



Reconciling User Costs and Rental Equivalence: Evidence from the US Consumer Expenditure Survey

Thesia I. Garner and Randal Verbrugge

Bureau of Labor Statistics, U.S. Department of Labor

ASSA 2009 Annual Meetings, San Francisco

January 4, 2009

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- What is the value of the service flow of owner-occupied housing?
 - Standard Jorgensonian capital theory
 - Durable good's rental cost = *ex ante* user cost thus alternative measures of the service flow value should be roughly equivalent
 - But...Verbrugge (2008a)-housing rents far less volatile than *ex ante* user costs, diverge markedly for extended periods of time
 - Use of indexes, not compare like with like



- Compare rents and user cost
 - At micro level
 - And aggregate levels
- Study factors related to reported rental equivalence
 - Provide clues towards understanding how rents relate to user costs
 - Provide clues regarding factors considered by consumers in answering reported rental equivalence questions

User Costs and Rents in This Study



- Relationship between user costs and rents
 - At the *individual unit level*
 - Reported rental equivalence
 - House value
 - Most components of unit-level user costs
 - Maintenance and repairs
 - Mortgage information
 - Income and family characteristics
 - Expected appreciation in house value
 - Model forecasts
 - Ad hoc measure of price inflation

- One of first studies to use micro data to study this relationship
 - Other, earlier investigations of how rents respond to use cost estimates
 - DiPasquale and Wheaton (1992)
 - Follain, Leavens and Velz (1993)
 - Blackley and Follain (1996)
 - Green and Malpezzi (2003)
 - Tian (2008)

Rental Equivalence in This Study



- Factors expected to be related to reported rental equivalence
 - Costs
 - Expected appreciation
 - Housing unit characteristics
 - Rooms
 - Type of housing (e.g., detached, townhouse or -plex, mobile home)
 - Age of dwelling
 - Geography
 - Vacancy rate
 - Neighborhood characteristics
 - Education

- One of first studies to use micro data to examine this relationship
 - Other, earlier investigations
 - Garner and Short (2008)
 - Frick, Grabka, Smeeding and Tsakloglou (2008)

Data-Consumer Expenditure Interview Survey



- Collected between 2004 quarter one through 2007 quarter one
- Each consumer unit interviewed 5 consecutive quarters; we use only 2nd interview
 - Current market value asked in first and carried forward
 - “About how much do you think this property would sell for on today’s market?”
 - Current monthly rental equivalence asked each quarter
 - “If someone were to rent your home today, how much do you think it would rent for monthly, unfurnished and without utilities?”
 - Annual property taxes asked each quarter
 - Maintenance and repair, mortgage information asked for previous to interview quarter
 - Annual Income for previous 12 months (collected in second and fifth interviews only)

Data-Consumer Expenditure Interview Survey



- Restrictions
 - 28 largest primary sampling units (self-representing samples)
 - No condos or coops
 - No vacation homes
 - No imputed market value or rental equivalence data
 - No costs paid for by government
 - Home value properties in excess of \$950,000
 - Rent to value ratios greater than 2 standard deviations
 - No “other” family type consumer units (does include singles, single parents, husband-wife couples, husband-wife couples with children)

- Sample size: approximately 5,181 interviews



- Freddie Mac Conventional Mortgage Home Price Indexes (CMHPI)
 - Weighted repeat-sales
 - For appreciation forecasts
- IRS income tax tables for 2003-2006

User Cost with Tax Preference



$$uc_t = P_t^h (i_t (1 - \tau_t^{Fed}) + \tau_t^{prop} (1 - \tau_t^{Fed}) + \gamma_t - E\pi_t^h)$$

P_t^h = price (market value) of owned house

i_t = a nominal mortgage interest rate

τ_t^{Fed} = federal marginal income tax rate

τ_t^{prop} = property tax rate

γ_t = sum of depreciation, maintenance and repairs, insurance

$E\pi_t^h$ = expected annual appreciation rate of house at time t

Standard theory leading to equation and to its equality with rent is derived from a frictionless model in which continuous asset rebalancing occurs



- Home price appreciation is...
 - Quite persistent
 - Forecastable component
 - Market participants are aware of this and expected to consider this in decision-making
 - Variable across time and cities
 - Has enormous impact on user costs and divergence from rents
 - No agreed upon model of house-price dynamics, so more conservative to take statistical view of expectations

Alternative Measures of Expected Appreciation



- $uc\{1\}$: Forecast over the next year
- $uc\{4\}$: Annualized forecast of expected appreciation over 4 years
- $uc\{pi\}$: Current inflation
 - Zero real capital gains even in short run
- $OOP_j = (mort.int._j)(1 - \tau_j^{Fed}) + (prop.tax)(1 - \tau_j^{Fed}) + (m \& r_j) + (ins._j)$

Out-of-pocket costs

- Expected appreciation is zero
- Expected real capital gains are negative
- Opportunity cost of equity in home is zero
- Depreciation of housing stock is zero

