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# Spatial Comparisons of Costs of Housing Services

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## Summary

Most countries measure changes in the housing cost component of their CPI based on a sample of rented dwellings for which periodic surveys measure changes in rents. Changes in the value of rental services of owned homes have been estimated applying a user cost approach or often by assuming that they will follow the trend of rented units. In temporal comparisons several housing types are usually distinguished by size of unit and whether it is single family, multiple units and the like. Spatial housing indexes have typically followed a similar methodology, particularly in the EU where matched models are distinguished within a limited range of housing types. This paper reviews some of the issues in spatial comparisons since the inception of the ICP in 1968 through the plans for the 2004-5 comparisons now under way. The principal focus of the paper is on two issues, rental equivalence for home owners as a problem of asymmetric information, and spatial rental differences as a measure of costs versus amenities.

## Introduction

Current services of housing are often 25% or more of reported consumer expenditures, so it is very important that temporal and spatial variations in costs for comparable dwelling services are carefully done. Even though there is still a very substantial literature, it is doubtful that statistical authorities devote near the proportion of resources to housing as to other categories of expenditure. Fortunately there are two recent papers by Erwin Diewert (2003) and Sergei

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Sergeev (2004) that respectively provide a theoretical and practical treatment of these issues.

While Diewert focuses on temporal indexes in the context of consumer price indexes his framework is perfectly general and sets out the two principal ways one might carry out comparisons of owner occupied housing. These are estimation of user cost or replacement cost, both of which involve estimation of depreciation of the asset, as well as the expectation of future appreciation and the opportunity cost of capital. The second approach is to survey rents of the same dwelling at two points in time applying changes in rents to owner occupied housing.

In Part A of this paper I set out past practice in spatial comparisons in the international context as well as some inter-area comparisons within countries. This discussion focuses on the early experience in the International Comparison Programme (ICP) of the United Nations and the experience of the EU, OECD and Eastern European and CIS countries as described in Sergeev (2004)

Part B deals with the practice of applying rental surveys across space to owner occupied housing. Typical practice has been to assume that rent of a dwelling as captured by the major rent determining factors like size, number of bathrooms, and an approximation of neighborhood quality can be applied to similar owner occupied dwellings. Analysis of a rental survey of dwellings used in the United States suggests that at a minimum, this practice is likely to err in the direction of underestimating the flow of housing services from owner occupied dwellings. As by-product of the ICP, a number of intra-country rental indexes were also estimated and are part of the basis for discussions of regional rent differences.[2]

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[2] For example, hedonic rent regressions for the United States are typically improved if the major regions are introduced as classificatory or dummy variables. A significant part of this paper draws on experience gained from the Cost of Living Allowance (COLA) program of the Office of Personnel Administration of the United States Government. Housing is one of the most important and most difficult of the comparisons required under this program that is directed at comparing the costs of living for federal employees in the non-continental US to Washington DC. These COLA areas include Alaska, Guam, Hawaii, Puerto Rico, and the US Virgin Islands, which offers a very diverse range of climates and housing needs. As part of research under this program Rakesh Kochar of Joel Popkin and Company in Chapter 3 of their report

Part C takes up the basic question of how to interpret spatial differences in rent for comparable physical amenities. Location cubed is the mantra on housing markets of professional real estate agents suggesting that physical dwelling characteristics are secondary. The issue that concerns us is to what extent spatial rent differences are a reflection of the amenities of the location or are costs. This issue often arises as employers decide whether to pay a housing allowance or try to compensate employees in other ways to work in communities with high rents or house prices. In this some illustrations of employer practice are provided as well an illustration of how these issues can play out in housing markets as diverse as Alaska and Hawaii.

## Part A: International Comparisons of Housing Service PPPs

In the 1960s the ICP approach to comparisons across countries was to follow a matched model, a common procedure in time to time price comparisons. However, this left the question of the domain of price somewhat unclear. In the ICP the PPP was primarily a deflator for components of national accounts in national currencies. In principle a national average annual price would be the appropriate concept since it should have been used to value quantities in the national accounts. For housing, however, there are in addition to location, at least three major problems in getting good quantity comparisons across countries.

**Problems in Comparing Housing Services Across Countries**

First, valuation of 50% and in some countries up to 90% or more of housing services may be by imputation because they are either owner-occupied or they are provided by governments or enterprises in kind, e.g., as a condition of employment. Second, there may exist only a very thin rental market, so valuation of owner-occupied housing often must be done with inadequate information about rents for comparable dwellings. And third, governments often

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evaluated housing based on a 1998 survey of employees. This chapter also contains a summary of earlier literature. This report is on the OPM website under COLA program. (http://www.opm.gov/oca/cola/html/app-a.pdf)

control rents and/or subsidize housing so that rental surveys must distinguish market from non-market rents. Sergeev (2004) has provided a detailed discussion of many of these problems as they emerged during the work on integrating many of the formerly planned economies into the European Comparison Programme (ECP) and ICP framework.

