Incorporating the Value of Owner-Occupied Housing in Poverty Measurement

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Outline

The purposes of this paper are to present the NAS panel's recommendation regarding the treatment of owner occupied housing in poverty measurement, review alternative approaches to account for this housing, note methodological and technical issues arising from the implementation of each approach, and to review normative issues arising with choosing an alternative measure. The paper concludes with the pros and cons of each alternative measure.

I acknowledge the many discussions that I have had with Connie Citro, Steve Malpezzi, Sylvester Young, Randall Verbrugge, Anthony Yezer, and my co-authors regarding topics covered in this paper. All views expressed are mine and do not reflect the views or policies of the Bureau of Labor Statistics or the views of other staff therein. I accept responsibility for any errors.

In the National Research Council Panel (hereafter referred to as the "panel") report (Citro and Michael 1995), the experimental threshold is based on median expenditures for food, clothing, shelter, and utilities of two-adult two-child families. Shelter expenditures are included in the thresholds with no adjustment to resources. The Consumer Expenditure Survey (CE) publication definition of owner-occupied housing shelter expenditures and rental housing expenditures were used for the estimation. For owner occupied housing these expenditures included:

- mortgage interest payments
- prepayment penalties
- interest on lump sum home equity loans
- interest on home equity lines of credit
- property taxes
- maintenance, repairs, insurance and other expenses.

In more recent research (beginning with that of Garner and Rozaklis 1999 and Short et al. 1999), interest on lump sum home equity loans and home equity lines of credit have been eliminated from threshold estimations.

In the panel's approach, there is no accounting for the fact that home owners might have an additional benefit from their housing that renters do not have. But the panel acknowledged that such an additional benefit could be used to meet the needs of households and families. The panel's report stressed the importance of accounting for the flow of services home owners obtain from their home in counting resources and thresholds, but noted limitations in data and measurement that made this impractical for poverty measurement. They suggested that the valuation of home ownership services is a priority area for further research and consideration for implementation in the poverty measure at a later date (see Citro and Michael 1995, p. 71). The report includes the following:

> The next regular review of the poverty measure should give serious consideration to revising the income definition to include imputed net rent values in homeowners' income. (p. 246)

Based on a review of the research that has been conducted since the panel's report was released in 1995, all the authors (Betson 1997; Johnson, Shipp, and Garner 1997; Garner and Rozaklis 1999, 2001; Short et al. 1999; and Garner and Short 2001) agree that the panel's approach did not account for owner occupied shelter in the most desirable way. Several alternatives have been suggested and tested. The demographic group expected to be most affected when owner occupied housing is considered in the measure is the elderly. The results of the studies reviewed, with poverty rates produced, suggest that elderly poverty is likely to fall when owner occupied housing is accounted for but perhaps not as much as might be expected. It is unknown at this time whether this result would continue to hold with a measure of poverty that consistently treats owner occupied housing in both the thresholds and resources. In none of the studies conducted thus far has owner occupied housing been accounted for, at the same time, in the thresholds and resources that is consistent with the panel's recommendations *and* economic principles. Garner and Short (2001 come close with reported rental equivalence used to value the flow of services in thresholds, which are in all other ways based on the panel's recommendations, and return to home equity added to money income. The recommended resource measure was not used in the Garner and Short (2001) study however. The study that comes the closest to the panel's recommendations is the one by Betson (1997) which adds to resources an implicit income for home owners based on assumptions regarding spending needs and income flows. However, the value of services flows from owner occupied housing and the opportunity costs of holding equity in the owner occupied housing are ignored.

The purposes of this paper are to present the panel's recommendations to account for owner occupied housing in an experimental poverty measure and to discuss alternatives. The paper is divided in to seven remaining sections. First, the panel's approach and recommended future work are presented. Second, a general overview of approaches to account for owner occupied housing in economic measurement is presented. Third, research conducted since the panel's report was published is next reviewed. Fourth, methodological and technical issues that have arisen in the application of the alternatives are highlighted. Each alternative presented thus far requires assumptions. Some are more data demanding and would require additional information be collected in the CE, Current Population Survey (CPS), and/or Survey of Income and Program Participation (SIPP), while others require little if any additional data. Fifth, some questions regarding normative issues in choosing an alternative measure are asked. Sixth, a summary of the pros and cons of each alternative is presented. And, finally, several comments on alternatives approaches and the panel's aims are presented as a conclusion.

I. The Panel's Recommendations

The panel made recommendations for both thresholds and resources, defined each, and presented approaches for estimating each. The panel refers to a budget for a basic set of commodities and states that actual consumer expenditures are to be used to develop the thresholds to initiate a new series of the official U.S. poverty statistics. Thresholds are based on spending (but not including mortgage principal payments) and resources are based on cash money income and near- money income.

The panel states that the poverty thresholds should be updated each year to reflect changes in *consumption* but that expenditure data are to be used to do this. Given the panel's reference to consumption, a question arises regarding what the threshold is supposed to represent: *spending or consumption needs*? A spending based threshold would imply one approach to account for owner occupied housing that differs conceptually and empirically from a consumption based threshold. Once the threshold concept is determined, a consistent treatment of owner occupied housing on the resource side follows. A basic requirement of any poverty measure is that thresholds and resources be consistently defined.

Parts of relevant recommendations are presented below. This information is listed as it is relevant to the discussion of the treatment of shelter and owner occupied housing in the thresholds and income. When commenting on the panel's recommendations in this section, I use italics or to highlight a particular word or phrase in the panel's recommendations.

> **Recommendation 1.1**
> "…the revised measure should comprise a set of poverty thresholds and *a definition of family resources – for comparison with the thresholds* to determine who is in or out of poverty – *that are consistent with each other* and otherwise statistically defensible…. "
>
> **Concepts Underlying the Threshold Measure**
> **Recommendations 1.2, 2.1**
> The panel recommended that the poverty measure should be based on a *budget* for food, clothing, shelter (including utilities), plus a multiplier for other basic *needs*, and the threshold for a reference family should be based on *actual consumer expenditures*.
> **Recommendation 2.2**
> The new poverty thresholds should be updated each year to reflect changes in *consumption* of the basic goods and services contained in the poverty budget… …determine the dollar value that represents the designated percentage of the median level of *expenditures* on the sum of food, clothing, and shelter for two adult/two child families and apply the designated multiplier….data from the Consumer Expenditure Survey… (p. 7)
>
> **Concepts Underlying the Resource Measure**
> **Recommendations 4.1, 4.2**
> Family resources should be defined – *consistent with the threshold* concept – as the *sum of money income* for all sources together with the *value of near-money benefits* (e.g., food stamps) that are available to buy goods and services in the budget, *minus expenses that cannot be used to buy these goods and services*. Such expenses include income and payroll taxes, child care and other work-related expenses, child support payments to another household, and out-of-pocket medical care costs, including health insurance premiums.

The Panel on Spending, Needs, and Consumption

This concept of poverty as insufficient resources for *basic living needs accords* with traditional pubic concerns for the needy….It is also not inconsistent with and, in our view, improves on, the concept that was originally used to derive the current thresholds, namely, the application of a multiplier for other *needed spending* to a minimum allowance for food. (p. 22)

Yet general agreement about basic needs does not mean that everyone agrees about a level of *consumption* that distinguishes a state of poverty from a state of adequacy…no matter what the particular concept, the determination of a poverty threshold invariably considers people's *actual spending patterns* and hence, inevitable, has a relative aspect.…we propose that *real changes in spending* on food, clothing, and shelter be used to update the poverty thresholds each year. By so doing, the thresholds will maintain a relationship to *real changes in living standards*, but only to the extent that these *changes affect consumption of basic goods and services* that pertain to a concept of poverty, not all goods and services. (p. 23)

The Panel's Treatment and Recommendations Regarding Shelter

The panel noted that economists have long argued that estimates of families' resources, to be comparable for renters and homeowners, need to take account of the flow of services that owners obtain from their homes. The panel made recommendations for both thresholds and resources to account for home ownership but did not implement these in the measure produced in the 1995 report. The panel's treatment and recommendations for the treatment of owner occupied housing is reviewed in this section along with comments regarding the consistency with economic theory and practice and within the experimental poverty measure are provided. These comments are presented in italics.

The panel's primary recommendation regarding the treatment of owner occupied housing in a poverty measure is to include net imputed rents in resources. They note that "The concept of imputed rent is hardly intuitive or palatable to many people, yet, theoretically, the case is unarguable: owners with low housing costs have more of their income available for consumption of other items (e.g., food) and, hence, not to include imputed rent is to underestimate their income relative to their poverty threshold." (p. 245). The panel also recommended including imputed rent in the threshold but recommended an approach that is not consistent with the resource measure.

Thresholds

In the BLS tabulations … " 'Shelter' included rent and, for owners, payments on mortgage interest (but not principal), taxes, and maintenance and repair. (The shelter variable for home owners was defined in this way for processing convenience." According to the panel, "a preferable definition would include actual outlays for mortgage payments, taxes, insurance, and maintenance and repairs, together with an imputed amount for the estimated rental value of the home net of such outlays." (p.148)

Such a definition results in a threshold measure that is a combination of spending and consumption. The recommended measure is not consistent with economic theory or with measures currently in use for U.S. economic statistics. The BLS uses spending, not including principal payments, for CE publications. The CPI and National Accounts Personal Consumption Expenditures include values for the flow of services from owner occupied housing. The associated owner expenses are not included at all in a consumption measure as they are implicitly already included in the implicit rent of owned housing. Net implicit rents would not be included in a spending measure as nothing has been spent.

Another alterative would be estimate the consumption of owner occupied housing using a user cost of capital approach. This approach requires one to know the value of the property, the capitalization rate (rent to asset price ratio) and expected rate of appreciation. Subtractions would include those noted by the panel in addition to depreciation. Since the expected rate of appreciation is very difficult to measure and because of the large effect of inflation on user cost, it would not be an attractive as the basis for poverty measures because the measure could change dramatically over the years. Due to the tax treatment of owner occupied housing and due to inflation and mortgage rate changes, the user cost of housing capital can fluctuate and even become negative.

The panel further states that "Such a definition would treat homeowners with low or no mortgage payments in a comparable manner with other homeowners and renters" (p. 148).

This statement is not true as now owners would then be treated differently from renters. If one wants to comparably treat renters and owners with and without mortgages or low mortgages comparably, values for the flow of services from housing, regardless of housing tenure, would be used to define thresholds. None of the expenses associated with owned housing would be included.

In their discussion of consumption as a resource measures, the panel noted that "the idea behind the inclusion of rental equivalence in consumption of owner occupied housing is to treat owners and renters in a comparable way by estimating what an owner would have had to pay in rent (not including utilities). If the rental equivalence value is not added to homeowners' consumption, then people who own their homes outright or who have housing costs below the rental value of their homes would appear to consumer less than renters or homeowners with higher costs.[1]" (p. 245)

What the panel did not get correct was stating that a consumption based resource measure would deduct from rental equivalence the owners' actual outlays for mortgage principal and interest, property taxes, and maintenance costs (i.e., nothing is added if owners already have mortgage, tax, and maintenance expenses that equal or exceed the estimated rental equivalence value). (see p.244) These would not be subtracted in a consumption measure but some of these would be subtracted in a resource measure as discussed below.

The panel noted that rather than including an imputed net rent in resources:

> Alternatively, one could lower the threshold for such [without or low mortgages or other ownership costs] families to recognize that they do not have the same budgetary requirements for shelter as other families. (p. 71)

A problem with this approach is deciding what is "low".