Fig. 1. Reported Rental Equivalence by Home Value

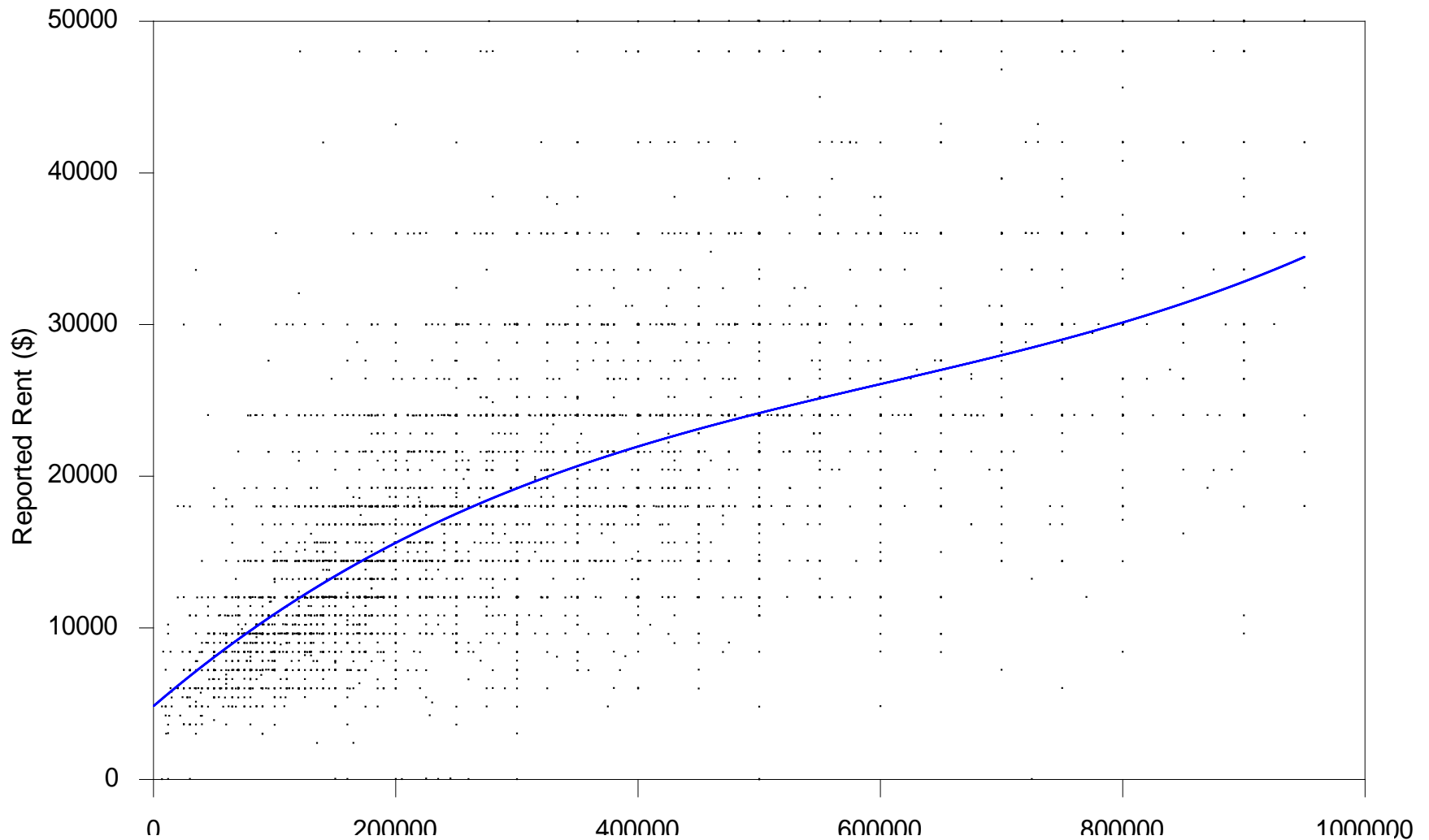


Fig. 2. User Costs with Annual Forecast