The way these problems have been handled has often been on a country by country basis within a broad framework of comparing like with like. The first task is typically to find out how the rental value of dwellings has been imputed in the national accounts. This is important so as to obtain the appropriate quantities when expenditure ratios in two countries are divided by price ratios (rental parities). Also, if subsidies or rent controls are involved, their treatment in the national accounts should be consistent with how the rents for these dwellings are treated in surveys. Another important reason for understanding national accounts is that often these techniques may be applied for spatial comparisons, and/or may be improved upon by introducing techniques used in spatial comparisons.

The method used in the ICP has been some variation of a matched model. Some cells of typical housing by type of structure, age, floor area or number of rooms and number of bathrooms has been used in the EU and OECD comparisons. Countries can fill in their estimates for each rent cell from special surveys (common in the EU), or from hedonic estimation (U.S, for example). Weights are available from housing censuses and the overall index can be generated in a variety of ways. An EKS procedure using Paasche, Laspeyere, or Fisher binaries for each pair of countries is one type of procedure.[3] An alternative multilateral procedure is to estimate a weighted CPD regression across the cells and countries involved in the comparison.[4] The rents in these comparisons are usually from large cities or one capital city, and in theory,

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[3] Usually the EU computes its EKS estimates from each heading using a Fisher index. Weights involving the importance of the item in each heading can produce Paasche and Laspeyere indexes from which the Fisher is derived. For rents there are quantity weights from housing censuses.
[4] This was the approach used in the first three reports of the ICP. See for example, Kravis, Heston and Summers (1982), pp. 54-59.

though often not in practice, moved to a national urban average rent applying a factor derived from an ad hoc survey.

While appropriate when the EU and OECD were smaller, these techniques are not adequate for economies with very small rental markets such as characterize the formerly planned economies or developing countries with very large rural populations. For these economies cell rents can still be estimated but the range of facilities for poorer countries will be larger so as to include dwellings without indoor plumbing, piped water, or electricity that must somehow be brought into the comparisons. In the 1975 ICP comparisons a total of 61 such cells were used with countries typically filling in 10 to 20 cells, but with enough overlap for all cells to be filled by several countries.[5]

For rural dwellings or thin rental markets some type of user cost approach has been typically applied. For example, in the 1975 ICP comparisons, there were national housing agencies that provided estimates of the cost of minimal rural dwellings. With assumptions about depreciation and interest an annual flow of rental services can be estimated. Often a methodology like this is used in the national accounts for countries with large numbers of rural dwelling with few amenities and expected short service life. An important point to be remembered is that land costs and any expected appreciation in property values are not included in these types of estimates.

It is fair to say that inter-country comparisons of rents have attempted to compare like with like to the extent physical characteristics of dwellings were adequately surveyed. However, as already noted for the OECD, the comparisons have been limited to urban areas, and in Europe, typically one to three cities per country. In theory, but often not in practice, these urban rents are moved to a national average based upon a factor from some prior ad hoc survey. Also, following national practice, the assumption is made in international comparisons that owner-occupied dwellings with similar measured characteristics will rent for the same as those obtained from surveys of market rents. This

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[5] There were 34 countries and a total of 619 observations, or about 18 per country, which, if evenly distributed, would yield just over 10 rental estimates per cell.

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assumption is examined in Part B of this paper. The main point is that there is some expectation that owner-occupied dwellings are likely to be of higher quality and therefore provide a larger flow of services than seemingly comparable rented dwellings.

Finally, international comparisons of urban rents have typically aimed for middle level housing, excluding very large properties, or high end neighborhoods, like Georgetown, in Washington, and have probably excluded very poor neighborhoods. There has been no specific controls for matching locations, or taking account of any amenities, like crime, congestion, museums, pollution, public parks, and the like. Thus far, despite many discussions, international comparisons have not tried to measure how extremes of climate across countries would modify reported results of benchmark studies.

## Experience in Comparing House Rents Within Countries

There is keen interest in housing costs within countries with many private firms offering services to households who are deciding whether to relocate within a country. Typically local taxes and house rents or prices are the major factors in the decision to move to another city. Employers, private and public, frequently claim to, or actually do, take into account differences in housing costs in determining salaries and allowances. The methodologies used by employers or service providers vary greatly in ambition. One approach is to compare house prices for similar physical facilities, with some attempt to hold location constant and perhaps some discussion of the prospects of appreciation. Other studies take into account both rentals and sales, typically for a quite selective set of neighborhoods across cities. In the United States there are ongoing estimates of spatial rental costs using hedonic regressions based on the Consumer Expenditure Survey, or other surveys.