Income Based Measure of Resources: Services from Home Ownership

The panel noted that,

> Estimates of families' economic resources, to be comparable for renters and homeowners, should take account of the flow of services that owners obtain from their homes. Thus, people with low or no mortgage payments or other ownership costs do not face the same housing costs as renters or other homeowners and so should have a rental equivalence value (a type of in-kind benefit) added to their income to recognize the fact that they do not face the same housing costs as renters or other home owners. (p. 71, 245)
>
> The imputed rent value would be net of mortgage and other costs that do not exceed the amount of imputed rent: that is, we do not suggest that homeowners who assume mortgage payments that exceed the rental value of their home obtain a deduction from income. (p. 245)

The mortgage principal payment (amortization) would not be subtracted as this is a type of savings. If one were to use a consumption rental equivalence approach to value owner occupied housing services, as implied by the use of an imputed rent value, the same rental equivalence as used for thresholds would be used on the resource side but with expenses for the following subtracted on the resource side: maintenance and repairs and other related costs paid by the landlord, property taxes, property insurance, and mortgage interest. Other expenses to be deducted from imputed rents listed by the BEA for the production of personal income in the national accounts are: mortgage origination fees, other closing costs, and for periods in which major disasters occur, and consumption of fixed capital. To be consistent with a rental equivalence based threshold, if the homeowner's expenses exceeded imputed rent, a SUBTRACTION from income SHOULD be made to reflect the fact that homeownership is costing them more than what they are implicitly receiving in services. However, it is likely that owners are being compensated by high rates of house price appreciation. But given the panel's preference, house price appreciation is not being counted as income but it is very important in high house price states. Thus, the treatment of unrealized capital gains in a poverty measure needs to be addressed. These gains can be a very important income source especially for older households.

A user cost approach to account for owned housing in the thresholds would call for an income measure based on a capital asset approach. In this case, the implicit income added to resources would be

[1] As noted in footnote 37, Chapter 4 (Citro and Michael, 1995, p. 145), "Similarly, consumption-based resource estimates typically include the estimated service flows from automobiles and consumer durables (and, correspondingly, exclude actual expenditures on these items)." When consumption flows are included, no actual expenditures for the items are included in the measure; they are never there so they are never subtracted. However, when an income based resource measure is designed to account for in-kind benefits, like the flow of services of housing and durables, all service flows should be included. For the income based measure, the expense associated with the provision of the service flows are subtracted resulting in net imputed rents or values of the flow of services.

the return to home equity plus annual expected appreciation. Expected appreciation could be negative if the property actually decreased in value over the year. More is presented on this in the next section.

Using data from the American Housing Survey, the panel estimated that about one-fourth of low-income homeowners could have significant amounts of imputed rent added to their income that could possibly raise them above the poverty line (those owning their homes free and clear with other housing costs less than 30 percent of income). These homeowners represent one-tenth of all low-income households. (p. 246)

II. Accounting for Owner Housing in Thresholds and in an Income Based Measure of Resources[2]

There are primarily three approaches that have been used to account for owner housing in price index and household economic well-being measurement. Each could be used for poverty measurement as well. These have been alluded to in the panel's recommendations in part, as noted above, and in my comments. Owned housing includes primary residences and vacation homes. However, for poverty measurement, only owner owned housing would be considered in the threshold measure while both owner occupied and vacation homes would be accounted for in resources. However, for the following exposition I strictly refer to owner occupied housing and refer to them as owner-occupied dwellings (OOD) or housing. As noted earlier, definitions of resources that are income based need to be consistent with the definition upon which thresholds are based. Each method is presented and discussed regarding the procedures that can be used to account for owner occupied housing in the poverty thresholds and resources.

Approaches to Value

A. rental equivalence
B. user cost of capital
C. out-of-pocket or the payments approach.

The first is based on a flow of services approach, the second on capital investment, and the third is a kind of cash flow approach. The first two approaches are accepted in the economics literature as appropriate alternatives to account for the owner occupied housing in economic measurement. The third approach is less generally accepted. Each alternative is described and some advantages and disadvantages of each are presented.

One justification for the rental equivalence approach is that under restrictive assumptions, rental equivalence equals user costs (see: Dougherty and Van Order 1982; Gillingham 1983). Both rental equivalence and user costs are estimates of the annual cost of housing consumption and should be based on what the household would have to spend to rent an equivalent unit at market prices (Malpezzi 2000). Each approach poses challenges however in estimation. The out-of-pocket or payments approach measures actual cash outflows and is easier in general to measure however this approach is not generally favored when the focus is consumption and these are noted in the section in which this approach is presented. However, Diewert (2003) notes that under some conditions, the payment approach to the treatment of owner occupied housing may be a reasonable compromise, but expected payments would be much smaller than for the other approaches except during periods of high inflation (p.37).

A. Rental Equivalence.

Rental equivalence is the value of the flow of services from an owner occupied dwelling. The owner occupant is both a consumer and producer of these services. As services that are consumed, the full rental equivalence is counted in consumption expenditures. As a producer service that generates income, only the net implicit rent (rental equivalence minus expenses of maintaining the housing) plus appreciation is counted as income. For both consumption based thresholds and income based resources, rental equivalence values of owner occupied dwellings are needed.

For a **consumption based threshold measure**, the full value of the implicit rent is added to expenditures of food, clothing, utilities and other basic necessities.

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[2] This section is primarily based on work that T.I. Garner did for the International Labour Office in Geneva in the spring of 2003. Additional references include: Glaeser and Shapiro 2002, Green and Malpezzi 2003, Poterba 1991, Verbrugge 2003, and Yezer 2002.

R=implicit rent

For an **income based resource measure**, the net implicit income (which in general will be greater than the net implicit rent) from owner occupied housing to be added to income is:

$$I_H = (R - C) + \Delta V \qquad (1)$$

where

I_H= after tax net implicit income from owner occupied housing
R=implicit rent
C = operating costs net of tax preferences (i.e., property taxes and mortgage interest would be included in C net of tax savings due to their deductibility. So, if the marginal income tax rate is τ_F , mortgage interest payments are I and property tax payments are T, then C would include $(I + T)(1 - \tau_F)$, i.e. the after-tax cost of mortgage interest and property taxes.)
ΔV = house price appreciation.

Operating costs would include the costs that a landlord has to pay to maintain the property plus the cost of financing. These include expenses for maintenance and repairs to maintain the property, mortgage interest, property taxes and other related expenses such as property insurance. Owner occupied housing has preferential treatment through the U.S. income tax code resulting in an even higher implicit rental income than would be possible without the tax treatment. Thus, before a net implicit income form owner occupied housing is estimated and if the homeowner itemizes when filing income taxes, adjustments need to be made so that after-tax mortgage interest and after tax property taxes are used in the estimation. This will reduce C and I_H will be higher.

Note that costs for home improvement would be savings. If the home improvements generated the ΔV , then they would balance out automatically because the cost of the improvement if included in C would just balance the value increase included in V leaving the estimate of after tax implicit income unchanged.

If unrealized gains and losses are counted as income, the return or loss due to capital appreciation of the dwelling, ΔV , would be added to household income. In the equation presented above, the assumption is that the implicit capital gain from owner occupied housing is not being taxed and neither is implicit net income.

Determining Rental Equivalence

The rental equivalence approach values the services yielded by the use of the owned housing for a period by the corresponding market rental value for the same housing for the same period of time. As noted by Diewert (2003), this is the approach taken in the System of National Accounts 1993. It is also the approach assumed in the production of the U.S. Consumer Price Index.

Different approaches can be used to determine the rental equivalence value. Basically they fall into two categories:

- Reported rental equivalence
- Statistical estimates of rental equivalence

Reported rental equivalence and a statistical approach to estimate rental equivalence have been used in experimental poverty measurement studies and are reviewed later in this paper.

Option 1. Reported Rental Equivalence

Reported rental equivalence could be based on the owner providing an estimate of how much he or she thinks the rent would be for the housing services provided by the owned unit. Another approach is that an interviewer, a housing expert, or community leader assigns a value.

An advantage of this approach is that owner occupants are simply asked something like the following:

"What would you say your dwelling would rent for without furnishings and without utilities for a month?"

An interviewer could also be asked the same question. An examination of reported home owner and CPI interviewer rental equivalences showed similar values by region in the U.S. (see Johnson, Shipp, and Garner 1997).

Owners can estimate rental equivalences even when there is no comparable rental dwelling in the area if they know of rents in other areas (for example if there is no rental housing in rural areas but there are rental units in nearby urban areas). The estimate might not be of lower quality compared to a statistics when a rental market exists exactly where the owners live, but owners, with the help of interviewers, can be walked through the steps needed to help them determine what they would be willing to pay to rent the own dwelling or alternatively what they might charge someone else to live there. Reporting what they would pay to live in their own dwelling could be a very good estimate of the true rent. However, according to research on market values, owners tend to overestimate value of their own units (see for example, Goodman and Ittner 1992; Follain and Malpezzi 1981).

The panel (1995) and Diewert (2003) noted that homeowners may not be able to provide very accurate estimates for the rental value of their dwellings. Some may suggest that the reported rental equivalence approach (based on the responses of interviewees and interviewers) over-estimates the rental value of the services from the owner occupied dwellings. Diewert (2003) notes that, "Care must be taken to determine exactly what extra services are included in the homeowner's estimated rent" (p. 38). For example, if the estimated rent includes insurance, electricity and fuel or the use of various consumer durables in addition to the structure, and if these extras are accounted for elsewhere in consumption, reported rental equivalence should be adjusted downward. However, if they are not included elsewhere, the reported rental equivalence could be used as reported.

It is expected that implicit in the reported rental equivalence would be the costs of administration, management, repairs and maintenance like landlords would cover, insurance like landlords would cover, and profit. Not included would be any renovations or extensions, as these would be considered capital improvements and would not represent a flow of services but additions to assets. The rental equivalence is what a landlord would charge for a like property. The landlord would want to cover in his or her rental price the items noted. The costs of the rental property would be subtracted from rental equivalence to obtain the net rental income from owner occupied housing for resources as noted earlier.

Malpezzi (2000) notes that, regardless of the method used to value owner occupied housing that is it is important that there is it clear what particular owned housing is being priced through the use of an implicit rental price. He suggests is a distinction between housing and agricultural real estate in rural areas, and between housing and shops, offices, and other nonresidential uses in both rural and urban areas. In addition, he states that any commercial premises that are physically attached to the household's dwelling be noted (p.301).

The recommended World Bank Living Standards Measurement Study questionnaire has included questions of respondent rental equivalence for owned housing as well as housing characteristics since 2000. Reported rental equivalence for owner occupied housing has been used in World Bank studies of economic well-being and poverty measurement using a consumption based measure of resources.

Based on the Bureau of Labor Statistics with a reported rental equivalence question in the Consumer Expenditure Survey, the majority of respondents have provided answers to this question. In 2002, for example, 55 percent of owner occupants answered with question. For the remainder, imputed values were assigned using a hot deck procedure based on primary sampling unit, building type, number of rooms in the living quarters, size of rooms, number of complete baths, number of half baths, year built, and whether the unit has central air conditioning or a window unit (Keil 2004).

Option 2. Using Hedonic Regression Models of the Rental Market or Statistical Matching to Impute Rents

The two statistical approaches are based on the characteristics of the owned housing unit. One approach is based on the characteristics of owned dwellings matched with those of rented dwellings and rental values, and rental equivalence values are estimated through stratification of the data (favored by EUROSTAT). The second option uses these same characteristics in a hedonic regression framework. Actual rents paid by renters are regressed on the characteristics of their rental dwellings. The estimated coefficients are then applied to the characteristics of owned dwellings to produce a predicted value of the rental equivalence of like owner-occupied dwellings. The characteristics of the dwellings would include size, types of construction, location, age, number of bedrooms, number of baths, etc. Regressions can be improved when location within the city or rural area and characteristics of the neighborhood are also included in the model, as well as characteristics describing the quality of the dwelling.

