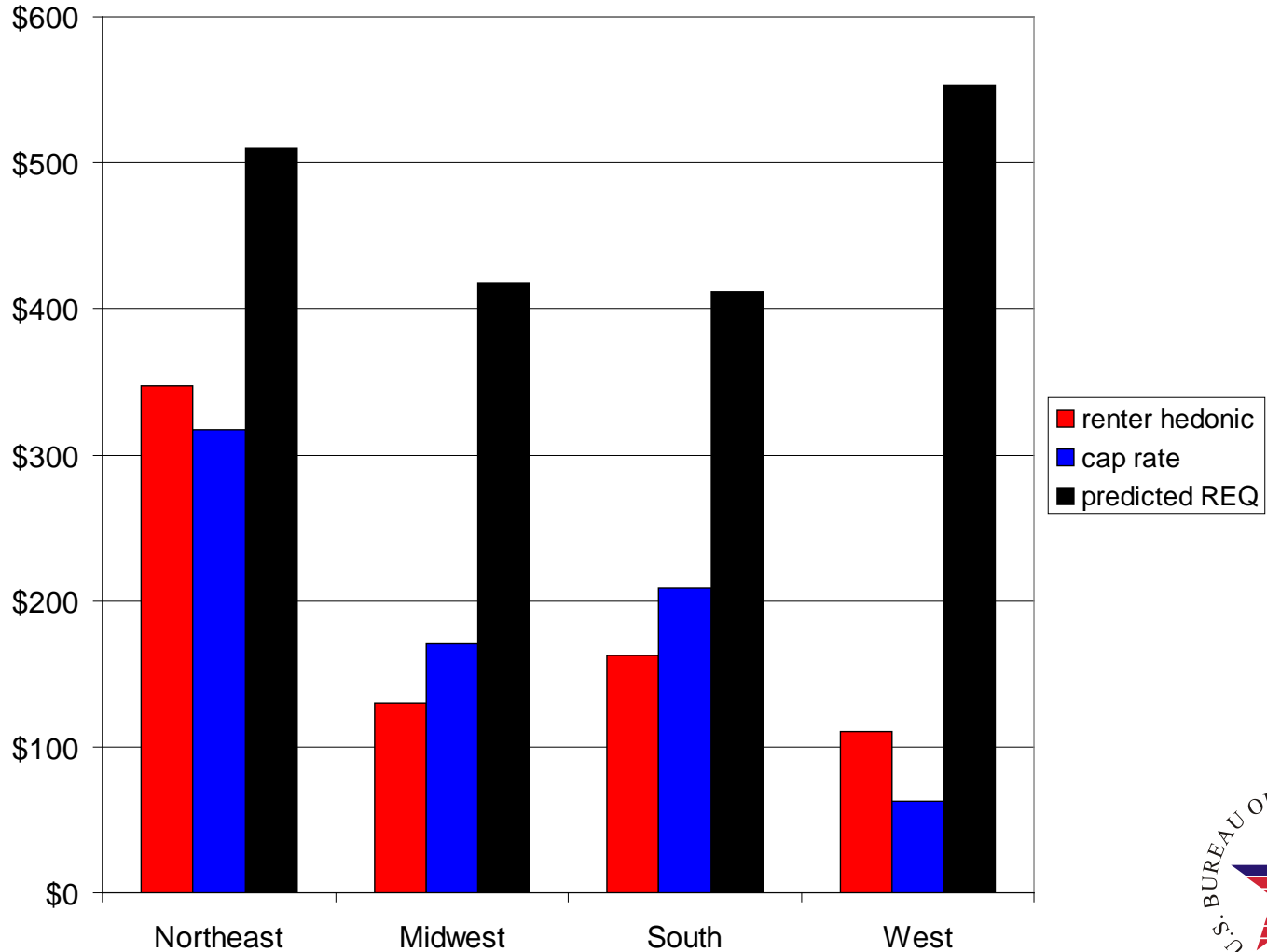# Capitalization Rates for Central City 2003: CE and AHS
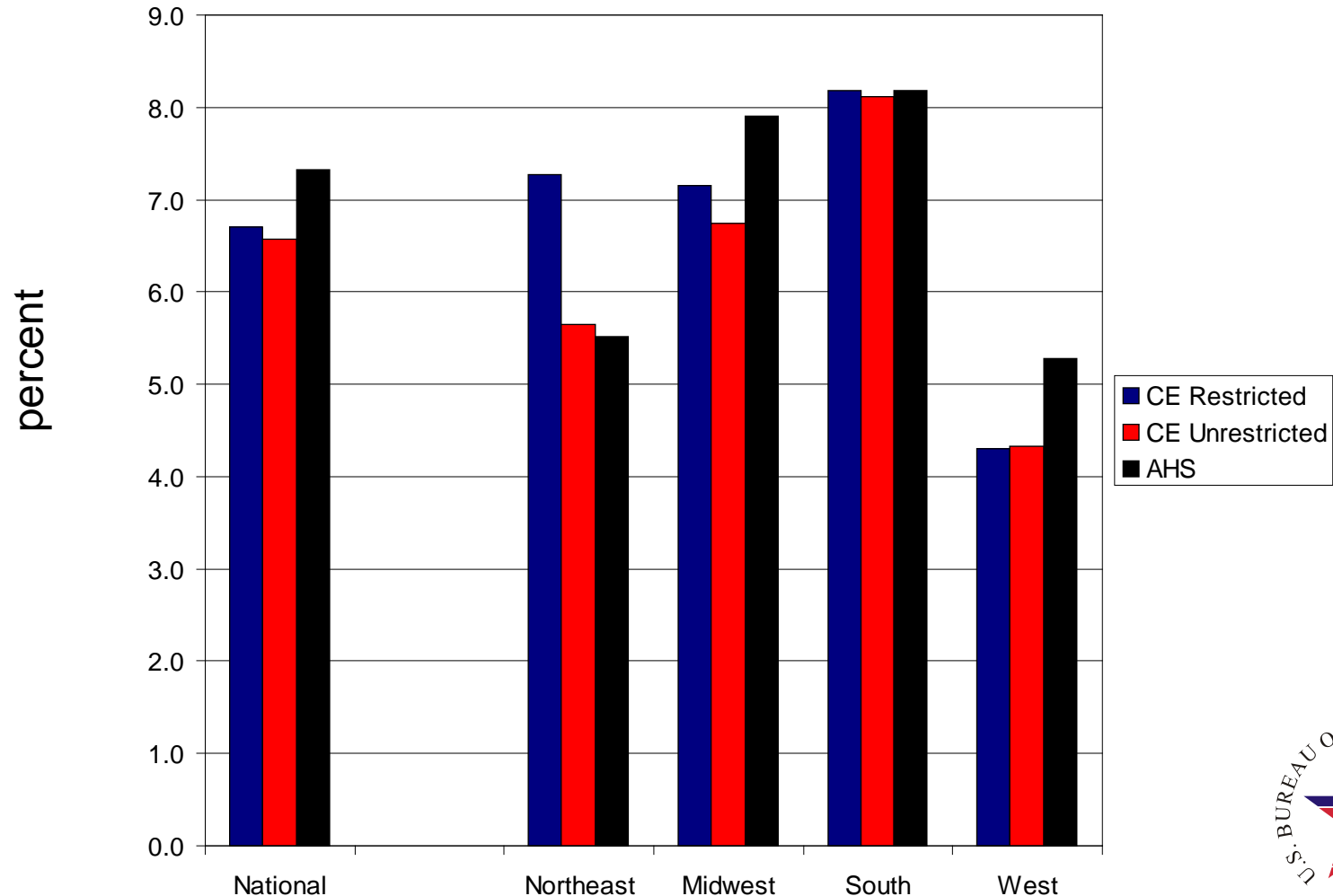