Where allowances are provided by governments, international organizations, and other employers there is a major identification problem in separating costs from amenities. States, like Florida for example, provide higher salaries for teachers in certain counties base on the cost of housing. Often foreign governments provide different allowances for staff living in New York

versus Washington, DC.  Such examples including the COLA program of the US government are discussed in Part 3.  While it is easy enough to understand why the Southwestern United States has been an area of substantial in-migration it remains doubtful that we know enough to introduce the value of amenities in different locations into spatial comparisons of incomes.

## Part B: Treatment of Owner-Occupied Housing Across Space

The assumption commonly used in national statistics is that the rental services of owner-occupied houses are the same as comparable rented units as best one can hold the physical and location characteristics of dwellings constant. This is commonly assumed when obtaining the weight for owner occupied housing in constructing price indices; and in some countries the assumption plays a role in deriving corresponding quantity measures of housing services, income, and production for national accounts. However, housing involves many features that are very hard to measure so homeowners know much more about their dwellings than do prospective renters.  Invoking the asymmetry of information framework, one would expect those rentals entering the market to be of lower quality for features that one cannot readily measure, than owner-occupied units.  It would follow that the flow of rental services is understated in consumer expenditure surveys that involve enumerators imputing a rental value to owner occupied units.  With respect to the national accounts it would really depend on the exact method that is used for benchmark imputations of the rental flow from owner occupied housing.[6] This question will be briefly examined in the next section.  For now we concentrate on two questions. Does the bias exist? And if so, is it significant enough in size to cause concern?

**Homeowner Valuations of Their Rental Equivalent**

In the United States, the Bureau of Labor Statistics (BLS) obtains a weight for owner occupied homes that is a response to the following question in the Consumer Expenditure Survey (CES).

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[6] Since owner occupied housing enters both the expenditure, production and income accounts, the exact method used may depend on which group is given the estimation task.  The revised SNA is silent on this point so country practice must vary.

*"If someone were to rent your home today, how much do you think it would rent for monthly, unfurnished and without utilities?"* [7]

What will responses to this question tell us? First, the responses will provide a weight, which in December 2001, was 22 % of the household expenditures, the total of shelter being 31.5%. Second, the CES question tries to elicit an accurate imputation of the rental services of owner-occupied houses and whether it does so is a question taken up below. First, how are the results used in the CPI?

**Price Change of Owner-Occupied Housing in the CPI**

In terms of the CPI price change the US introduced rental equivalence between 1983 and 1985 with a major change in method in 1987. A special housing survey of renters was used until 1987 to estimate implicit rents for owner occupied units. A new housing survey in 1987 involved both rented and owner-occupied dwellings. The data collectors worked with the owners to match their dwelling with rented units of given size, structure type, age, type of air conditioning and of course, location. The change in rents for the sample of rental units for the various types of housing was then applied to similar owner-occupied units. This required a significant amount of resources and a re-weighting of the rent sample, when in fact the main housing characteristic associated with rent changes is location. As a consequence, BLS returned to the simpler method of 1983-87 that assigned changes in rents in rented housing to owner-occupied units in the same geographic location.

The design of the 1999 survey of renters was informed by research showing that the most important determinant of rent change was not the type of unit but the location. When geographic location and level of rent was held constant, matching of owner-occupied with rental units added little to estimates of rent change. So in 1999 the BLS returned to the practice of applying the rental change to owner-occupied units using a stratified sample based upon geographic location, which associates rental units with similar owner-occupied units.

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[7] (BLS,12/4/2003:bls.gov/cpi/cpifact6).

## The Level of Owner Occupied Rents

In responding to the CES question about what would be the rent of their dwelling, how good an approximation will respondents provide? First, some property owners will be knowledgeable of the rental markets, or have some experience of rentals in their neighborhood, or will have rented their home before. These homeowners can provide an informed response, but others will have much less basis for their estimate. So for starters, the response is likely to be subject to substantial variance about truth.

Will the responses center on truth? This also seems doubtful. Most homeowners are likely to value distinctive features of their homes more than would the market. A purple bathroom with hot tub may not be worth much in the rental market, but will to the owners who paid to add these features. Let us refer to this source of upward bias as the *pride factor*.