For the two statistical approaches, enough data must be collected in order to estimate values from rental dwellings and apply these to owned dwellings. If the household survey does not include an adequate number of observations for the estimation, data from a rental survey or data from real estate agents could be used. The BLS and Census need to be sure to include a sufficient number of rental dwellings in their sample designs if either of the statistical approaches is to be used.

Malpezzi (2000) notes that hedonic approaches to estimating rent for owner occupants have good theoretical and intuitive foundations. These are discussed in detail in Malpezzi, Ozanne, and Thibodeau (1980) but he notes that these approaches involve substantial data requirements and analytical work. Additional information that is needed to help one understand how imputed rents based on the rental market may differ from the implicit rents of owners, Malpezzi recommends the collection of the following information: price controls, subsidies, discounts to relatives and kin, and transactions that include in-kind rents (such as services performed in lieu of cash rent). He notes that all of these introduce obvious differences between the cash price paid and the arms-length market price. As noted earlier, what exactly is being priced must be made clear: space rent for owner occupied housing or owner occupied housing with a shop attached for example. According to Malpezzi (2000), research has demonstrated that the longer a household stays in a unit, the lower are rents for a given level of housing service, even in markets without rent control. Landlords essentially price rental units offering what is termed a "tenure discount". The longer one stays, the lower the turnover and lower vacancy losses. Thus information about length of tenure is needed to distinguish more recent rental prices from long term prices that would not be as related to current market values. Other key variables for filtering renters include the age of the unit and housing quality.

Diewert (2003) lists several problems with the hedonic regression approach and some of these concerns could apply to the statistical match approach as well (p.38-39):

- It is information intensive; in addition to requiring information on the rents and characteristics of rental properties, information on the characteristics of owner occupied properties would also be required.
- The characteristics of the owner occupied housing market could be quite different from the characteristics of the rental housing market. In particular, if the rental market for housing is subject to rent controls, this approach is not recommended.
- Hedonic regression models suffer from a lack of reproducibility in that different researchers will have different characteristics in the model and use different functional forms.
- …it would seem that market rents can be considerably higher than the opportunity costs of home owners and hence using market rents to impute rents for owner occupiers may lead to rents that are too high.[3] On the other hand, if there are rent controls or a temporary glut of rental properties, then market rents could be too low compared to the opportunity costs of home owners.

Diewert (2003) also notes that landlords, in setting rents as would be used in an hedonic regression, face additional costs compared to home owners, but Yezer (2004) suggests that owners have additional costs as well that may equal out those in rents. Diewert suggests that the additional related costs faced by landlords be removed from market rents before the estimation of a hedonic model. These include costs associated with damage, nonpayment of rent and vacancy, and billing. Diewert expects market rents to be upwardly biased due to these additional costs. However, according to Yezer (2004), similar issues confront owners – their houses may be vacant while they are away on vacation, and they may experience higher commuting costs because of the transaction costs that prevent them from changing houses when they change work locations. If this is the case, no adjustment downward in market rents would be needed for the hedonic since the assumption is that owners have similar additional costs. Malpezzi (2000) also notes that rents could be downwardly biased due to rent controls.

[3] Yezer (2004) notes, when market rents are higher there is an incentive for owners to move out of their owned homes and then to rent the houses to others. Whenever price is greater than opportunity cost then that is a signal to sell.

Concerns for Both Options to Estimate Housing Consumption and Net Implicit Income from Owner Occupied Housing

When these methods are used to estimate the flow of services from owner occupied housing, there are several key issues that need to be considered. However, as noted, there are issues for reported rental equivalence as well. Of particular concern is the condition needed for rental equivalence estimations to be valid: there is an overlap in characteristics of the owned and rental units. When there is little rental housing available in an area and reported rental equivalence is the approach used, owners, with the help of interviewers, can be walked through the steps to help them determine what they would be willing to pay to live in this dwelling or alternatively what they might charge someone else to live there. After appropriate questioning and probing, an estimate can emerge that can be used as the rental equivalence value. The goal is to collect the market price of the flow of services from owned housing.

Rents charged could be affected by legislation. When this is the case, rental housing may be inherently different from owner-occupied housing leading to a failure of condition (b). If most housing is rent-controlled or rents are subsidized, then a hedonic approach to estimate the rental equivalence of owner-occupied housing would under estimate the market value. Diewert (2000) does not recommend statistical methods be used for valuing housing consumption when there is rent control. If only a minority of the rental housing sample is rent controlled or subsidized, only those rental dwelling units that are not rent controlled or subsidized would be used in the hedonic regression or stratification. Enough information needs to be collected to understand whether self or interview valuations reflect the current market rental prices or whether other factors affecting price are being considered.

The treatment of housing costs associated with rental equivalence can be affected by the institutional arrangements. The housing costs that could be affected by institutional arrangements include those for community taxes, services, utilities, costs of repairs and maintenance. However, if these are paid by landlords of rented properties, they would be deducted from the estimated rental equivalence for owner-occupants in order to derive implicit net rental income for the household. As noted earlier, these expenses would not be deducted from rental equivalence in consumption expenditures nor would they be included elsewhere in total consumption expenditures as they are implicitly already counted in rental equivalence. If these expenses are not paid for by landlords, then they would not be deducted from landlord rents to derive net rental income. They would, however, be counted as expenditures elsewhere in consumption expenditures. Such is the case when rents include utilities. For consumption expenditures, a value for utilities is subtracted from rents paid and then combined with other utilities paid by the household. Thus what is left is space rent in consumption expenditures. This is the treatment of rents for the National Accounts Personal Consumption Expenditures. Data should be collected on all the costs associated with rental and owner-occupied housing. Also information about the institutional arrangements and legislation regarding rented and owned housing also needs to be made available in the documentation of the household income and expenditure surveys.

B. User Costs

The user cost of capital approach can be used to transform asset values of housing into flows of annual cost to the owner of the housing. In this section, the user cost of capital for estimating the cost of housing services is first presented. Use cost can be used in the thresholds for owners to represent the annual costs to the owner of their housing. This too can then be used to derive the net implicit income from owner occupied housing to be added to resources for the poverty measure.

User Cost of Capital as an Estimate of Housing Consumption for Thresholds

The user cost of capital is another approach used to estimate the annual cost of housing consumption for owner-occupiers of housing. Basically, the user costs of capital or asset price of housing is based on the present discounted value of expected future net rental income. Green and Malpezzi (2003) define user cost as the cost to use a unit of housing capital each period. For a renter, user cost is the rent he or she pays. For owners of capital, like owner occupants, the estimation of the user cost is more complicated. The user cost expression can be interpreted in terms of the capitalization rate; that is, the rate at which rents, R, are discounted into asset prices, V. In the simplest form (asset is completely financed and the mortgage last forever with an interest rate of i, and there are not taxes or inflation), the user cost can be presented as R below:

$$V = \frac{R}{i} \tag{2}$$

so

$$R = iV. \tag{3}$$

Green and Malpezzi (2003) note that the user cost approach is designed to figure out what a "user" of the house really pays (or would pay), net of financing, taxes, maintenance, and inflation. Generally time-series data (e.g., Hendershott and Shilling 1982) are used for the estimation but cross-section data have also been used (e.g., Follain1981). The advantages of the user cost of capital approach are that it incorporates a model of what determines prices and accounts for the effects of taxation, inflation, and maintenance on prices. A disadvantage is that this approach is "hard to do well in cross-section" (Green and Malpezzi 2003). As noted by many researchers (e.g., Diewert 2003; Green and Malpezzi 2003) there are several details of the procedure that are somewhat controversial. These involve the use of opportunity costs, which are usually imputed, the treatment of interest and capital gains or holding gains. A key question with the user costs approach is the choice of the particular interest rates to use for computation of user costs.

The literature (e.g., see De Leeuw and Struyk 1975; Diewert 2002m 2003; Dougherty and Van Order 1982; Follain 1982; Green and Malpezzi 2003; Hendershott and Shilling 1982; Gillingham; 1983, Jorgenson 1963, 1981) provides guidance for directly estimating the user costs of capital and of owner occupied dwellings in particular. (Rental equivalence is an indirect method of measuring user costs.) The discount rate to be used for owner-occupied dwellings can be computed based on the costs associated with the capital.

There are three basic specifications of user cost that are useful for the poverty measurement discussion:

1. *simple user costs*
2. *after tax user cost with itemization*
3 *after tax user cost without itemization*

When there is not mortgage and there are no expenses for maintaining the property, the user cost of imputed rental cost of the dwelling over some time period, such as a year, is made up the following costs. One could look at this as purchasing the property at the beginning of the year and selling it at the end of the year.

- The real opportunity cost of the financial capital tied up in the structure
- The real opportunity cost of the financial capital tied up in the land
- The depreciation cost of the structure.

In this case an interest rate applied is for the owner's opportunity cost of equity capital and another for depreciation. For the U.S. National Accounts imputation of housing services for owner occupiers, rent to value ratios for renter units is applied to the stock of owner occupied housing. The ratio in this case is regarded as an estimate of the real interest rate plus the depreciation rate (Lebow and Rudd 2003).

When there are other expenses associated with owning the property, these needed to be accounted for the in the model. First is presented a simple model with no income taxes. However, given that the U.S. tax system provides an advantage for home owners in that they can deduct mortgage interest and property taxes, adjustments need to be made in the user costs model to reflect these. Also, when there is inflation, this too needs to be taken into account.

1. simple user costs(no income tax)

In order to perform this computation, I first assume a simple world with no *income tax*. For the purposes of this example, the annual cost, noted C, of a single unit of housing capital is assumed to have an asset price of P. Total asset value of a unit is, Pq, where q is the quantity of housing capital. We observe Pq=V, where V is the asset value or sales price (i.e., market value) of the housing unit. For the first example there is not distinction between the different interest rates (opportunity cost and mortgage interest) and in the literature (see Gill and Haurin 1991) is sometimes referred to as the weighted average of the nominal mortgage interest rate and opportunity costs of home equity. This formulation also ignores the risk premium that reflects households have borrowing constraints.

The annual user cost of housing capital or house value is given by (based on Poterba 1992):

$$R = [i + \tau_p + \beta + m + \delta - \pi]V \quad (4)$$

where

R = annual user costs of housing consumption with a dwelling market value of V

i = interest rate,

τ_p = property tax rate

β =risk premium for housing investment

m = maintenance costs rate[4]

δ = depreciation costs rate

π =owner's nominal capital gain rate (assumption here is that house prices appreciate at the overall inflation rate π).

Property insurance can be treated in a similar manner as maintenance and depreciation. This specification would assume a gross premium approach (see Diewert 2003). Glaeser and Shapiro (2002) note that the maintenance costs and depreciation rates for renters of single rental dwellings are greater than that for owners due to moral hazard. However, these rates are greater for owners for multi-unit dwellings due to the fact that maintenance is usually building, not unit specific for multi-unit structures.

Accounting for inflation. The term, *i*, is the interest rate that is observed at any point in time and is readily available from news reports and financial institutions. This is the market rate of interest which implicitly includes inflation. The appreciation rate when inflation is present, π , is based on the value of the dwelling at the beginning and end of some time period. These values can be obtained from appraisers, tax offices, or realtors.

2. After tax user costs with itemization

When personal income tax laws exempt both implicit rental income and capital gains on housing, but allow the deduction of mortgage interest and property taxes from taxable income, after tax user cost rates are lower than they would be without this tax treatment. The cost of homeownership differs depending upon whether the owner claims itemized deductions. In this case, the after tax cost rate needs to be determined using the marginal personal income tax rate τ_F . Here we also assume there is no tax on the capital gains. Thus the after tax costs of interest, at rate *i*, and property tax, at rate τ_p , equal (i+ τ_p)(1- τ_F) and the after tax cost rate is as follows:

$$\begin{aligned} R' &= [(1-\tau_F)(i+\tau_p) + \beta + m + \delta - \pi]V \\ &= R - \tau_F(i+\tau_p)V \end{aligned} \quad (5)$$

Thus, the tax system reduces the costs of owing a home. This effect rises with increases in nominal interest rates and marginal tax rates. Households consume housing services based on the real cost to them after tax deductions are considered and after inflation. If the inflation rate is π , then the rate paid on the mortgage with a real rate of interest is the sum of the inflation rate and the mortgage interest rate, the nominal mortgage interest rate. When prices are rising, the real value of the mortgage amount owed is falling at the inflation rate, π .