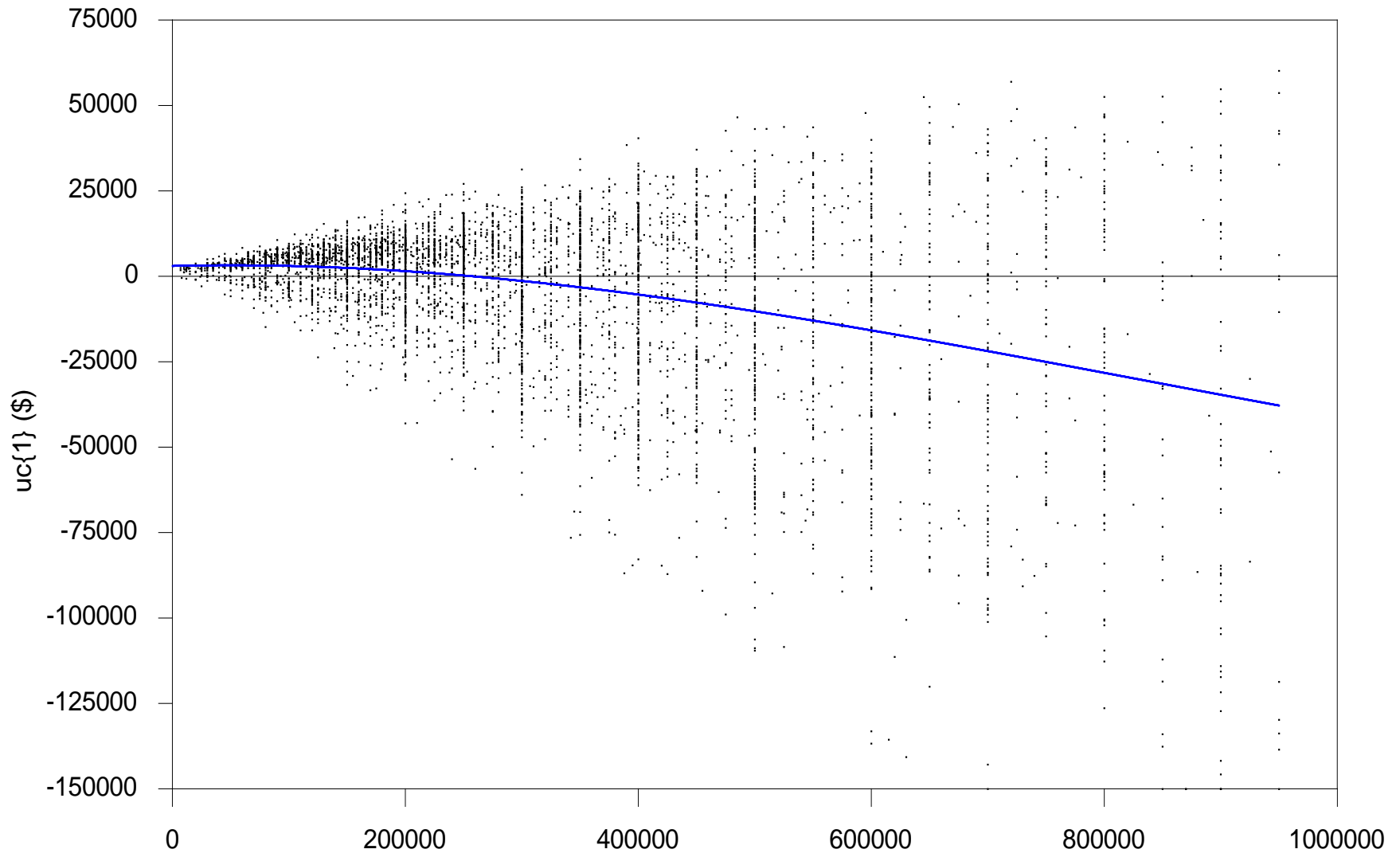


Fig. 3. User Costs with Annualized 4-yr. Forecast

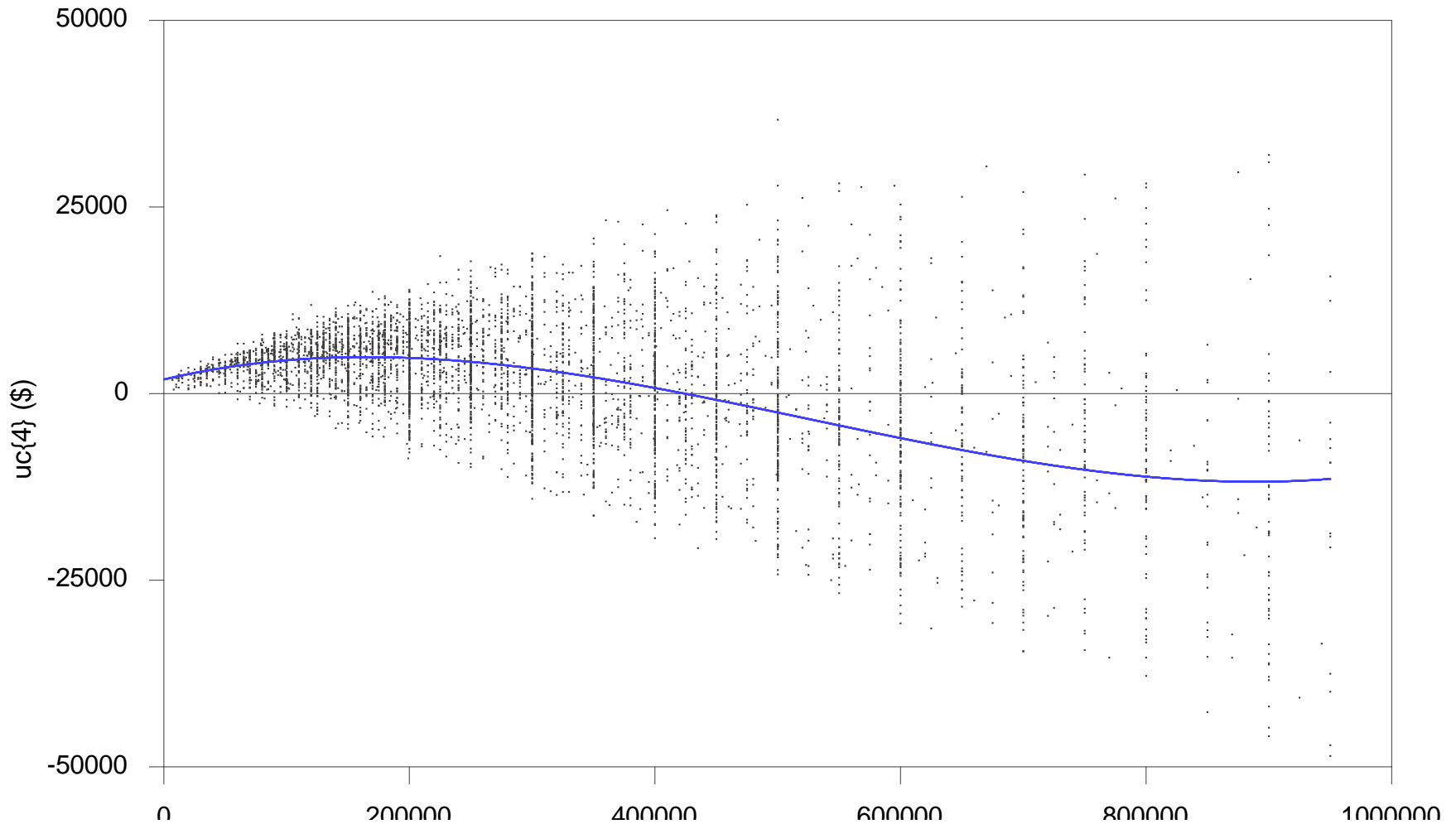


Fig. 4. User Costs with