There is also a second factor that is likely to lead homeowners to respond to the question with a higher rental of their housing than would the market, given measurable characteristics. This arises because of the asymmetry of information available to rental agents and potential renters compared to the homeowner who possesses much more knowledge of the unmeasured quality features of the house. Because most surveys gather gross physical characteristics of housing and distinguish very broad differences in quality, like dilapidated versus say average condition, or good versus poor neighborhood, there are many features of a dwelling not captured in rent surveys. The expectation is that based on features of rented units from a survey, the same owner-occupied home would have a higher rental value because lower quality homes tend to enter the rental market. The second factor will be termed unmeasured quality factor.

Our argument is that both homeowner pride and the unmeasured quality factor of owner-occupied units will lead to responses of higher rents for owner occupied homes in surveys asking the CES question. If this proposition is correct, how big are these factors in total? And can we distinguish between the two? And should we care?

We should care for two reasons.  First, if the pride factor is very important then the weight to owner-occupied units is likely to be too high.  And second if the unmeasured quality factor is important, then it may raise questions about the contribution of housing services in consumer expenditures as compared to the national accounts.   Before speculating on this, let us turn to the some results.

The empirical work reported below is based upon a survey of Federal Government employees as part of a Safe Harbor process involving research on the Cost of Living Allowance or COLA program administered by the Office of Personnel Management.  The COLA program began in 1948 and pays an allowance above the federal salary schedule in three areas Alaska, the Caribbean and the Pacific based on relative prices for consumption items in the areas relative to the Washington DC area.  The program came under litigation and as a by-product research was undertaken to improve the methodology of the comparisons.  One part of this research included the largest component of consumption, rental services.  In addition to surveys of real estate firms a mail survey of employees covered a large number of dwelling characteristics for both renters and homeowners.  In addition homeowners were asked the BLS question, so that it is possible to estimate hedonic regressions holding characteristics of housing constant, and distinguishing between rented and owner-occupied dwellings.

The regression results are presented in Appendix A along with definitions of the variables included.  The results presented in Table 1 below provide the relevant coefficients from a pooled regression of all observations on rental houses for the three COLA regions and Washington, as well as pair-wise equations of each COLA region with Washington.  Holding floor area, number of bathrooms, number of bedrooms, age, furnished or not, quality of exterior condition and neighborhood, and availability of parking and air conditioning constant, coefficients were estimated on whether the house was rented or owner occupied.  In each equation a dummy variable was used to distinguish renters from owners.  The omitted variable in Table 1 is for renters in Washington, which includes the District and adjacent areas of Maryland and Virginia, each receiving

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equal weight. The regressions are semi-log and the coefficients have been expressed as the index by which the rent in Washington for renters would be multiplied to obtain the estimated rent for homeowners and renters in other regions as well as homeowners in Washington.[8]  These indexes are expressed in rows 1a, 1b, and 2a, and 2b of Table 1, the first group from pooled regressions using all observations and the $2^{nd}$ using observations of Washington and each area pair-wise.

**Table 1: Rent Indexes for Owners**
**(Washington Renters are the Base)**

| COLA AREA | Alaska | Caribbean | Hawaii-Pacific | Washington |
|---|---|---|---|---|
| **1. Pooled Regression** | | | | |
| a. Renters | **1.256** | **.857** | **1.275** | **1.00** |
| b. Homeowners | **1.538** | **1.021** | **1.413** | **1.19** |
| c. Premium (b/a) | **1.224** | **1.191** | **1.108** | **1.19** |
| **2. Pair-wise Regressions** | | | | |
| a. Renters | **1.070** | **.886** | **1.341** | **1.00** |
| b. Homeowners | **1.270** | **1.072** | **1.466** | **1.14\*** |
| c. Premium (b/a) | **1.187** | **1.210** | **1.093** | **1.14\*** |

Note: Entries derived from Equations in Appendix.
These entries refer to the pair-wise equation with Alaska. The entries for the Caribbean are 1.172 and for the Pacific, 1.187

For example, for the Caribbean the entry of .886 for the Caribbean in row 2a means that for renters, rents are estimated at 88.6% of those in Washington, while for owners in the Caribbean, they are estimated at 107.2% of renters in Washington.  The ratio of the rent between home-owners and renters is given in rows 1c and 2c, and for the Caribbean in 2c, the premium that owners put on their housing for the same physical characteristics, is 21%.  All entries in rows 1c and 2c are greater than1 meaning that the pride and quality adjustment factors are operating in the direction suggested above.

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[8] The Goldberger adjustment has been used, adding half the standard error of each coefficient before expotentiating the coefficient.

In answer to the first question, then, there appears to be a 8 to 22% premium that owners put on their homes. The standard errors are in the 5 to 8% range, so they are different from 1. The second question posed are these premiums a cause for concern? My answer would be yes. For example, the average of the entries in rows 1c and 2c indicate that pride or non-observed quality lead to rent on owner occupied dwellings to be 16% more than market rents. If this is all due to pride, it means that too large a weight is being attributed to rents in consumer surveys. Some of the materials discussed in the next section of the paper bear on this premium, so in the concluding section we will return to this point.