3. after tax user cost without itemization

It the homeowner does not itemize deductions, the rental price would be as follows:

[4] Diewert (2002) states that normal maintenance expenditures can be immediately expensed and hence should appear as separate items from the dwelling. He also notes that the term for taxes and insurance

$$R^{"} = [(1-\tau_F)(1-\alpha)i + \alpha i + \beta + \tau_p + m + \delta - \pi]V$$
$$= R - \tau_F(1-\alpha)iV \qquad (6)$$

where

α = fraction of the property that is debt financed.

Since homeowners who do not itemize cannot claim mortgage interest deductions their after-tax cost of borrowing is simply *i.* However, if they invested elsewhere other than in this house, they could presumably earn $(1-\tau_F)i$. The rental price of owner occupied housing is higher when α is small. As noted by Poterba (1992), a nonitemizing homeowner using all-debt financing receives no tax subsidy.

General

A more general model for user cost is presented below.[5]

$$R = (i_e(1-\alpha)(1-\tau_F) + i_m\alpha - i_m\alpha\tau_F + \tau_p(1-\tau_F) + \beta + m + \delta - \frac{\Delta V}{V})V \qquad (7)$$

where

i_e = nominal interest rate on equity (or the alternative use of funds)

i_m = mortgage interest rate

$\frac{\Delta V}{V}$ = rate of appreciation of the dwelling

When multiplied by the value of the dwelling, *V*, the first term is the opportunity cost of having wealth tied up in the dwelling; it represents the after tax interest that the homeowners could receive from investing in other capital. The second term is the out-of-pocket mortgage interest. The third term is the mortgage interest deduction. The fourth is the net of tax deduction property tax. The other terms have previously been defined.

User Cost of Capital as an Estimate of Net Implicit Income from Owner Occupied Housing in Resources

A description of what the income value would be that is consistent with the user cost of capital approach used to value housing consumption is presented in this section. The value of user cost as estimated for housing consumption is *not* equivalent to net income for the purposes of computing household income. Household income, when using the user costs approach for consumption, is the implicit return from owning the home that is owner occupied. It is the return to home equity plus appreciation.

Using the more general user cost model, the net implicit income from owner occupied housing to be added to income is:

$$I_H = (R - C) + \Delta V \qquad (8)$$

where

I_H = after tax net implicit income from owner occupied housing

$$R = (i_e(1-\alpha)(1-\tau_F) + i_m\alpha - i_m\alpha\tau_F + \tau_p(1-\tau_F) + \beta + m + \delta - \frac{\Delta V}{V})V \qquad (9)$$

$$C = (i_m\alpha + \tau_p + m)V \qquad (10)$$

ΔV = house price appreciation.

The basic equation is the same as when rental equivalence is used, with operating costs (*C*), being defined the same as before. The difference between *R* and *C* is the net operating implicit rental income

[5] This is primarily based on a summary of the user cost formulations from Randal Verbrugge (2003).

Another approach to estimate the net implicit income based on the capital asset approach can be described as follows:

$$I_H = i_r(1-\alpha)V + \Delta V \tag{11}$$

where

i_r = real rate of interest

The first term now replaces the net operating implicit rental income as is the return to home equity. Thus, the addition to resources is the implicit interest income from holding the wealth in housing plus the appreciation or unrealized capital gains. Note, this means that there would be no implicit income from owner occupied housing, not counting appreciation, if the dwelling was 100 percent financed, however, the consumption of housing would be positive. This result provides some hint regarding how differences could result when a rental equivalence versus user cost of capital approach is used.

Additional Concerns with User Cost as a Method to Estimate the User of Owner Occupied Housing and Net Implicit Income from Owner Occupied Housing

To estimate the user cost of capital an estimate of value of the owner-occupied unit is needed. The most straightforward approach to determine the values of dwellings is to ask respondents what the current market values of their dwellings are. Another approach is to use data from local realtors or appraisers. For this latter approach, characteristics of the owned housing are needed. Most important are the number of bedrooms, number of baths, and location of the dwelling. Data would have already been collected for from owners concerning the maintenance and repairs costs of housing.

Also needed is an estimate of the owner's marginal income tax rate (both state and federal), and the property tax rate or actual property taxes paid.

As noted earlier, a difficulty in applying the user cost method in practice is that of obtaining estimates for interest rates. However, the difficulties in forecasting inflation are manageable. The difficulties in forecasting appreciation rates can be a bit harder; for these data would be desirable. Deciding on depreciation rates can also be challenging. However, rates used in the economy for other capital formation can be used here. For appreciation rates, Yezer (2004) suggests that the combined Fannie-Mae-Freddie-Mac index of house price appreciation is readily available so the problem of estimating appreciation is greatly reduced over the past.

Another issue in implementing a user cost measure is that a cost of capital for the owner's equity in the unit is needed. Most applications of the user cost approach simply use the current mortgage interest rate on 30-year fixed-rate mortgages as the rate at which owners finance the equity portion of their housing investment. This makes the computation of user cost easy, just set *V* = m*ortgage amount*. The justification for this is that owners are amortizing their mortgages so the cost of capital to them must not be higher than the mortgage interest rate and the mortgage interest rate is the rate at which they could do a cash-out refinancing if they needed the money. Yezer (2004) regards the user cost of capital is the most precise way to estimate cost of owner occupied housing to the home owner and the most appropriate way to compute the threshold cost of owner occupied housing.

C. Out-of-pocket or Payments Approach

The third approach to account for owner occupied housing is the out-of-pocket approach or cash flow method. The goal here is to identify those expenditures associated with owning the dwelling that represent outflows from the household. With a payments approach, no implicit income from owner occupied housing would be added to resources.

The costs of owing one's housing include *down payments(?)*, mortgage repayments, mortgage interests, penalties, maintenance and repairs, property taxes, property insurance, expenditures for capital improvements and renovations. If the owner uses the equity in the dwelling to finance other expenditures, this debt (home loans and lines of credit when used) would be counted against the house (?). Expenditures counted include not only those considered household expenditures but also allocations to capital. Thus the resulting definition is neither a consumption or user cost of capital measure. With this approach, once a dwelling is owned and thus has not debt associated with it, out-of-pocket expenditures fall. Thus, if this measure were to be used to approximate housing consumption, implicit housing consumption would fall as the debt is paid off.

Diewert (2003) notes, "Possible objections to this approach are that is ignores the opportunity costs of holding the equity in the owner occupied dwelling, it ignores depreciation and it uses nominal interest rates without any offset for inflation. However, if the payments approach is adjusted for these imputed costs, then the result is a rather complicated user cost approach to the treatment of housing." He further notes that this approach will tend to lead to much smaller monthly expenditures on owner occupied housing than the other … main approaches, except during period of high inflation, when the nominal mortgage rate term becomes very large without any offsetting item for inflation." (p.37)

Other concerns are why one would include the type of financing for owned housing while not for other commodities in the basic bundle. For example, credit might be used to purchase food, clothing, utilities and other basic commodities, but the interest associated with this debt financing is not being counted (see Goodhart 2001 in Diewert 2003, p.37).

Payments Approach to Estimate Expenditures for Thresholds

$$E = R + P + T + I + M + R \tag{12}$$

where

R=maintenance and repairs expenditures other related costs
P=property insurance payment
T=property tax payment
I=mortgage interest payment
M=mortgage principal payment
R=expenditures for capital improvements and renovations

Payments Approach to Estimate Net Implicit Income from Owner Occupied Housing in Resources

When a payments or out-of-pocket approach is used, there would be *no addition* to household income to reflect home ownership as there would be no money flowing into the household explicitly from the owner occupied housing.

III. Alternative Measures Produced Since the NAS Report

Since the panel published their report in 1995, a several studies have been conducted that focus on alternative treatments of owner occupied housing in the experimental poverty measure. The earliest is by Betson (1997) following up on an approach suggested by the panel but not tested. Betson produced thresholds and poverty rates using his preferred measure. Johnson, Shipp, and Garner (1997), Garner and Rozaklis (1999, 2001), Short et al. (1999), and Garner and Short (2001) produced thresholds based on responses in the CE of reported rental equivalence. Of these later studies, Short et al. (1999) made an adjustment on the income side to account for owner occupied housing but used money income as the base. Poverty rates were produced by Johnson, Shipp, and Garner (1997), Short et al. (1999) and Garner and Short (2001). Garner and Rozaklis (1999, 2001) estimated imputed rents for owner occupants to replace the Panel defined shelter expenditures and then included these imputations in the estimation of thresholds. Short et al. (1999) used the hedonic based threshold estimates from the earlier Garner and Rozaklis (1999) research and Census estimates for net return for home equity and added this to money income. A similar approach was followed in Garner and Short (2001). The Betson (1997) study and the more recent studies (Short et al. 1999; Garner and Rozaklis 2001; Garner and Short 2001) based on the hedonic and the rental equivalence approaches are reviewed.

Resources: The Betson Study (1997)

The Betson (1997) recommended approach includes a value for implicit income from owner occupied housing that is based on the implicit normative spending amount for owner shelter in the thresholds and the out of pocket expenditures for mortgage principal and interest payments. The approach that is proposed caps the implicit income at that level as in the thresholds for the particular family or household. If the homeowner has mortgage principal and interest payments that are higher than the normative, nothing would be added. Betson notes that this approach is equivalent to producing separate thresholds for renters, owners with mortgages, and owners without mortgages. The approach is based on a spending and flow of income or payments approach is not on a consumption of housing services approach as would be represented by rental equivalence or user costs.

Betson states that, "The idea behind including in resources net imputed rent from owner occupied housing is that owners who have low expenditures for owned shelter have more cash income or in-kind benefits available that can be used to meet other needs than those for shelter." However, he acknowledged that, "…just because the household may be housing 'rich' does not imply that all of the household's needs are being met. While the household may have its housing needs met, it still has to have sufficient current resources to pay for the property taxes, utilities, and home repairs as well as its food, clothing and other non-medical , non-work related needs." (p. 3)

Betson (1997) lists two justifications for including an imputed value for home owners but rejects the first one: (1) to account for assets of the household and how they might be used to meet the household's needs; (2) based on consumption needs and money available to meet those needs (p. 10). Even though home owners hold much of their wealth in housing, "it does not seem consistent to consider home ownership and ignore other assets if one if truly concerned about he extent to which a household can meet some minimum consumption level. Yet the above treatment of home ownership is consistent with an alternative view of poverty which focuses entirely upon income flows into the household and hence ignores assets." Betson (1997) rejects the traditional economic reasoning behind the inclusion of net imputed rent of owner occupied housing in the resource measure.

> "What I find convincing is the observation that if a home owner does not have a mortgage or has a small mortgage, then they will have a greater ability to finance their needs compared to an identical household who rents. The logic behind this justification leads me to suggest that what should be added to home owners' resources is the difference between the portion of the household's shelter needs which do not reflect property taxes, maintenance, and repairs (approximately $0.75\,\Theta_s T$) and the amount of the mortgage paid by the household." (p.13) *[in other words, the out-of-pocket expenditures for mortgage principal payment and interest]*

Consumer expenditure survey (CE) data from 1989 were used to estimate that the share of shelter expenditures for mortgage principal and interest payments is 0.75 in the threshold of the four person consumer unit.