Inflation as Forecast

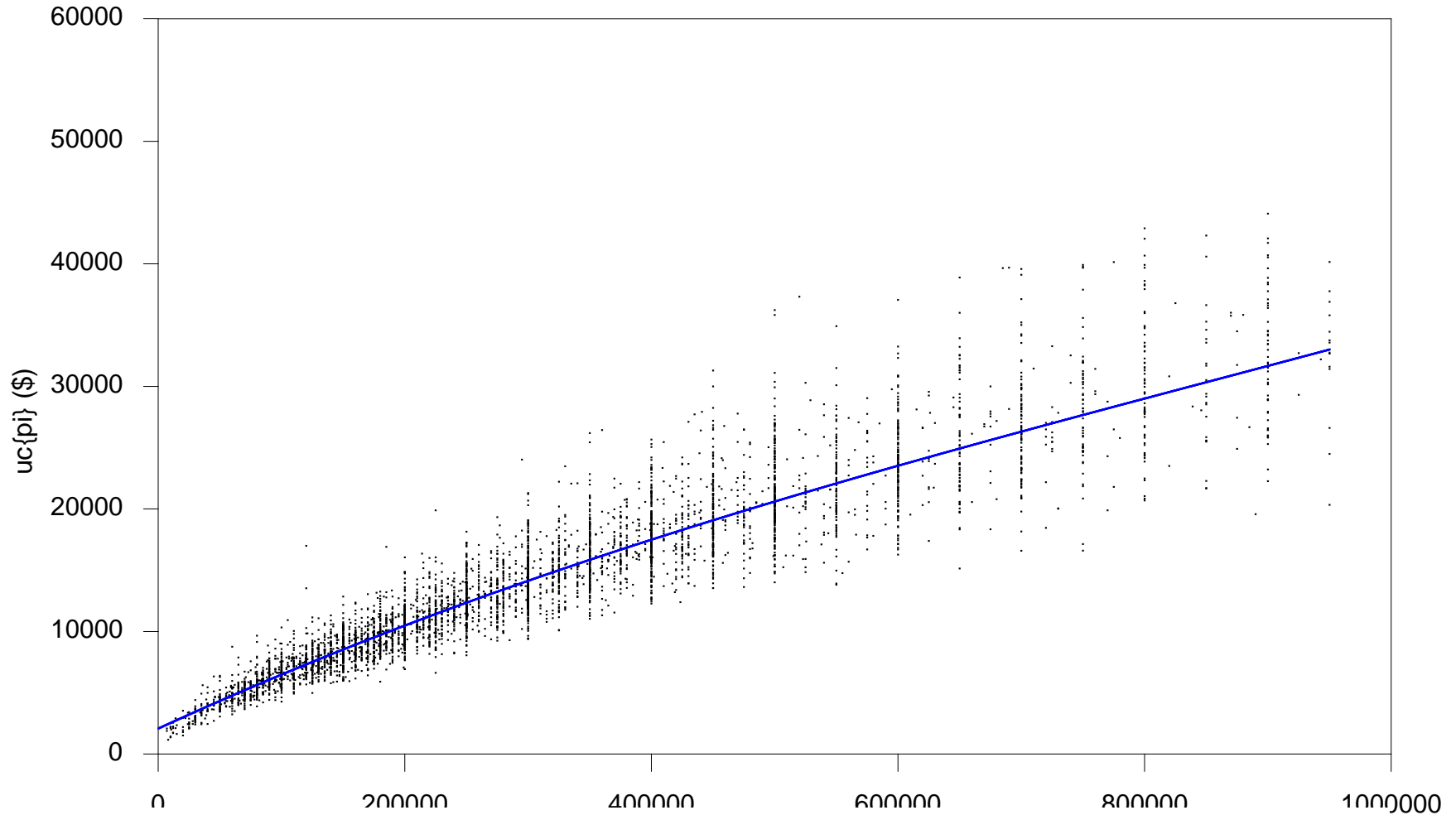
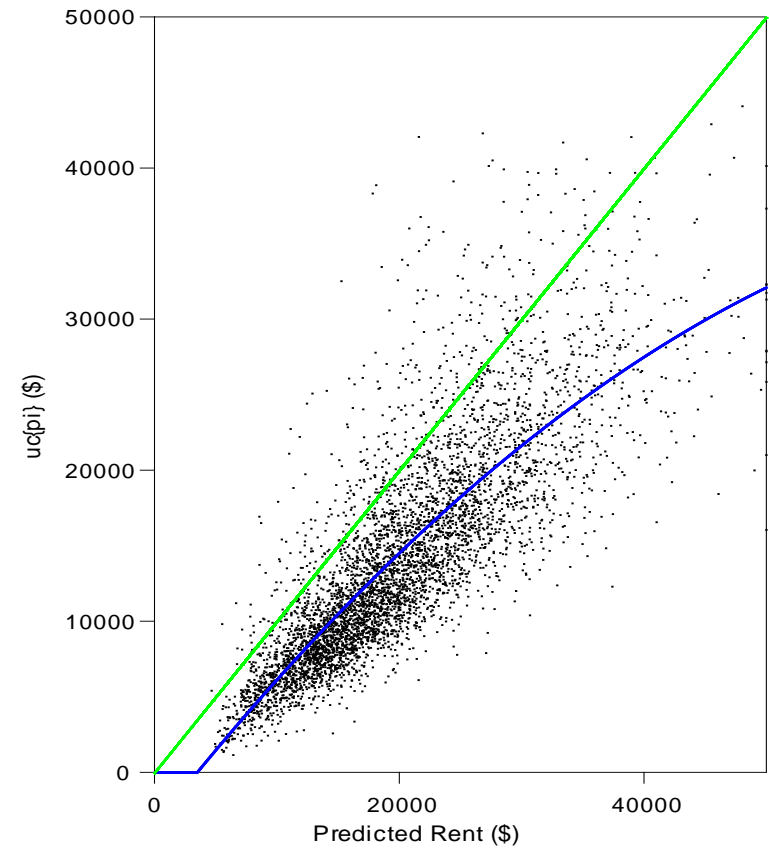
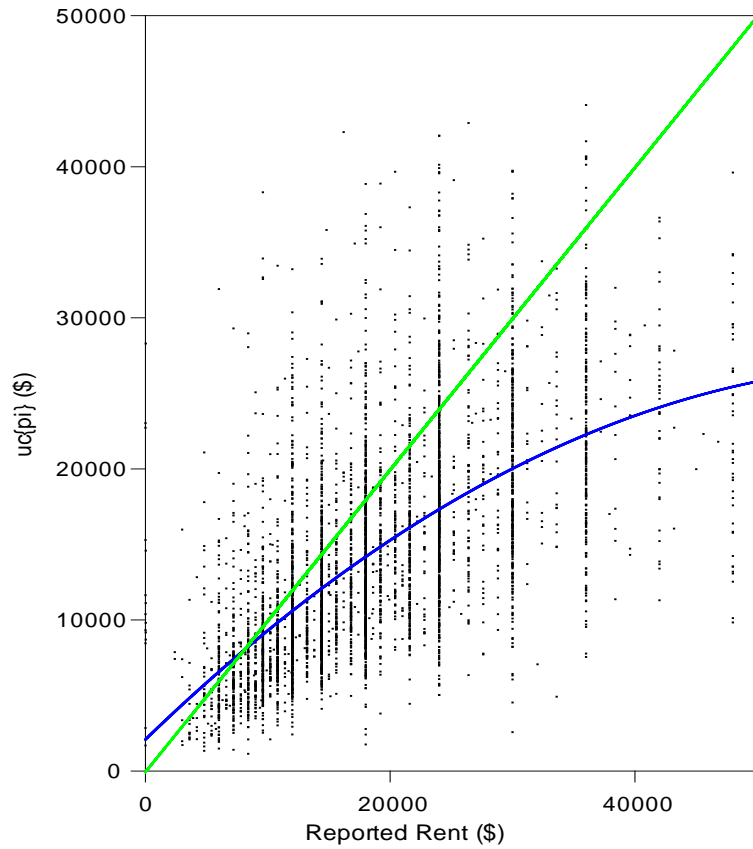