Median Monthly Owners' Implicit Rents and Expenditures: 2003
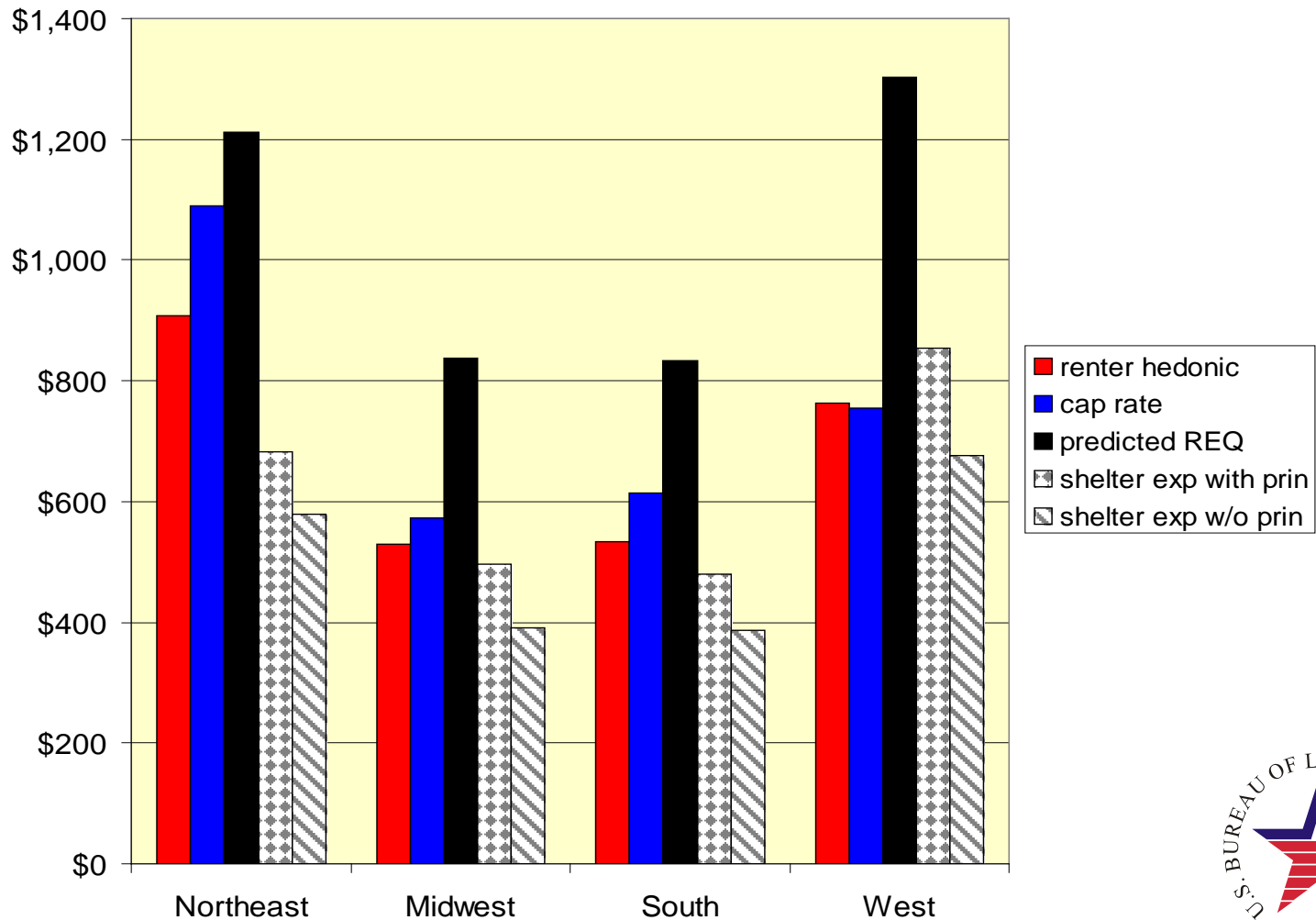
Average Operating Costs as Shares of Owners' Implicit Rents: 2003