## Part C: Prices and Rents of Housing: Reflection of Costs, Amenities or Both?

*Both*, most of those familiar with renting or buying a home in different locations within cities or in different states or countries, would answer the question of the title of this section. However, it is a very difficult question to deal with in indexes purporting to measure cost of living across space. For example, Fairbanks and Kona are both in the United States. Both get the same amount of daylight during each year, but the distribution is very different, as are average temperatures and the amount and form of precipitation. There are those, who ceteris paribus, say they would prefer Fairbanks, but they are not the majority. There is a long tradition in regional science to estimate the value of amenities in different cities, but this has not made it into state and national statistics.

In international comparisons of housing, no attempt has been made to deal with the amenities of location, nor with other *costs* associated with geography. For example in comparing construction, the average cost of building a kilometer of road will be greater in a very hilly country than a flat country, but the comparison is typically for a mile of road on level terrain. These widely recognized problems are usually ignored. In constructing cost of living comparisons across cities in1968, BLS did try to deal with the need for more fuel and heavier clothing in Minneapolis than Los Angeles, for example, but this becomes a very slippery slope that economists have tended to avoid. No

attempt is made to climb this slope in this section. Having said this, economists should not be in denial and make recommendations and legislation as if rents solely a cost, when this is clearly not true. For example, National Academy of Science Panel on Poverty (1995), among other recommendations, suggested that the one important factor to take into account in geographically adjusting the national poverty line for geographic price differences is the cost of housing. This is certainly a reasonable proposal given the importance of housing in family expenditures, but as will be argued below, the recommendation does raise some issues.

## Locality Pay and the Cost of Living

Locality pay in principle compensates federal employees in the same way as the private sector for working in different parts of the continental United States. There are well known problems with the surveys underlying locality pay but broadly they distinguish more expensive localities from the *rest of the US*, or RUS, In RUS employees receive the base federal scale which is typically raised each year. Based on the locality pay surveys a gap is estimated between private sector and federal wages in each survey area. Federal employees working outside the continental US are compensated for their location by a cost of living adjustment (COLA), based upon their prices for the consumption bundle of Washington compared to its cost in Washington. Because of litigation surrounding the COLA program, BLS also carried out locality pay surveys in Anchorage, Honolulu and San Juan, the three largest COLA cities in 1996. The results were quite interesting and are summarized in the Table 2 below.

**Table 2. Target PayGap based upon March 1996 Locality Pay Surveys and Indexes of Housing Costs**

| COLA CITY | TARGET GAP (1) | COLA INDEX (2) | RENTAL EQUIVALENCE (3) | HOUSE PRICES (4) |
|-----------|----------------|----------------|------------------------|------------------|
| ANCHORAGE | 52% | 105 | 112 | 91 |
| HONOLULU | 19% | 129 | 110 | 148 |
| SAN JUAN | 19% | 102 | 81 | 86 |

The first column expresses the pay gap between 1996 federal salaries and what they would need to be required to equalize their wages to the private sector in each COLA city surveyed.  Both Honolulu and San Juan were assigned the RUS value because salary surveys indicated that private sector wages were at or below the level of other cities treated as RUS within the continental US.

The second column shows the results of the COLA Survey for that year (http://www.opm.gov/fedregis/1997/62R14190.pdf) where Washington is 100.  The first point is that Anchorage has high private sector wages and a low cost of living compared to Honolulu, which in turn has relatively low private sector wages.  At first glance, these results are paradoxical.  The last column provides the mechanics of the result.  In 1996 OPM basically used the old BLS approach to compare rents of owners, which had been set up by Runzheimer International.  It was based on a survey of house prices with some allowance for location and size from which a user cost estimate of rental services was made.  The very high index for Honolulu based on a user cost type of approach is what drives the higher cost of living there.  Columns 2, 3 and 4 are based on Washington as 100.

**A Digression on the Rent to House Price Ratio**

A second seemingly paradoxical result is the comparison of columns 3 and 4.  Here we see that the house price index (column 4) in Anchorage is 81% of the rent index (column 3) whereas in Honolulu it is 135%.  Clearly house prices in Honolulu in 1996 were strongly influenced by anticipated capital gains, but not so in Anchorage.  And using rental equivalence would have moved the COLA levels somewhat closer to each other, roughly 111 in Anchorage and 116 in Honolulu, but still leave a large difference compared to the locality pay survey results.