Fig. 5. User Costs with Inflation as Forecast



45 degree line represents user costs = rents

Fig. 6. Best-fit Curves of Cost Measures Against Home Value

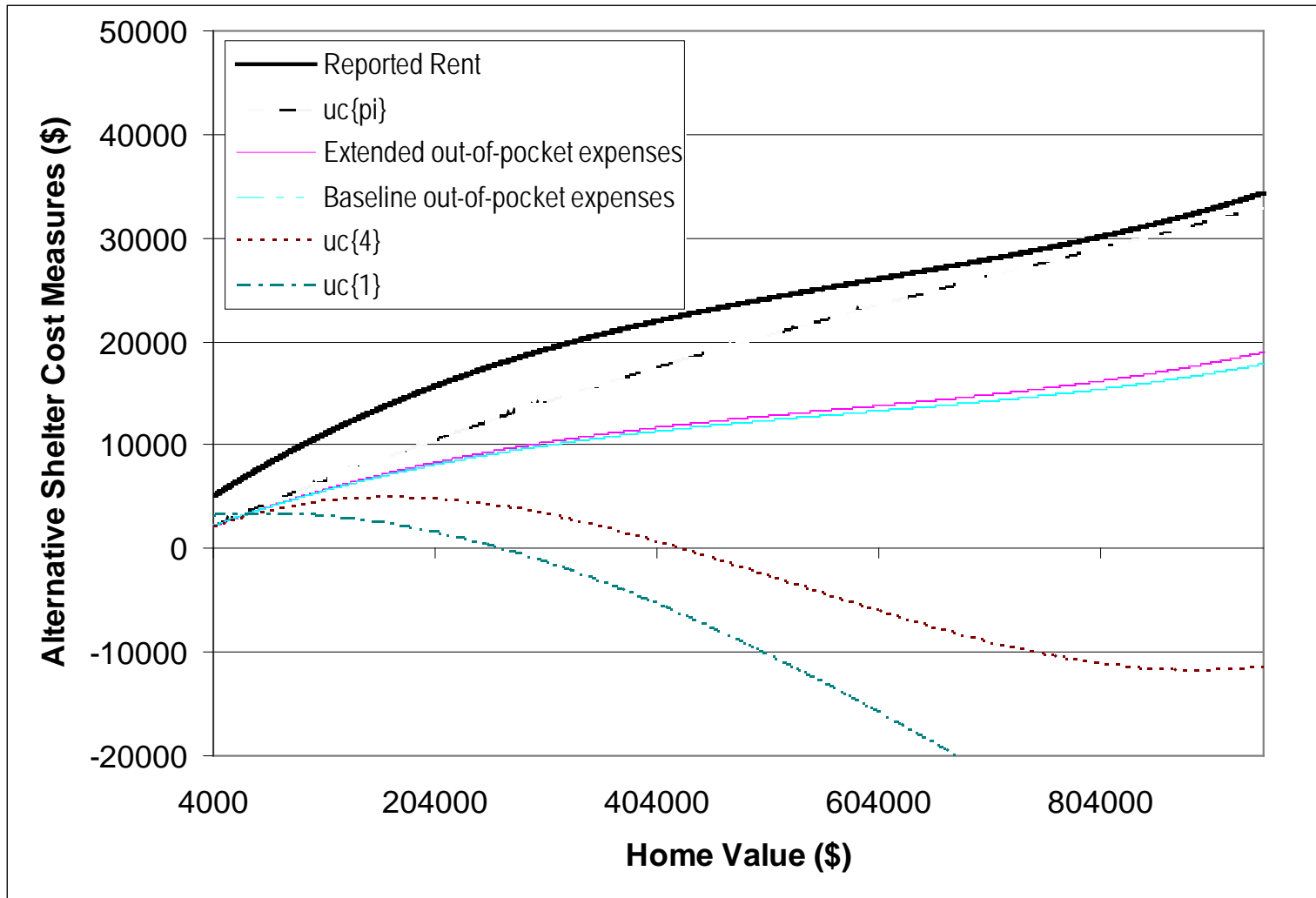