Betson goes on to say that consistent with the Panel's approach would be the production of different thresholds for owners with and without mortgages and renters as noted above. He suggests that the threshold for owners without mortgages be lower than other households by $0.75\,\Theta_s T$. "This reduction in the threshold for the household would be equivalent to adding the same amount to the household's resources" (p. 10).

Betson's recommended approach is also guided by available data. The only additional information needed to be added to the CPS is the amount of the mortgage paid. He recommends that the following be included in the resource value to account for owner occupied housing:

$$\mathrm{MAX}(0.75\,\Theta_s T - \mathrm{Mort};\ 0). \qquad (13)$$

If the difference is negative then zero would be added. For those households without a mortgage, the maximum amount, $0.75\,\Theta_s T$, would be added to the household's resources reflecting that this portion of the shelter needs have been met.

Betson produced estimates of poverty using his approach and placed a cap on the amount of net implicit income to be added. The poverty rate of the elderly appeared to be much more sensitive to the treatment of homeownership than other groups (see Table 1). He also found the poverty rate of children and of the elderly to be insensitive to the choice of Θ_s. "Based on these imputations, the proportion of the poor population who were home owners would remain roughly unchanged" (p. 12).

Betson says that "The primary advantage of this approach is that it focuses directly upon the ability of the household to meet its needs given its current situation and not a hypothetical situation envisioned through the use of the net imputed rent. The second advantage is that this approach would require only one additional question (the amount of the mortgage paid) on the March CPS and none on the SIPP data. It would be possible to implement without much difficulty" (p. 13).

This approach appears to be an abbreviated user cost of capital approach with the $0.75\,\Theta_s T$ as the implicit rent (even though it only accounts for principal and interest payments) and the mortgage principal and interest payments as the costs. There is no accounting for the asset value of the housing. Also, unlike a user cost approach, negative net implicit rental income is not allowed in the Betson model. Not allowing for negatives seems rather counterintuitive. If expenses are greater than the implicit income, homeowners are over extended financially based on the norm and they have less to spend on other commodities than are accounted for the in the threshold.

In addition to presenting his recommended measure to account for owner occupied housing in an experimental poverty measure, Betson proposed an ideal measure but noted that currently "the vast majority of the information needed to implement this treatment of homeownership is not currently present in either of these two data sets [SIPP or CPS]" (p. 4-5). The model follows for the value to be added to resources:

$$\text{Net imputed rent} = \text{MIN}(\Theta_s T, \text{MAX}\{\text{GRent-Mort - PTx - Main; } 0\}) \quad (14)$$

Where:

GRent	=annual rental value of property
Mort	=annual principal and interest payments
PTx	=property taxes paid
Main	=home maintenance expenditures
T	=threshold for the household – normative level of need expenditures
Θ_s	=proportion of threshold needs for shelter.

If someone does not have a mortgage, the net imputed rent would equal the value of their household's share for shelter in the threshold. If they have a mortgage, the net imputed rent would equal a positive net rent after expenses or zero if expenses are greater than gross rent. Betson provided some examples with extremes of the situation above to show potential over- and under-estimations of net imputed rents.

Thresholds Only: Garner and Rozaklis (2001)

Garner and Rozaklis (2001) proposed that a consumption approach for owner occupied housing be applied in the production of any new *poverty threshold*. Such an approach would be based on the costs of the consumption flow of housing services, rather than on the CE publication definition of expenditures, for owner occupants. This approach is consistent with other major federal statistical programs including the U.S. Consumer Price Index and Personal Consumption Expenditures of the National Accounts. Garner and Rozaklis use two approaches for estimating the costs of consumption flows of housing services which account for the occupancy of owner occupied housing. One is based on rental equivalence values reported by consumer units participating in the CE Interview. For the other they estimated a value for the flow of services from owner occupied housing using a hedonic approach and renter information.

Thresholds based on the two consumption based approaches are compared to thresholds based on the official BLS CE definition of shelter expenses (does not include mortgage principal payments). In their research, Garner and Rozaklis did not deal with the issue of accounting for the value of owner occupied housing in resources. The two consumption costs approaches were previously used in earlier experimental poverty work (Johnson, Shipp, and Garner 1997; Short et al. 1998). Refinements to the hedonic model were introduced by Garner and Rozaklis in the 2001 study.

For the rental equivalence[6] based thresholds, responses to the following question were used:

> *"If someone were to rent your home today, how much do you think it would rent for monthly, unfurnished and without utilities?'*

For the threshold estimation, only data for primary residence is recommended to be used, not that for not vacation homes. When rental equivalence based thresholds were produced, Garner and Rozaklis (2001) replaced the CE defined shelter expenditures of owners (those for mortgage interest, property taxes,

[6] Rental equivalence values reported in the 1995 CE and the 1995 Consumer Price Index Housing Survey were compared and were found to result in very similar responses on average. Whether owner occupants are accurate evaluators of the rental values of their housing units has not been examined based on our search of the literature. We are unaware of other federally sponsored surveys in which the rental equivalence question has been asked.

maintenance and repairs, and insurance) with rental equivalence. No additional owner occupant expenditures were allowed. The assumption is that reported rental equivalence would represent the market rent as the additional shelter expenditures incurred by renters are quite low (e.g., maintenance and repairs and property insurance). Renters would not incur principal interest or shelter property insurance payments as they would be implicitly included in the reported rental equivalence.

Homeowner consumption costs, defined as implicit rents and associated housing costs, were imputed by using homeowner dwelling characteristics and estimated coefficients from a hedonic regression-pricing model of renter housing out-of-pocket expenditures. Observed out-of-pocket housing expenditures for renters are regressed on explanatory variables representing the individual characteristics of the rented dwelling. The regression coefficients are estimates relating to the implicit marginal prices of the dwelling characteristics. Applying this approach results in an estimate of owners' housing costs in an average community using the characteristics and rent plus associated expenditures paid by renters with like housing, location, and interview characteristics. The imputed housing costs for owner occupants replaces the out-of-pocket housing expenditures for these families in the production of the poverty thresholds. Consumer units with subsidized rent or utilities included in their rents were not included in the hedonic rent sample. (The hedonic regression results were also used to estimate the rent subsidies which were added to the actual rents paid by consumer units living in government subsidized housing before the thresholds were estimated.)

Defining housing costs for owner occupants this way contrasts with what the panel's describes as a "preferable definition." As noted in the Introduction, the Panel's preferable definition of housing costs would include actual outlays for mortgage payments, taxes, insurance, and maintenance and repairs, plus an imputed amount for the estimated rental value of the home net of such outlays. The panel states that such an approach would treat homeowners and renters comparably. For homeowners with low or no mortgage payments such an approach would result in housing costs which are more comparable in size with the out-of-pocket expenditures of homeowners with mortgages, and yes, some imputed estimated rental value of the owned home would be included so that implicit housing services would be valued. However, given differences in the economy and mortgage markets, it is conceivable that homeowners with mortgages could have out-of-pocket expenditures that are higher than their imputed housing costs. When this is the case, an inconsistency in concept across homeowners would exist. The housing costs of homeowners with low or no mortgages would be based primarily on imputed housing costs while those of homeowners with high mortgage payments and associated costs would be based on CE defined expenditures. Following the panel's definition, owners with high mortgage payments and other large expenditures would be treated differently than other homeowners and renters living in similar types of dwellings and in the same areas. In this study we model housing costs so that those of homeowners with mortgages, homeowners with low or no mortgages, and renters are comparably defined conceptually.

The housing out-of-pocket expenditures paid by renters are the basis for the dependent variable in the hedonic regression model. Housing expenditures for renters include cash rent paid, and expenditures for maintenance, repairs, and tenant's insurance. The latter expenditures are included in the model since it is assumed that homeowners would incur similar costs in their consumption of the flow of services from housing. Expenditures for home improvements cannot be distinguished from homeowner maintenance and repairs in the CE so homeowner maintenance and repair expenditures are replaced by the implicit comparable costs included in the imputed total housing costs for homeowners.

In our analysis, owner's imputed housing costs are based on a semi-log regression of renter's housing expenditures on selected housing and location characteristic variables. Malpezzi et al. (1998) and others (see Gillingham 1975; Moulton 1995; Ozanne and Malpezzi 1985; Thibodeau 1995) have found that a semi-log regression fits the hedonic price-characteristics relationship for housing fairly well. To be included in the regression sample, renters are identified as consumer units in the CE database with positive out-of-pocket housing expenditures, do not receive rent as pay, and do not live in government subsidized or public housing. Owners are identified as those owning their dwelling and having a positive value for CE defined housing expenditures, or a positive value for rental equivalence. The requirement of a positive rental equivalence amount is added to ensure that the owner sample is actually composed of owners.

The model is expressed as:

$$
\begin{aligned}
&H = e^{X\beta + F\gamma + \varepsilon} \\
&Z = \ln H = X\beta + F\gamma + \varepsilon \qquad (15) \\
&E\{H \mid X, F\} = e^{(X\beta + F\gamma) + (\sigma^2/2)}
\end{aligned}
$$

where H = the vector of housing out-of-pocket expenditures for renters
X = the matrix of dwelling unit characteristics
B = the vector of unknown hedonic coefficients
F = the matrix of unique consumer units in the CE
γ = the vector of unknown random effects coefficients
$\mathcal{E}$ = the vector of unknown random errors whose elements are not required to be independent and homogeneous.

The expectation of estimated rental housing costs is conditional on X and F, the dwelling unit characteristics and uniqueness of consumer units. Due to the functional form of the model and Jensen's inequality[7], we use both the estimated coefficients and the estimated model variance to produce the estimated rental housing costs.

Proc Mixed in SAS was used to estimate the hedonic equation for eight regions of the country and for two time periods. Proc Mixed was used because they wanted to account for the correlation of interviews when a consumer unit was in the data file more than once and we wished to use all of the interviews. This last requirement meant that we had an unbalanced design, thus Proc Mixed was the most appropriate of the SAS procedures for us to use. In the CE consumer units can be in the data file from one to four times, depending upon when and how often they participate in the Interview survey. To conduct the regression analysis we used all the CE Interviews for collection quarters one 1993 through collection quarter four 1997, regardless of family type, in order to maximize our sample size.

The rent regression sample included data from 31,122 interviews. This sample was divided into 16 sub-samples. First the sample was divided into two time periods and then into eight regions of the country. The time period groupings were necessary since they wanted to use primary sampling unit as our geographic location variable. In quarter two 1996 a new sample design was fully implemented for the CE so some of the primary sampling units differed from than those in the earlier period.[8] Our two time period samples include data collected in (1) quarter one 1993 through quarter one 1996, and (2) quarter two 1996 through quarter four 1997. These two samples were then dis-aggregated by region and size of primary sampling unit in order to allow for regional and population size variations in our coefficient estimates. Each of the four Census regions, Midwest, North, South, and West, were divided into samples representing (1) large primary sampling units, and (2) other primary unit sample units.

Results showed that, for owners, whether the family has a mortgage or not greatly affects out-of-pocket housing expenditures, as does the mix of homeowners and renters among the reference families. They report that approximately 75 percent of the reference families live in owner occupied housing (Table 2). This is in contrast to the full weighted sample in which approximately 70 percent of all consumer units live in owner occupied housing. About 64 percent of the reference families live in owner occupied housing and have a mortgage. Mortgage interest payments account for about 69 percent of the owners-with-mortgages' out-of-pocket housing expenditures (results not shown). Other expenditures include those for property taxes (20 percent), maintenance, repairs, and related goods and services such as homeowners' insurance (11 percent). Since mortgage interest is a substantial portion of the out-of-pocket expenditures paid by many owners, thresholds will tend to rise and fall with the movement of mortgage interest rates. In addition, larger mortgage interest payments are associated with families living in newer, larger housing

[7] The predicted value of the expectation is not equal to the expectation of the predicted value.