One of the reasons that rental equivalence is attractive as a statistic compared to most user cost estimates is that it is more stable over time.  While trends are likely to be closer over periods of 10 or 20 years, in the short run the two indexes can substantially diverge for a whole country. And for regions within a country the divergence is likely to be greater, because the time patterns and

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extent of divergence of rental equivalence and house prices, are far from perfectly correlated across regions.  This also means that ratio of rents to house prices are unstable over time.

The ratio of rents to house prices are used in developing national and regional statistics in the United States, usually to estimate rents from data on house prices in regions or between censuses when only house prices are available.  This ratio is usually calculated for dwellings grouped by value class, because the ratio declines systematically with the price of a house (Garner and Short, 2001 and McBride and Smith, 2001).   For example, the rent to value ratios were about 17.1 % for dwellings under $20,000 and 6.1 % for dwellings in the $200 to 300 thousand class in the early 1990s.  For 1997 these ratios varied regionally and for the COLA areas in Table 2 as follows:

**Table 3: Ratio of Rents to House Prices, Selected US Areas, 1997**

| Region or COLA AREAS | House Value | Ratio of Rents to Value |
|---|---|---|
| All US | $76,480 | .084 |
| Northeast | 85,578 | .081 |
| Midwest | 71,719 | .089 |
| South | 58,943 | .099 |
| West | 102,082 | .074 |
| Anchorage | 91,484 | .104 |
| Honolulu | 172,504 | .052 |
| Washington, DC | 111,735 | .081 |

This same systematic pattern exists within states.   In Oahu in the 1990s the ratio was .122 for houses in the $50 – 100 thousand range, to .057 for homes over $500,000.  Because this rent to price ratio is used in national statistics and research in the United States between census years and to infer rents from prices, it would be desirable to better understand its variation.  A model that took into account changes in the ratio over time and across space .would improve its use in national statistics.

**Towards a Bottom Line**

   If my mother had read this far she would have rightly said, "But who wants to live in Alaska?" There is nothing subtle about the point that some places are more and some less desirable places to live and that people are willing to pay for desirable amenities. In the case of Hawaii in Table 1, the payment is in terms of lower wages, whereas those in Anchorage want higher wages to compensate for long winters. The tradeoff of wages and house prices is part of the compensating differential framework as set out by Roback (1982) and others. There is similarly a large literature on the quality of life that attempts to quantify these effects and the extent they are capitalized (Gyourko, Kahn and Tracy, 1999). The point here is not to survey this literature but rather to look at its implications for social programs that single out housing costs as a basis for special allowances.

**Programs to Compensate for Geographic Housing Costs**

   One point of this section is that many public and private compensation schemes assume that wage differences mainly arise from cost of living differences. A major contributor (typically 1/3) to cost of living differences is rental value of housing, especially if estimated on a gross user cost approach, unadjusted for anticipated capital gains. But even if estimated on a rental equivalence basis or an adjusted user cost basis, there are still issues as indicated in Table 2. Clearly cost of living indexes are not far apart for Honolulu and Anchorage on a rental equivalence basis, while wage differences are very large. I would argue that cost of living indexes based on rental equivalence will still overstate some measure of *true* costs if we allow for the amenities in different areas. In a world where labor is free to move and transactions costs are low, wage differences should in principle capture measured and non-measured differences in living costs, a rationale for a program like locality pay.

**The Florida Price of Living Index**

   However, this suggests that establishing programs to compensate for differences in housing costs *in addition to* going wage differences really are of

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doubtful validity. Consider the following example of the Florida Price of Living Index (FPLI). The purpose of the FPLI is to allocate education funds by county in order to compensate for differences in the cost of living of teachers and other employees, who are the largest component of education expenditures. This is done under the rubric of the Florida Education Finance Program. The University of Florida was asked to examine the FPLI because of criticisms leveled at its effects and particularly the housing component. (Denslow, et al, 1996 and 1997). For non-housing it was concluded that the county was not the appropriate unit since many worked in other counties and all big-ticket items were purchased on the basis of price across a number of counties.

So this left housing, which was 38% of the weight in FPLI and accounted for 71% of the variation in the FPLI.. Housing was based on renter and owner components. The owner component was a version of user cost taking a construction firm's estimates of putting up a specific single family house in various counties, excluding cost of land. Construction costs varied across counties with a standard deviation of 8.5%. The county assessor provided land costs and these were added to obtain building costs in each county. However, land costs were added in for a given lot size, whereas costs per unit of land varied from $4 a square foot in Dade county to under $ 0.10 in some rural counties. In practice paying teachers more who live in counties with higher land prices appeared to the authors as a movement away from equity.