Fig. 7. Alternative Shelter Cost Measures Over Time, National

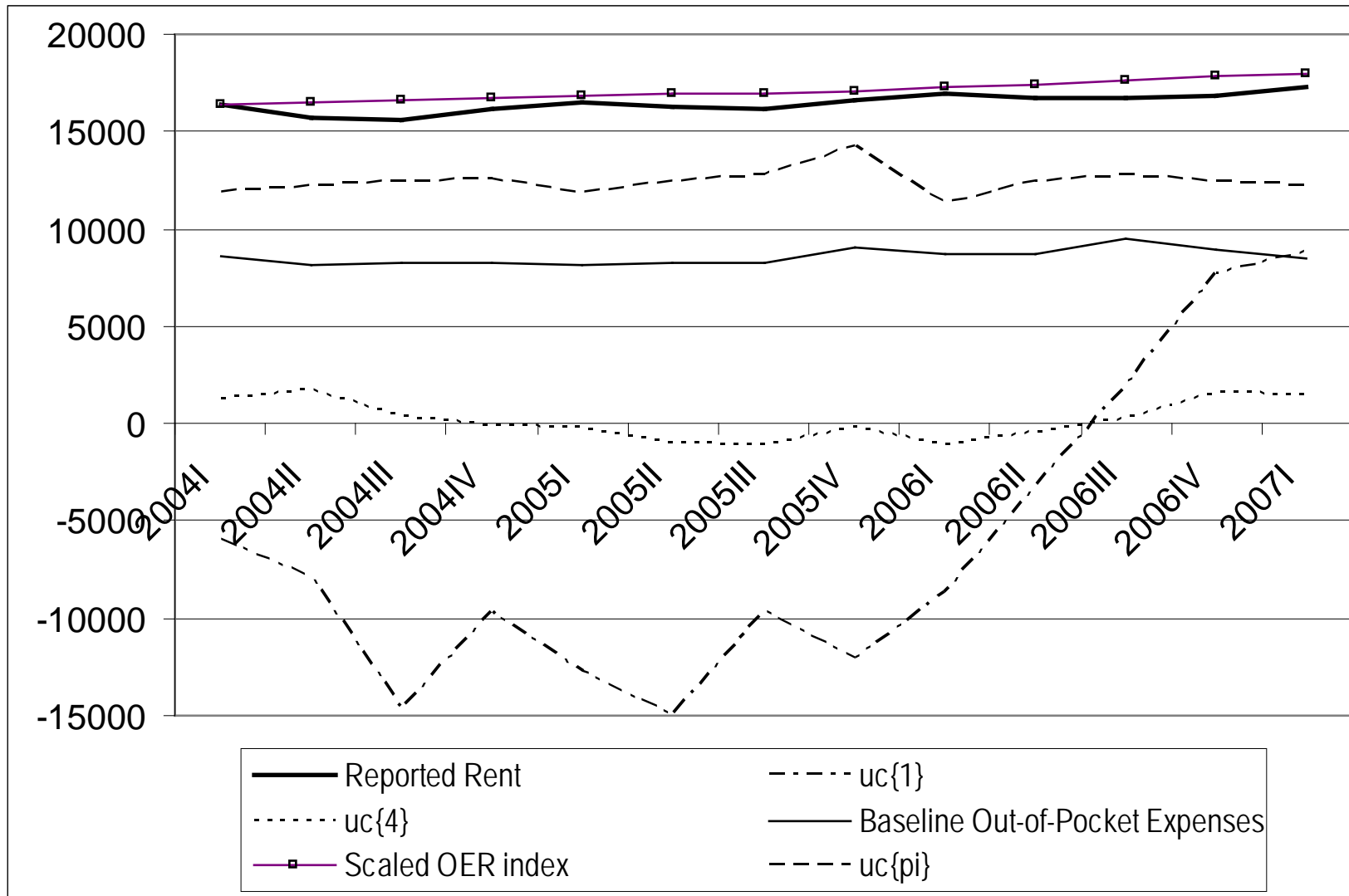


Fig. 8. Alternative Shelter Cost Measures Over Time, Chicago