[8] In quarter one 1996 data were collected using both the earlier primary sampling unit design and the newer sample design. However, data were not collected in January 1996 using the new design. Therefore we decided to use data collected based on the older design for quarter one 1996 in order that expenditures would refer to a full quarter.

units located in high amenity neighborhoods. This means that thresholds will tend to be relatively high when reference families have higher interest payments and live in such neighborhoods.

Table 2: Percentage Distribution of Reference Families by Housing Tenure: 1993-97

Housing Status	Percent Distribution
All Owners	0.75
Owners with Mortgages	0.64
Owners without Mortgages	0.10
All Renters	0.25
Unsubsidized Renters	0.24
Subsidized Renters	0.01

Assume CE Interview quarterly data are independent; weighted by families.

The Panel recommended, when producing thresholds, that the percentage of median expenditures lie between 78 percent and 83 percent. These percentages correspond to the 30th and 35th percentiles of the distribution of total FCHU expenditures for a family of two adults and two children. The Panel recommended a lower and upper value for the multiplier of 1.15 and 1.25. Since Garner and Rozaklis used different concepts of housing and a different time period, they re-estimated both the percentages of the medians and the multipliers for each year for which we produce a threshold, 1995, 1996, and 1997

The percentages of the median vary slightly when they used the 1993 through 1997 quarterly CE data, and the different approaches to define housing costs for owner occupants. The percentage of the median FCHU expenditures that corresponds to the 30th percentile increases to 0.79 while the upper percentage increases to 0.84 for out of pocket expenditures. In contrast, when owners' imputed costs substitute for out-of-pocket owner expenditures, both the lower and higher percentages are higher, moving to 0.83 and 0.87 approximately. This means that housing costs based owners' imputed values are more concentrated in the lower end of the FCHU expenditure distribution than are out-of-pocket housing expenditures. Owners in the lower end of the distribution may more likely be owners without mortgages than those with mortgages given this result. Rental equivalence based percentages are only 0.01 percentage point higher than those for out-of-pocket expenditures are. Again, further examination of the dwelling characteristics of the housing status samples is needed. Garner and Rozaklis (2001) also produce new multipliers given the percentile differences and were within the 1.15 to 1.25 range that the Panel used to estimate the thresholds presented in their report.

Poverty thresholds using the CE definition and two consumption definitions to account for owner housing show that although the FCHU median expenditures for reference families are lowest when owners' imputed housing costs are used, the resulting poverty thresholds are higher than are those based on the CE definition of shelter expenditures for owners. This is likely since larger percentages of the median are being applied for the owners imputed cost based thresholds. For 1997, the threshold based on out-of-pocket expenditures is $16,371. The next highest thresholds are those based on owners' imputed costs; for 1997 the threshold is $16,992. The highest thresholds are those based on the rental equivalence reported by owners; for 1997 the threshold is $18,348.

Housing accounts for approximately 35 percent of CE FCHU expenditures at the average of the 30th and 35th percentiles. (We show this average since it is the one used in our estimation of the thresholds.) Housing based on owners' imputed costs is approximately 38 percent of FCHU expenditures. Reported rental equivalence accounts for the largest share of FCHU expenditures at 43 percent.

To estimate the housing share of the threshold, the authors convert the housing share of the FCHU expenditure at the 30th and 35th percentile average to a fraction of the total poverty threshold. This conversion can be accomplished by dividing the FCHU median expenditure share at the percentile average by the multiplier for the threshold. For this exercise they assume the multiplier to be the average of the smaller and larger budget multipliers. This is essentially the same procedure used by the panel to determine the portion of the threshold to adjust for inter-area housing price differences.[9] Housing out-of-

[9] For housing, the Panel examined expenditures at the approximate 35th percentile value of expenditures on food, clothing, housing, and utilities for the reference family. They determined the share of housing of that total, and converted that share to a fraction of the total poverty threshold using a multiplier of 1.15. In their example, housing plus utilities accounted for 44 percent of the total poverty threshold.

pocket expenditures represent the smallest share for housing among the valuation approaches at approximately 29 percent of the FCHU threshold. Next is the share of the FCHU threshold based on owners' imputed costs (approximately 32 percent). Housing costs for owners based on reported rental equivalence is 36 percent of the FCHU threshold (see Table 3).

Table 3. Reference Family Annual Thresholds and Housing Shares: 1995-1997

Owner Housing Valuation Approach	Year	Median Expenditure	Threshold	Housing Share of FCHU Expenditures at average of 30th and 35th percentiles	Housing Share of FCHU Thresholds
CE publication definition	**Year**				
	1995	$16,039	$15,821	0.35	0.30
	1996	$16,242	$16,089	0.35	0.28
	1997	$16,526	$16,371	0.34	0.28
Owners' Imputed Costs					
	1995	$15,667	$15,983	0.38	0.32
	1996	$16,041	$16,435	0.38	0.32
	1997	$16,351	$16,992	0.37	0.31
Reported Rental Equivalence					
	1995	$17,757	$17,291	0.43	0.36
	1996	$18,228	$17,750	0.43	0.36
	1997	$18,761	$18,348	0.43	0.36

Assume CE Interview quarterly data are independent.

It is clear from the above results that owners without mortgages have significantly lower CE shelter expenditures than would be represented by imputed shelter rents or reported rental equivalence. Thus, their consumption of owner occupied housing is likely being undervalued. If the consumption costs of owner occupied shelter are not accounted for in the thresholds and the CE expenditure approach is followed, the Panel suggested that the production of thresholds for different housing status groups might be an option as noted earlier. In order to see how such an approach might proceed, we present median FCHU expenditures for reference families in Table 4 by their housing status and using the three approaches for valuing the owner occupied housing. Garner and Rozaklis (2001) did not produce the thresholds since implicit multipliers and percentages of the medians would need to be re-estimated for each group.

Table 4. Reference Family Annual Median Expenditures by Owner Housing Valuation and Housing Status: 1997

Owner Housing Valuation Approach	Housing Status	Median FCHU Expenditures
CE publication definition		
	All	$16,526
	Owners with Mortgages	$19,222
	Owners without Mortgages	$11,666
	Renters	$13,788
Owners' Imputed Costs		
	All	$16,351
	Owners with Mortgages	$17,562
	Owners without Mortgages	$14,602
	Renters	$13,788
Reported Rental Equivalence		
	All	$18,761

	Owners with Mortgages	$21,280
	Owners without Mortgages	$16,593
	Renters	$13,788

Assume CE Interview quarterly data are independent; weighted by families.

Garner and Rozaklis (2001) conclude their study by noting that thresholds tend to be the lowest when based on out-of-pocket approach, followed by those based on imputed housing costs. The highest thresholds are based on the reported rental equivalence of owners.

The authors leave the reader with several questions. For example, should the focus of the poverty measure be based on the expenses that people face and the income that they have to meet those expenses? Or should the measure be based on the costs of consumption or some basic needs and the resources available to provide for that consumption or to meet those needs? Are the CE expenditures that the panel used too high due to the fact that there is no accounting for the deduction of mortgage interest when one estimates their income taxes? Would the thresholds based on the hedonic model be higher if the model better accounted for differences in amenities such as quality of neighborhoods and dwellings?

If a consumption approach for the thresholds is assumed, a consistent measure of resources would be needed. In the panel's estimate for resources, there is no accounting for the value of the flow of services that owners obtain from their homes. Thus, owners with low or no mortgages have more of their incomes available for the consumption of items not covered by the basic bundle when the threshold is defined in terms of CE expenditures of reference families. Reference families tend to have relatively high CE expenditures since they tend to be homeowners with mortgages. The panel noted that by excluding values for this implicit income is to underestimate homeowners' resources relative to their poverty thresholds (Citro and Michael 1995, p.245). Valuing the implicit income from owner occupied housing has interesting implications especially for elderly households who own their homes and do not have mortgages or have very low mortgage interest payments. Ignoring this implicit income for the elderly means that households living in large value houses with substantial wealth and hence implicit income in the form of owner's equity are just as likely to be classified as poor as those in small inexpensive units. If it is assumed that elderly households can transform their home equity into a flow of guaranteed income using a reverse annuity mortgage, this equity could be used to increase their resources. Following this approach for resources, one could assume that this implicit income could be used to meet their basic consumption. As noted by earlier suggestions have been made to cap the implicit income added to resources.

Thresholds and Resources

There are two studies in which the owner occupied housing has been accounted for in both the thresholds and resources. These are those by Short et al. (1999) and Garner and Short (2001). Each is described in this section.

Short, Garner, Johnson and Doyle (1999)

In the Census report on experimental poverty measures, Short et al. (1999) made adjustments in the thresholds and resources to account for owner occupied housing. For the thresholds, they used earlier imputed rent and rental equivalence results from Garner and Rozaklis (1999). The imputed rent and rental equivalence thresholds differ in that the panel's recommended percentages of the median were used rather than the ones based on their re-estimations as in Garner and Rozaklis (2001). Also, for the latter Garner and Rozaklis (2001) study, imputations were included to account for the subsidy that renters living in subsidized housing implicitly receive. The thresholds in the Short et al. (1999) study do not account for housing subsidies to renters. Differences in the FCSU thresholds result due to updating of data in the CE file.

For resources, the authors attempted to produce an implicit income value from owner occupied housing based on the capital asset approach. However due to data limitations, only the benefit that home owners implicitly receive from their home equity is added to other income. The value of expected appreciation is not being counted but should be counted when a capital asset approach is used. The implicit income added to resources is based on applying a rate of return to the estimated amount of home equity. Thus, home equity in the owner occupied house is being treated as an asset from which the owner receives interest income. This is the approach followed by the Census Bureau in its annual publication of income. The rate of return chosen was the average rate of return on high grade municipal bonds from the Standard and Poors series.

Reference family thresholds based on the panel's approach, imputed rents, and rental equivalence were presented by the authors for 1995-97. Poverty rates were presented for 1997. Overall poverty using the official measure was 13.3 percent compared to a measure based on the panel's threshold and money income of 12.9. An imputed rent based threshold and money income resulted in poverty of 12.2 percent. When the official poverty thresholds were used, but money income was adjusted to income net return to home equity, poverty fell to 12.1 percent. When imputed rents replace owners' shelter expenditures in the threshold and net returns to home equity were included along with money income, poverty fell further to 11.0 percent.

Garner and Short (2001)

Garner and Short (2001) presented thresholds and resources that attempt to consistently account for owner-occupied housing in the experimental poverty measure. Four approaches were presented for thresholds. Two of these were based on shelter expenditures (the BLS CE definition of expenditures and expenditures outlays) and the other two on the costs of the consumption flows from owner occupied housing (reported rental equivalence in the CE and rental equivalence used in combination with the market of the owned home). A consistent resource measure with the first two threshold based measures would not include any addition to or subtraction from resources. Consumption based thresholds required adjustments to the resource side. The resource side was defined as money income, and when owner occupied housing was accounted for, an addition for net return to home equity as in the Short et al. (1999) research.

Thresholds based on owners' expenditures (CE publication and outlays) were presented along with those based on reported rental equivalence and an approach similar to that used for the National Accounts for Personal Consumption Expenditures (PCE). Defining housing costs for owner occupants in the last two ways contrasts with what the panel described as a "preferable definition." As noted earlier, the Panel's preferable definition of housing costs would include actual outlays for mortgage payments, taxes, insurance, and maintenance and repairs, plus an imputed amount for the estimated rental value of the home net of such outlays. The panel states that such an approach would treat homeowners and renters comparably. For homeowners with low or no mortgage payments such an approach would result in housing costs which are more comparable in size with the out-of-pocket expenditures of homeowners with mortgages. And yes, some imputed estimated rental value of the owned home would be included so that implicit housing services would be valued. However, given differences in the economy and mortgage markets, it is conceivable that homeowners with mortgages could have out-of-pocket expenditures that are higher than their imputed shelter costs. When this is the case, an inconsistency in concept across homeowners would exist. The housing costs of homeowners with low or no mortgages would be based primarily on imputed shelter costs while those of homeowners with high mortgage payments and associated costs would be based on out-of-pocket expenditures. Following the panel's definition, owners with high mortgage payments and other large expenditures would be treated differently than other homeowners and renters living in similar types of dwellings and in the same areas.