. They concluded there were four main problems with the approach to housing in the FPLI. First, they recommended that a sample of sales of vacant lots be used instead of county records. Second, there is a systematic relationship between average lot size and price of land across Florida; a 10% rise in land prices produces a 7% decrease in lot size, county income held constant.[9] To make the cost comparison comparable, larger lot sizes should be assumed in counties with lower land prices. Thirdly, they note that the capital gain aspect in

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[9] This is based on an equation that includes per capita income of the county and proportion of renters in the county (Denslow and Scroggins, 1997, p. 15). Since price of land rises proportionally to income, observed lot size will actually decline by much less than 7% for a 10% rise in land prices

different counties is directly related to the growth of population in the counties, though in the end they do not really take this into account.

Fourth, with respect to the renter sample, Denslow and Scroggins introduce a number of quality variables to try to pin down the value of location. These include distance from the coast which clearly adds to the rental value of a given apartment complex. Taking account of these amenities of location for renters and assuming larger lot sizes in counties with lower land prices would certainly move the FPLI in the right direction. The point made in this paper is that even if the FPLI handled user cost estimates in the way suggested by Denslow and colleagues, there is still a problem if higher land prices reflect in part more amenities. For example, if one county has little waterfront property and the other has a great deal of waterfront property, then the higher land prices in the latter are buying a view or recreational access to water. It is clear that the FPLI was not capturing this nor is it clear that even increasing lot sizes in the way Denslow and colleagues suggest will produce equity in terms of welfare teachers can purchase across counties.

**Other Issues**

Essentially we are arguing that if labor is mobile the wage differentials will compensate for differences in human capital, the personal characteristics of a worker, the work environment, and city characteristics, a framework common in the regional science literature. (e.g., Gerking and Weirick, 1982). Studies in this literature that explicitly treat house prices as a variable partially signaling desirable city characteristics suggest the ambiguous role of housing as a factor entering into cost of living (e.g.,Stover and Leven,1992). In the illustration of the FPLI mobility of teachers seems a reasonable assumption and so the question should be raised as to whether there is any justification for allowances in addition to salary. However, when programs are aimed at those in poverty, for example, it can not be assumed that it is necessarily easy for the poor to move from say Chicago to a city where it is always summertime. In this context, consider the recommendation of the National Academy of Science Panel that if the poverty

line in the United States were to be adjusted for regional differences in the cost of living then priority should be given to housing.

There certainly are regional differences in measured cost of living within the continental United States without invoking Alaska or Hawaii. Based on work of the BLS on inter-area prices (Kokoski, et.al, 1995), Aten (1996) estimated that the poverty basket would cost 66% less in a region encompassing the Dakotas than in the New York City area in 1987. The implications this would have for poverty counts are clear and political, which is why there is resistance to changing the system, however marred.[10] While in principle taking account of price differences across regions in estimating poverty counts is the way to go, this poses problems if housing is the main mover.

For example, should the poverty line be lower in South Dakota and higher in Phoenix because the former is below and the latter above the average of fair market rents or some similar index of spatial housing costs represented in the national poverty line? Are there not amenities included in Phoenix rents for which there should be no upward adjustment in the poverty line? Whereas if the rent index were the same in Detroit as Phoenix, there would be little problem in saying the poverty line should be adjusted upwards. Having looked this problem squarely in the face, I walk away and leave it to others to resolve.

## Conclusion

This paper reviewed a number of comparisons of housing across countries that have been carried out since 1968 as part of the International Comparison Programme. The methods used typically produce estimates for types of housing for which countries can provide weights from census surveys. The rents themselves are generated from user cost estimates, surveys for CPIs in a country, special surveys of real estate agents, or hedonic equations using national survey data. These methods do not worry about the concerns of this paper, namely imputing rents to owner occupied housing and adjustments for

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[10] There are programs related to poverty incidence that involve Federal transfers to states. Regional poverty lines would most likely lead to decreases in poverty incidence and transfers to the South and non-urban Midwest and increases in the West Coast and New England. The political arithmetic is clear.

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characteristics of location associated with large differences in climate, distribution of daylight hours, or physical surroundings.

Evidence is presented suggesting that for the similar measured features of housing, the rent that homeowners believe their home would rent for is substantially more (8-21% in our estimates) above market rents.  This premium was attributed to owner pride or unobserved quality of owner occupied dwellings.  If the difference is all due to pride it means that any expenditure survey attributions of rental value of owner-occupied dwellings on the basis of owner responses are likely to be over-estimates.  On the other hand if the premium is due to unobserved quality characteristics then the assumption that the rental value of owner occupied housing can be inferred from market rents would understate the weight of owner occupied housing.  This latter assumption is often made in obtaining weights for CPIs and in estimating rental services, rental income and production of housing services in national accounts.