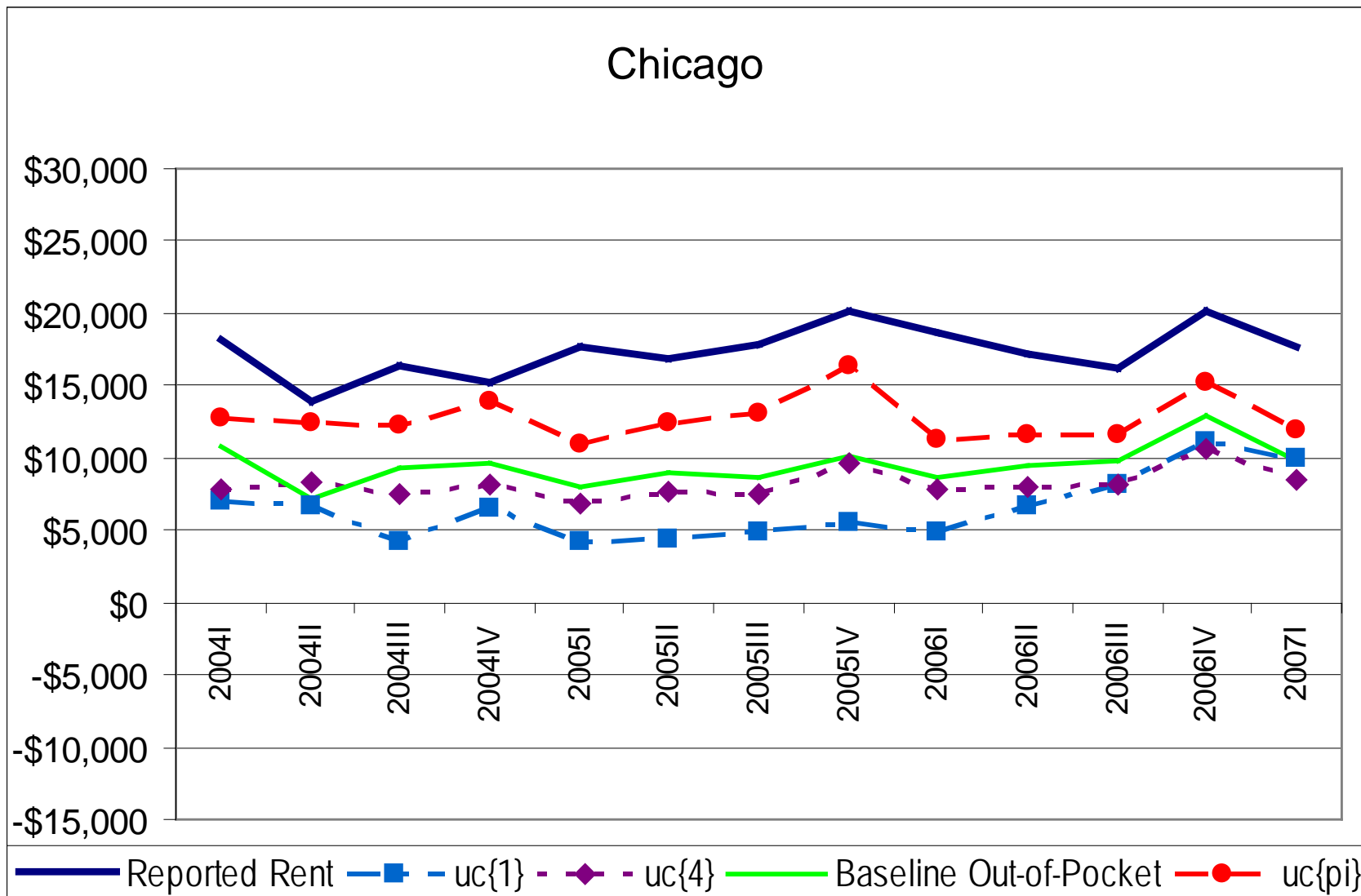


Fig. 9. Alternative Shelter Cost Measures Over Time, Houston

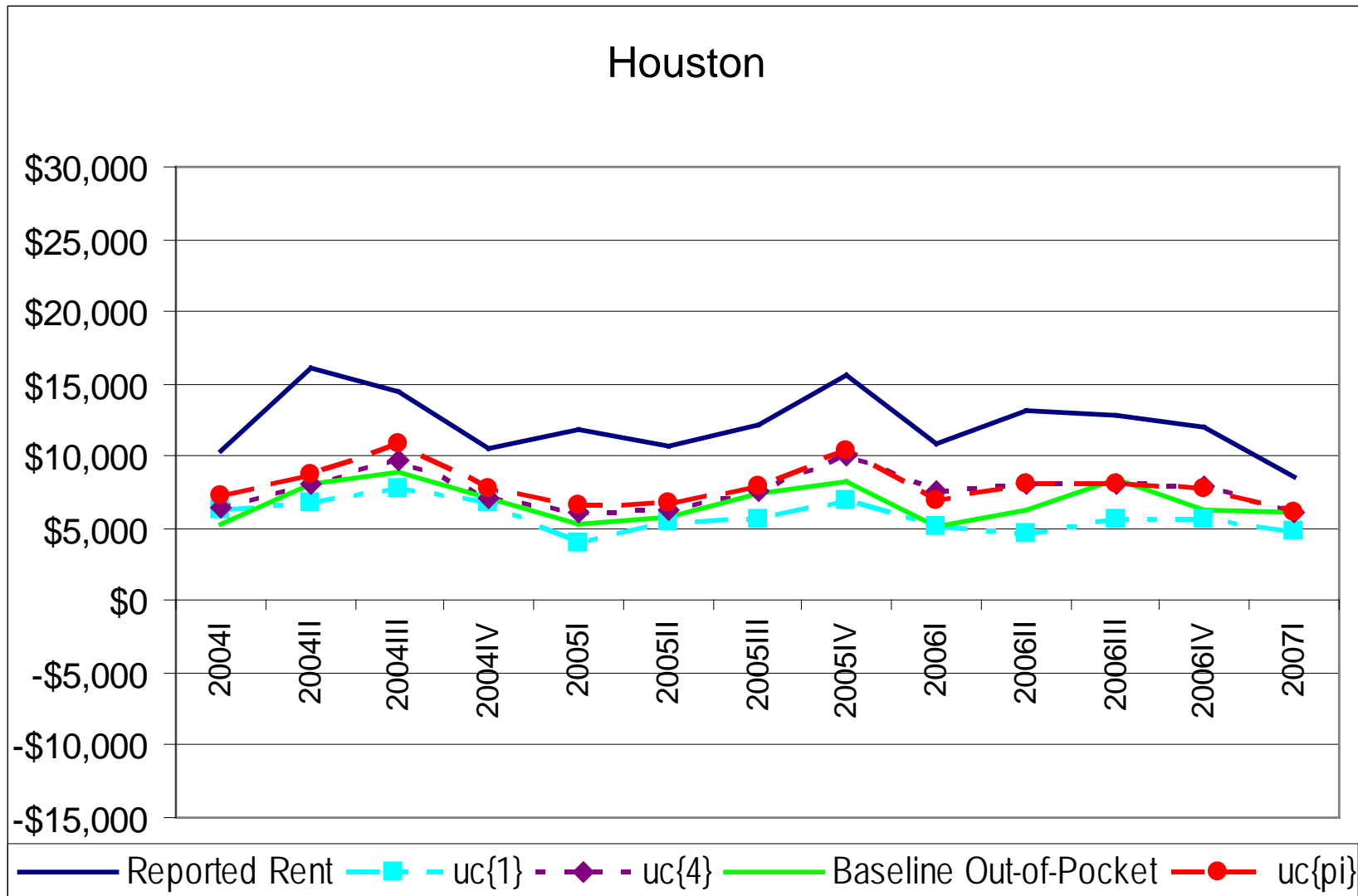
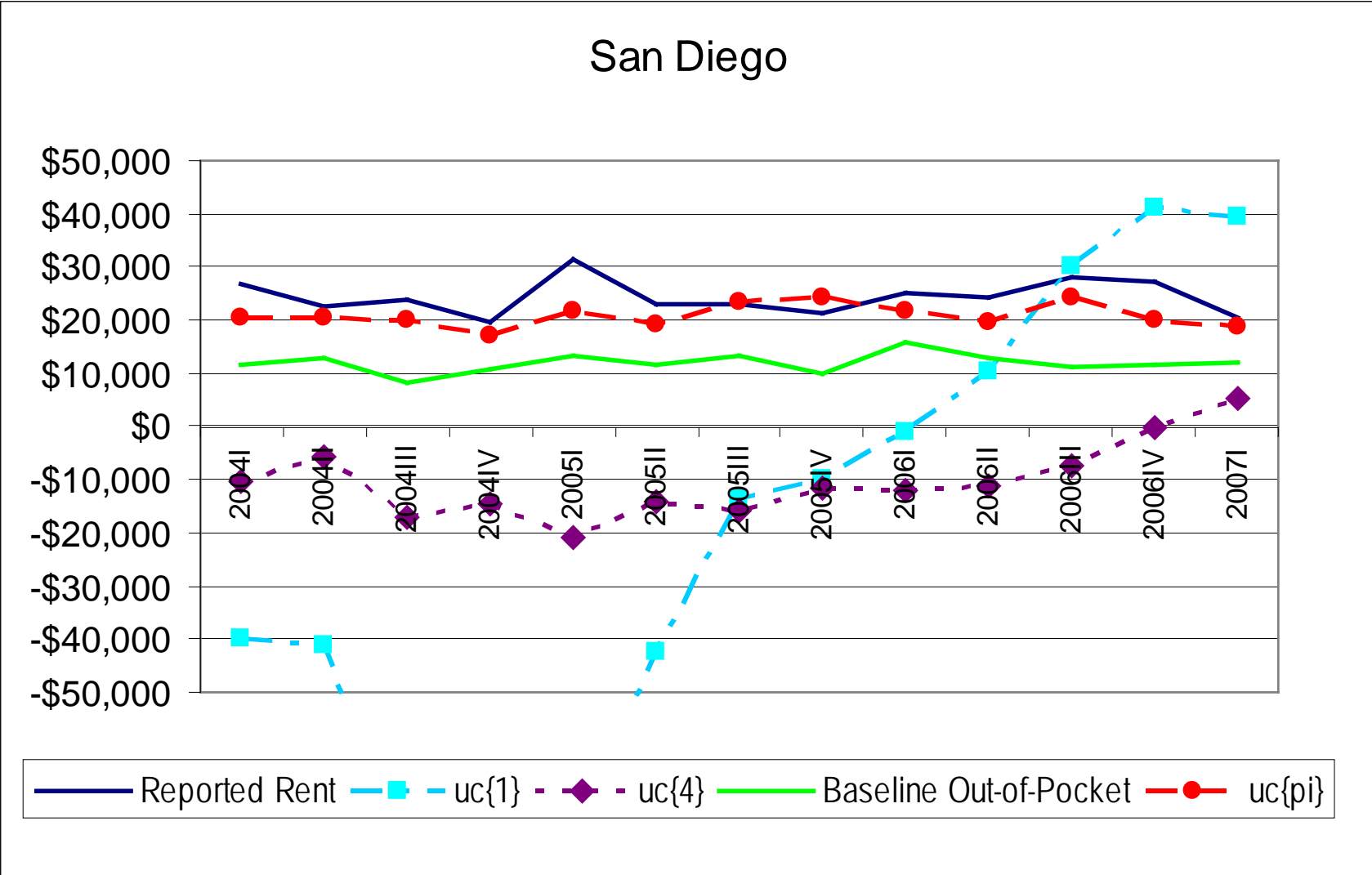