The authors reported average expenditures and consumption values of owners with mortgages, owners without mortgages, and renters. The mean imputed housing expenditures for all renters are approximately $5,700 compared to $6,700 for reference family renters. The highest housing values are for owners. For all consumer units the costs range from approximately $9,600 based on the CE publication definition to $12,800 based on reported rental equivalence. Reference families with mortgages have housing costs that range from about $700 to $1,600 higher than the population at large (including reference families). Housing costs represent approximately 43 percent of CE publication and outlays food, clothing, shelter, and utilities (FCSU) expenditures. The share increases to 51 percent once imputed rents are assigned to owner occupants. The ratios are somewhat closer for the reference family. The share based on the CE definition of housing is 43 percent while that based on reported rental equivalence is highest at 49 percent, only slight higher than those based on the two other remaining measures. The implication is that different multipliers and percentages of the median should be used when the definition of shelter differs from the one used by the Panel as noted earlier in the Garner and Rozaklis (2001) study.

Among housing status groups, owners with mortgages have the highest out-of-pocket housing expenditures, as well as the highest costs using outlays, reported rental equivalence, and BEA imputed rents. For all consumer units, housing costs based in some part on rental equivalence are higher for owners with mortgages than for other groups. However, for the reference sample, the highest housing costs are those based on outlays. This is likely since this group is likely to have newer mortgages with higher costs and may live in higher cost areas. Not surprisingly, owners without mortgages gain the most from using the rental equivalence based approaches.

Shelter values based on reported rental equivalence resulted in higher estimates than those based on the hedonic model. This would not be surprising if the respondents answer the rental equivalence question with respect to their neighborhoods, and current housing expenditures. Houses with higher mortgages could be in neighborhoods with more amenities. Or it could just be that respondents think that their homes are worth more on the rental market than they actually are. On the other hand, the reported rental equivalence values are likely to be capturing variations in housing and neighborhood quality that hedonic approaches do not.

Garner and Short (2001) assessed the importance of accounting for owner-occupied housing in a poverty measure by looking at the way it changed measured poverty rates (see Table 1). In the year 2000, the official measure of poverty, which does not take account of owner-occupied housing, showed that 11.3 percent of all persons were in a family with income below the official poverty threshold. Changing from the official thresholds to an experimental threshold, but using money income, increased the overall poverty rate slightly to 11.7 percent and also increased poverty rates for nearly every subgroup of the population examined. When using out of pocket expenditures or outlays for thresholds and money cash income raised poverty rates by over a percentage point to 12.9 percent for 2000. When the value of net return to home equity was added to money income, but official thresholds were used, 10.2 percent of the population is poor. So that including net return to home equity and subtracting property taxes reduces the national poverty rate by almost a full percentage point. They reported that the effect is much greater for groups that tend to have more home equity. One important group is the elderly. When their incomes include net return to home equity, the subsequent fall in poverty rates is quite large, from 10.2 percent poor under the official measure to 6.7 percent with net return to home equity. Other groups with large declines are families with no workers and female householder families, both groups that tend to include a large percentage of elderly.

Rental equivalence in the threshold and net return to home equity added to money income results in poverty rates for all people were 13.1 and 13.6 percent depending upon with rental equivalence approach was used. For the elderly, 11.6 percent are classified as poor using the CE definition (panel's) of expenditures and 13.2 percent when payments to mortgage principal are included. Only 10.8 percent of elderly are poor when we add net return to home equity to income and use rental equivalence to value owner occupants' shelter cost in the threshold.

IV. Methodological and Technical Issues that Arose

In conducting the research cited above, the researchers often highlighted issues assumptions underlying a revised poverty measure, as well as methodological and technical issues. For example, should the focus of the poverty measure be based on the expenses that people face and the income that they have to meet those expenses? Or should the measure be based on the costs of consumption or spending needs and the resources available to provide for spending needs or consumption? In economics, actual expenditures and implicit expenditures to represent consumption, for example, are equally valid measures of expenditure.

If a consumption approach for the thresholds is assumed, a consistent measure of resources would be needed. In the Panel's estimate for resources, there is no accounting for the value of the flow of services that owners obtain from their homes. Thus, owners with low or no mortgages have more of their incomes available for the consumption of items not covered by the basic bundle when the threshold is defined in terms of out-of-pocket expenditures of reference families. Reference families tend to have relatively high out-of-pocket expenditures since they tend to be homeowners with mortgages. The Panel noted that by excluding values for this implicit income is to underestimate homeowners' resources relative to their poverty thresholds (Citro and Michael 1995, p.245).

Valuing the implicit income from owner occupied housing has interesting implications especially for elderly households who own their homes and do not have mortgages or have very low mortgage principal and interest payments. Ignoring this implicit income for the elderly means that households living in large value houses with substantial wealth and hence implicit income in the form of owner's equity are just as likely to be classified as poor as those in small inexpensive units. Elderly households living in large value housing *are consuming* that level. Some have suggested that implicit income from this housing be capped (e.g., Ruggles 1990). One approach suggested is to cap the amount of implicit income from owner occupied housing at the level of the shelter component in the poverty thresholds as defined in terms of out of pocket expenditures (Citro and Michael, 1995, p. 246). In part this is the approach presented by Betson (1997) although he limits the implicit income to mortgage principal and interest payments.

However, some younger households may be spending more for the mortgage principal and interest payments as owner occupants than the implicit value of these included in their threshold. Should the additional expenses of these households be subtracted from resources? Betson (1997) indicates no. However, if an approach for resources were to be used, based on some shelter spending standard, with expenditure for mortgage principal and interest subtracted, why not enter a net negative for these households?

If an expenditures approach is used, as suggested by Betson, the deductibility of mortgage interest needs to be accounted for in the calculation of the implicit additional income that the owner occupant has available to spend for other commodities. There needs to be a downward adjustment for this so that a smaller amount is subtracted from the normative mortgage interest in the thresholds. In other words, given that mortgage interest is tax deductible, the actual out of pocket expenses for these by the owner occupant is less than what is most likely to be reported by respondents for mortgage interest. When this tax deductibility is accounted for, the implicit income added to resources will be higher than the implicit income recommended by the Betson approach.

Methodological and technical issues mostly involve data and the application of assumptions. For example, regardless of the threshold and resource approach selected, assumptions regarding the data are needed. What data are best to derive the thresholds and resources? The CE collects data on expenditures (CE publication defined and outlays), reported rental equivalence, and housing characteristics. This information can be used to estimate the any of the thresholds proposed.

If an expenditure approach is used, or one based on user costs, would gross nor net property insurance premiums be included? Also care needs to be taken to distinguish operating expenses from expenditures associated with renovations or additions.

If the assumption is that the threshold is based on some “needs” standard and that these needs are those of the two adults with two children family, are “needs” to be defined as consumption or expenditures. With the thresholds based on a different underlying concept, the multipliers would have to change as noted by Garner and Rozaklis (2001). If consumption is the basis of the threshold, how is consumption to be estimated? If reported rental equivalence is used, how good are the CE reports of these? Currently a relatively large percentage of these reports are being imputed in the CE. How good is the imputation? A staff member in the CE office is currently working on this issue.

If hedonic regression is to be used to estimate the value of owner shelter consumption, what model specification is most appropriate? Are there additional variables needed, for example, neighborhood characteristics? Are rents in the data file market rents? Garner and Rozaklis (1999, 2001) estimated rent plus expenditures reported by renters for maintenance and repairs, housing property taxes, and property insurance since renters did report these. Then the same bundle of expenditures was imputed for home owners. Is this assumption valid?

For the rental equivalence approach in estimating thresholds, Garner and Rozaklis (1999, 2001) assumed that the additional rental costs (i.e., maintenance and repairs, property insurance) reported by renters are implicitly included in reported rental equivalence. Property interest and property taxes were also assumed to be implicitly included in reported rental equivalence. Is this a valid assumption?

When a user cost of capital approach is used to value owner housing services, for the threshold and resource measures, the components of cost (e.g., maintenance and repairs, taxes, insurance, etc.) would need to be included as separate items in the estimation. Then the tax deductibility of property interest and property taxes could more directly be dealt with. Currently marginal personal income tax rates are not available in the CE, CPS, or SIPP. What could be proposed?

For resources, the most straightforward approach might be to estimate an implicit income from owner occupied housing by applying a rate of return to the home equity. But there are data challenges associated with this approach. The CPS does not collect information on home equity. This is currently being imputed using data from the American Housing Survey statistically matched to the CPS. However, this matching and production of home equity is not done on an annual basis at the Census Bureau. Since market values can change from year to year, the estimates are likely to not reflect current conditions. Another issue regarding this approach is what rate of return to use. In the approach used by Short et al. (1999) and Garner and Short (2001) all net negative home equity values were deleted. Since property taxes should not be deducted if one uses a capital asset approach, not subtracting property taxes would eliminate the need to deal with negatives.

The implicit income in the market value of owner occupied housing was not considered by any of the researchers. However, if this income were to be included, changes in market values would be needed.

If the Betson approach were to be used, the income tax rate of the household would be needed in addition to the mortgage principal and interest payments.

V. Question Regarding Normative Issues in Choosing an Alternative Measure

Regardless of the measure selected, the following questions must be answered in the affirmative:

- Can the alternative measure be explained to the public?
- Is it statistically defensible?
- Is it operationally feasible?

Once these are answered, then others follow. For example, should renters and owner occupants be treated the same or differently in the poverty measure?

For expenditure based approaches, should separate thresholds be produced for renters and owners? If different thresholds are produced for owners, how would one decide what is the cut-off for high versus low expenditures for owners with and without mortgages in order that separate owner thresholds be produced? Which owner shelter expenditures would be included?

The panel recommended that the spending of the reference family serve as the basis of the normative need for shelter. Currently a larger percentage of reference families are owners with mortgages than in the population in general with higher out of pocket expenditures on average. How can an expenditure based measure of need be justified when mortgage markets change? It is acceptable to allow spending needs to represent more than the value of housing consumption for owner occupants?

For housing services based approaches, what are the trade-offs of a rental equivalence based approach versus a user cost approach? What segments of the population would be impacted?

Should implicit incomes from owner occupied housing be restricted on the resource side so that they are not higher than some value and not less than zero? If so, at what levels should they be capped? Should owner shelter expenses that are greater than some normative be subtracted from resources? Who would be affected?

Should the appreciation in one's owned home be counted as implicit income in resources? What about implicit income from others durables being counted as implicit income?

Depending on the alternative, consumption or spending, how and would one account for employer-provided services and those provided by governments including food, health care, rental housing, etc. in thresholds and resources? The panel's thresholds included the implicit expenditure for food and rent provided as pay and the cash value of food stamps. Garner and Rozaklis (2001) included an imputed value for rental subsidies in the thresholds.

VI. Pros and Cons of Alternative Methods

Thresholds

The primary advantages of the reported rental equivalence approach to account for owner occupied housing in the thresholds, used in several of the studies (Johnson, Shipp, Garner 1997; Garner and Rozaklis 1999, 2001; Short et al. 1999; Garner and Short 2001), are that it is based on accepted economic theory, it is simple, easily explained, statistically defensible, and operationally feasible given that the data are available in the CE. A potential disadvantage relates to data quality. Additional research needs to be conducted to determine how reliable consumer unit responses are to rental equivalence.

The primary advantages of the hedonic approach to impute rents for owner occupied shelter consumption (see Garner and Rozaklis 1999, 2001) are that it is based on accepted economic practice, statistically defensible, and operationally feasible. Possible disadvantages include the massive amount of data that are required and that statistical modeling using regression analysis is required.