The second problem that we described is that amenities associated with climate, physical terrain, and latitude are one source of differences in spatial housing costs.  Our illustration focused on the contrast of Honolulu and Anchorage where information was available for 1996 on both differences in cost of living and pay differences.  Pay levels in Honolulu were low and in Anchorage very high, while cost of living was higher in former, mainly due to housing.  In short residents are paying for their nice climate in Hawaii with lower wages, and the opposite in Anchorage.

Another aspect of the Anchorage-Honolulu comparison is that the rental to house-price difference is large.  This would be especially likely where there has been over-building or where expected appreciation of housing is much more in one region than another.[11]  This point is mentioned here because in the United States at least, this ratio is assumed to be constant for the country by house price group across the country. The ratio is then applied to house price data to infer rents in various states, an approach that seems to deserve re-examination.

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[11] In a recent paper Glaeser (2004) has emphasized the importance of supply of land available for housing as a neglected aspect of most economic discussion of housing markets.

The discussion of differences in climate and other amenities across cities and regions produced no surprises,  But what is of concern are programs designed to compensate for differences in housing costs between cities and regions, the amenities associated with living in the different cities are not considered.

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| Appendix Table | Rent Equations | | Dependent Variable | | Natural Log of Rent | | | |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Pooled Observations** | | **Alaska and DC** | | **Caribbean and DC** | | **Hawaii and DC** | |
| | **Coefficient** | **Standard Error** | **Coefficient** | **Standard Error** | **Coefficient** | **Standard Error** | **Coefficient** | **Standard Error** |
| Area-1000 sq. feet | 0.1069 | 0.0118 | 0.1315 | .01`67 | 0.1338 | 0.2012 | 0.0985 | 0.0137 |
| Number Bathrooms | 0.1732 | 0.0149 | 0.1506 | 0.0195 | 0.1356 | 0.0270 | 0.1654 | 0.0178 |
| Number Bedrooms | 0.0268 | 0.0107 | 0.0438 | 0.0139 | 0.0585 | 0.0201 | 0.0169 | 0.0132 |
| Age of House (10 years) | 0.0059 | 0.0061 | 0.0163 | 0.0076 | 0.0231 | 0.0100 | 0.0217 | 0.0070 |
| Excellent Exterior | 0.1559 | 0.0593 | 0.1966 | 0.0613 | 0.2103 | 0.1393 | 0.1723 | 0.0765 |
| Good Exterior | 0.1179 | 0.0540 | 0.1526 | 0.0684 | 0.1258 | 0.1327 | 0.1276 | 0.0704 |
| Not Furnished | 0.4460 | 0.0633 | -0.1290 | 0.0401 | 0.5965 | 0.1564 | 0.6874 | 0.0812 |
| No Central Cooling | -0.1078 | 0.0410 | 0.0513 | 0.0712 | -0.1313 | 0.0765 | -0.1807 | 0.0458 |
| No Window Units | -0.0834 | 0.0228 | 0.1478 | 0.0809 | -0.1484 | 0.0525 | -0.1048 | 0.0251 |
| Good neighhood | 0.0622 | 0.1755 | 0.0395 | 0.1857 | 0.0386 | 0.0325 | | |
| Average neighborhood | 0.0029 | 0.1745 | -0.0213 | 0.1844 | | | | |
| No Parking | | | | | | | -0.1497 | 0.0392 |
| Alaska Rented | 5.9734 | 0.1995 | 5.5778 | 0.2291 | | | | |
| Caribbean Rented | 5.5883 | 0.2061 | | | 5.3068 | 0.2314 | | |
| Pacific Rented | 5.9890 | 0.1983 | | | | | 5.8901 | 0.1230 |
| Washington Rented | 5.7462 | 0.1977 | 5.5010 | 0.2481 | 5.4326 | 0.2229 | 5.5936 | 0.1288 |
| Alaska Owned | 6.1747 | 0.2014 | 5.7695 | 0.1892 | | | | |
| Caribbean Owned | 5.7648 | 0.2019 | | | 5.4945 | 0.2380 | | |
| Pacific Owned | 6.0906 | 0.2007 | | | | | 5.9762 | 0.1288 |
| Washington Owned | 5.9167 | 0.2027 | 5.6716 | 0.1764 | 5.5895 | 0.2276 | 5.7676 | 0.1233 |
| | | | | | | | | |
| Number of Observations | 2112 | | 1109 | | 662 | | 1337 | |
| RmeanSquare Error | 0.3469 | | 0.3178 | | 0.3631 | | 0.345 | |
| Adjusted R Squared | 0.372 | | 0.392 | | 0.448 | | 0.344 | |