Fig. 10. Alternative Shelter Cost Measures Over Time, San Diego



Findings Summarized: User Costs and Rents



- Cross-sectional dispersion of rents and user costs surprisingly large over 2004:I - 2007:I period
- Expected user costs well below rents
 - Mainly driven by expectations of real appreciation (in SR often negative)
- Expected concavity in rent/value relationship to result in reduced divergence for higher valued properties
 - But divergence was greater for higher valued properties
- Use of inflation as proxy for expected appreciation
 - Results in user cost measure which is fairly comparable to rents
 - Far superior to out-of-pocket expenses

Findings Summarized: Reported Rents



- Naïve assumption that respondents simply report out-of-pocket expenses (OOP) for reported rental equivalence
 - Informal and formal evidence rules this out
 - Reported rental equivalence appears to grow at same rate as BLS OER index (based on rents of rental units)
 - Lies well above OOP
 - Elasticity of reported rents with respect to OOP is well below unity
 - Homeowners estimating reported rental equivalence as something more than just OOP
- Tenuous relationship of rents to standard measures of user costs
 - Not always possible to discern a statistically significant relationship between reported rents and measures of expected appreciation



- In micro data, divergence between user costs and rents is even more striking than results based on aggregate index data
 - Less divergence with longer-horizon forecasts
- Rents generally exceed both user costs and out-of-pocket expenses
 - Although in some cities, declining real estate prices have driven some user cost measures above rent
- Expected appreciation is of crucial importance
 - Natural expectation measure of a one year appreciation forecast results in user cost measure that often negative and has no evident relationship to rents at all
 - Longer range forecast also result in divergence
 - Rules out index construction errors as cause of rent-value differences
 - Interestingly, ad hoc appreciation measure appears to outperform theoretically rigorous variants



- Study factors related to reported rental equivalence
 - Decisively reject commonly held hypothesis that these merely reflect out-of-pocket expenses

- Puzzle remains – rents only appear weakly related to their user cost determinants



- Perhaps need to approach from perspective of *rent dynamics*
 - Construction inherently slow
 - Slow adjustment of rents to user costs might result from costs of converting structures between owned and rental properties
 - Inefficiencies in housing market (Smith and Smith, 2006)
 - Pricing frictions in rental markets
 - Rents are much smoother than smoothed user costs so rent inflation stickiness may be part of the answer
 - Interesting industrial organization work to be done
 - Perhaps need to approach from perspective of *user cost measurement*
 - Appropriate measure of expected appreciation—better that these be based on true underlying structural factors (will need to distinguish between land price and structure price dynamics)
 - How about a better user cost measure?
 - Allow for frictions in real estate markets
 - Expected appreciation replaced by average probability of adjustment and realization of after-costs capital gains
- *Continued research is needed*