Resources

The advantages of the Betson (1997) approach are that it is simple and requires little additional data be collected. An implicit income value is added to resources when the normative or "needed" mortgage expenses (principal payment and interest) for the household, based on their estimated threshold, are greater than the out of pocket mortgage principal payment and interest. For owner occupants with no mortgage, the full value would be added to resources. For owner occupants with a mortgage, a value would be added only when the difference is positive. Another advantage noted by Betson (1997) is that "it focuses directly upon the ability of the household to meet its needs given its current situation and not a hypothetical situation envisioned though the use of the net imputed rent" (p. 13). However, this is not entirely correct, as the implicit mortgage payment and interest payment norm is hypothetical and has nothing to do with the implicit value of housing services consumed by the homeowner and thus this could be considered a disadvantage of the model.

Other disadvantages include that the Betson approach is not based on accepted economic approaches to account for owner occupied housing in consumption or income. Betson is not concerned with this and discounts traditional economic reasoning (p. 12). Also a specific percentage of shelter expenses is assumed in the model for the mortgage principal and interest payments as a share of shelter expenditures. Whether this is stable over time and how applicable it is to each owner occupant is not examined.

Another assumption underlying the Betson (and panel's approach) is that the "need" as defined by spending in the threshold is the normative. What are the implications of using this normative rather than one based on the value of the flow of services from consuming housing services? Due to the fact that the majority of two adult-two child consumer units own their homes with mortgages, the normative level of shelter spending is based on what the fact that these homeowners have incurred debt for this spending. What would the implication be for normative shelter expenditure "needs" if the threshold were based on the expenditures of mostly owners with no mortgage? Spending needs would be less, but not consumption needs.

The advantages of the approach used by Short et al. (1999) and Garner and Short (2001) to account for owner occupied housing in resources are that it is simple, in part based on accepted economic practice, and operationally feasible. The approach used is based on the user cost of capital approach. Following this approach, property taxes however should not be subtracted from the return from home equity. And the implicit appreciation in market value should be added.

The major disadvantage of the approach used in these studies is that data are not readily available in the CPS and imputations, based on statistical matching, are being used. As noted in Garner and Short (2001) the match is not always current and thus missing changes in market conditions. It is recommended that market value and mortgage debt information be collected in the CPS if it continues to be used for poverty measurement. However, the SIPP does collect this information. If there is an interest in including the value of unrealized capital gains or losses in the poverty measure, data on the market value at the beginning and end of the year would also be needed. Different rates of return could also be tested for sensitivity.

VII. Final Comments on Methods to Account for Owner Occupied Housing in Poverty Measurement

It is imperative that owner occupied dwellings are treated consistently on the threshold and resource sides in any poverty measure. Consistency within thresholds and within resources is also needed. For example, if a rental equivalence approach is used for the thresholds, no other expenditures associated with owner occupied housing should be included or subtracted from thresholds. Net implicit income from owner occupied housing would be added to resources.

If there is an argument that there is no rental market and thus rental equivalence cannot be used, the user cost approach can be applied *without* the assumption that there is a rental market. In this case, the focus would be on using up capital and the appreciation of that capital. If there is a preference not to use the user cost approach and there is no rental market, the only consistent other alternative is to use the out-of-pocket, or outflows, approach to value household expenditures and not to add any imputed net implicit income from owner occupied housing to resources. The expenditures based measure will not reflect consumption needs, only what the reference family at the median pays for shelter.

To be consistent with other major economic series, e.g., the National Accounts and the Consumer Price Index, rental equivalence would be used for the poverty measure as the value of the flow of services of owner occupied housing. This value *would NOT be* reduced by housing costs for consumption expenditures. However for household resources, implicit income based on rental equivalence plus appreciation *would be* net of housing costs for resources. The housing costs deducted to arrive at implicit net income from owner occupied housing would only be those that an owner-landlord would incur. In the tabulation of consumption expenditures, no where in the set would these housing costs appear: they would not be subtracted, they would just never appear.

Further research needs to be conducted to produce estimates of rental equivalence (using direct questioning or hedonic models) and user cost of owner occupied housing. The direct questioning method to estimate rental equivalence could be presented as a willingness to pay type of question or as what the rent the owner would charge someone else. Both approaches are valid. Cognitive research should be supports to determine the consistency across the approaches. As far as I know, no work has yet to be done on the user cost of owner occupied housing for poverty measurement.

Regardless if the rental equivalence, user costs, or out-of-pocket approach is used, specific data will need to be collected in order to follow though with a consistent definition of thresholds and resources. The user cost approach has greater demands of any statistical office as depreciation rates, interest rates, appreciation rates, etc. need to be selected before the approach can be implemented. However, the advantage of the user cost approach is that it can be applied in geographic areas with no rental markets.

References

Betson, David, “Effect of Home Ownership on Poverty Measurement,” University of Notre Dame, Poverty Measurement Working Paper, Census Bureau web site, April 7, 1997.

Citro, Constance F. and Robert T. Michael (eds.), *Measuring Poverty: A New Approach*, Washington, D.C.: National Academy Press, 1995.

De Leeuw, Frank and Raymond Struyk, *The Web of Urban Housing*, Urban Institute Press, Washington, D.C., 1975

Diewert, Erwin, “CPI Chapter 23: Durables and User Costs,” Forthcoming in Prices Manual, September, 2003.

Diewert, W. Erwin, “Harmonized Indexes of Consumer Prices: Their Conceptual Foundation,” paper presented at the Joint Meeting of the Centre for Economic Policy Research and the European Central Bank: Issues in the Measurement of Prices Indices, Frankfurt, November 16-17, 2001 (paper revised February 28, 2002).

Dougherty, Ann and Robert Van Order, “Inflation, Housing Costs and the Consumer Price Index,” *American Economic Review*, Vol. 72, No. 1, March 1982, pp. 154-164

Follain, James R. Jr., “Does Inflation Affect Real Behavior? The Case of Housing,” *Southern Economic Journal*, January 1982, pp. 570-582

Follain, James R. Jr., and Stephen Malpezzi, “Are Occupants Accurate Appraisers?” *Review of Public Data Use*, Vol. 9, 1981, pp. 47-55.

Garner, Thesia I. and Patricia Rozaklis, “Accounting for Owner Occupied Housing in Poverty: Focus on Thresholds,” *American Statistical Association (ASA) Proceedings of the Section on Government Statistics and Section on Social Statistic,* 1999.

Garner, Thesia I. and Patricia Rozaklis, “Owner-Occupied Housing: An Input for Experimental Poverty Thresholds,” SGE-ASSA Annual Meeting, New Orleans, Louisiana, January 6, 2001, Poverty Measurement Working Paper, Census Bureau web site.

Garner, Thesia I. and Kathleen S. Short, “Owner-Occupied Shelter in Experimental Poverty Measures,” Southern Economics Association Annual Meeting, Tampa, Florida, November 1, 2001, Poverty Measurement Working Paper, Census Bureau web site.

Gill, H. Leroy and Donald R. Haurin, “User Cost and the Demand for Housing Attributes,” *AREUEA Journal*, Vol. 19, No. 3, 1991, pp. 383-395.

Gillingham, R.F., “Place to Place Rent Comparisons,” *Annals of Economics and Social Measurement* 4, 153-173, 1975.

Gillingham, R.F., “Measuring the Cost of Shelter for Homeowners: Theoretical and Empirical Considerations,” *The Review of Economics and Statistics*, Vol. 65, Issue 2, May 1983, pp. 254-265.

Glaeser, Edward L. and Jesse M. Shapiro, *The Benefits of the Home Mortgage Interest Deduction*, Harvard Institute of Economic Research Discussion Paper Number 1979, October 2002.

Goodman Jr., John L. and John B. Ittner, "The Accuracy of Home Owner's Estimates of House Value," *Journal of Housing Economics*, Dec 1992, V. 2 No. 4 PP 339-357.

Greene, William H. *Econometric Analysis*, First Edition, New York: MacMillan Publishing Company, 1990.

Green, Richard K. and Stephen Malpezzi *A Primer on U.S. Housing Markets and Housing Policy*, AREUEA Monograph Series No. 3, Washington, DC: The Urban Institute Press, 2003.

Hendershott, Patric H., and James D. Shilling, "The Economics of Tenure Choice, 1955-1979," in *Research on Real Estate*, edited by C.F. Sirmans, New York: JAI Press, 1982.

Johnson, David, Stephanie Shipp, and Thesia I. Garner, "Developing Poverty Thresholds Using Expenditure Data," *in Proceedings of the Government and Social Statistics Section*, Alexandria, VA: American Statistical Association, August 1997, pp. 28-37.

Jorgensen, Dale, "Inflation and Corporate Capital Recovery," in C. R. Hulten (ed.), *Depreciation, Inflation, and the Taxation of Income from Capital,* Washington, The Urban Institute Press, 1981 (with M.A. Sullivan), pp. 171-238.

Jorgenson, Dale *American Economic Review,* vol. 53, May 1963, pp. 247-259.

Keil, Eric, Unpublished tabulations regarding rental equivalence from the CE Interview Survey 2002, email communication, Bureau of Labor Statistics, Division of Consumer Expenditure Surveys, Washington, DC, May 27, 2004.

Lebow, David E. and Jeremy B. Rudd (2000), "Measurement Error in the Consumer Price Index: Where Do We Stand?" *Journal of Economic Literature*, Vol. XLI, March, pp.159-201.

Malpezzi, Stephen, "Chapter 12: Housing," *Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 years of the Living Standards Measurement Study, Volume One*, Margaret Grosh and Paul Glewwe (eds.), Oxford University Press and the World Bank, May 2000.

Malpezzi, Stephen, Gregory H. Chun, and Richard K. Green, "New Place-to-Place Housing Price Indexes for U.S. Metropolitan Area and their Determinants," *Real Estate Economics*, Summer 1998, Vol.26, No. 2, 1998, pp. 235-274.

Malpezzi, Stephen, Larry Ozanne, and Thomas Thibodeau, *Characteristic Pries of Housing in 59 SMSAs*, Washington, DC: The Urban Institute Press, 1980.

Moulton, Brent, "Interarea Indexes of the Cost of Shelter Using Hedonic Quality Adjustment Techniques," *Journal of Econometrics*, 68, 181-204, 1995.

Ozanne, Larry and Stephen Malpezzi, "The Efficacy of Hedonic Estimation with the Annual Housing Survey, Evidence from the Demand Experiment," Journal of Economic and Social Measurement, Vol. 13, 185, pp.153-172.

Poterba, James M., "House Price Dynamics: The Role of Tax Policy and Demography," *Brookings Papers on Economic Activity,* 2, 1991, pp. 143-203.

Ruggles, Patricia, *Drawing the Line—Alternative Poverty Measures and Their Implications for Public Policy*. Washington, D. C.: The Urban Institute Press, 1990.

Short, Kathleen, Thesia Garner, David Johnson, and Patricia Doyle, *Experimental Poverty Measures: 1990 to 1997*, U.S. Census Bureau, Current Population Reports, Consumer Income, P60-205, U.S. Government Printing Office, Washington, D.C., June 1999.

Thibodeau, Thomas G., "House Price Indices from the 1984-1992 MSA American Housing Surveys," *Journal of Housing Research*, Vol. 6, Issue 3, 1995, pp.439-481.

Verbrugge, Randal, notes on user cost of owner occupied housing and email communication, Bureau of Labor Statistics, Division of Price and Index Number Research, Washington, DC, June 4, 2003.

Yezer, Anthony, “Issues of Return to Home Equity and Rental Equivalence: Implications for Poverty Measurement,” notes, George Washington University, Washington, DC, November 6, 2002.

Yezer, Anthony, personal communications via email, May and June, 2004.