Median Monthly
Owners' Net Implicit Rent: 2003

Rental Equivalence: Additional Information

- Log linear model with demographics and other variables fits the data better

- Positive and statistically significant coefficients
  - Quarterly spending on shelter
  - Higher education

- Did not add to the explanatory power of the model
  - Age of respondent
  - Whether the CU had a mortgage or not

Conclusions

- Location, location, location
  - Owner imputed rents are different across geographic areas
  - Importance of housing unit characteristics varies across areas

- Rental equivalence results in highest implicit rents

- Net implicit rental income can be derived from CE but more work is needed to produce a more complete measure

- Data issue: using imputed versus not imputed rents, rental equivalence, and property values from the CE has an impact on the results

- Further research is needed to identify reasons why rental equivalence is always higher than imputed rents based on the other two approaches
  - Housing unit quality and neighborhood quality
  - Role of the presence of renters in a geographic area (i.e., renter intensity)

- *Caution* should be followed before one approach is selected over another to produce measures of consumption and income that account for the value of owner-occupied housing in the U.S.

- Much more work needs to be done … *we have only just begun*

Shelter Expenditures

- Associated with producing housing services – operating costs
  - Mortgage interest
  - Property taxes
  - Property insurance
  - Maintenance and repairs
- All owner shelter expenditures (including mortgage repayments, equity loans and lines of credit)