Remarks on Geographic Variation in Housing Prices and the Measurement of Poverty

by Stephen Malpezzi [1]
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In these very informal remarks I will first discuss some issues and trade-offs in the measurement of housing prices that are relevant to the proposed changes in poverty measures. Second, I will present a brief proposal for how we might incorporate housing price measures into an experimental poverty measure using hedonic indexes and data more or less at hand. Finally, I will briefly discuss some long-range research issues. Comments and criticisms are welcome.

Measuring Housing Prices

I would like to briefly discuss five issues related to housing price instruction relevant to the proposed experimental poverty measures. In turn I will talk about techniques of price index construction, data requirements, market definition and coverage, timeliness, and volatility.

There is a well developed literature on housing price index construction. An overview can be found in Green and Malpezzi (1998). The simplest measures are straightforward sample medians, such as Census' median rent and median house value measures reported from decennial Census data. The National Association of Realtor's median house price series, reported for about 100 metro areas, is another well known example. These are several types of time series price indexes using Paasche, Lasyperes, Divisia and related techniques. These types of indexes are well understood, especially by the audience for this note, and include examples such as the Consumer Price Index.

Hedonic price indexes use regression techniques to calculate constant quality price indexes. Rents or asset prices are regressed against a set of housing characteristics, using a cross section of data from a given market in a given time period. Malpezzi Ozanne and Thibodeau (1980) is one of many introductions to constructing such hedonic indexes. See also Thibodeau (1989,1992) and Moulton (1995). After a series of such regressions are estimated, a set of reference characteristics, or bundle, is chosen. Coefficients are multiplied times the corresponding elements of the bundle, and summed. These dot products can then be used to construct a place-to-place index for each metropolitan area or market area (Follain and Ozanne 1979). Of course hedonic regressions can also be estimated for one or more markets over different time periods. Thus hedonic models can be used for place to place price indexes, time series indexes, or combined panels.

Another common method of price index construction is the repeat sales index. This index is constructed using data on units that have sold twice. If the unit's characteristics have not changed, less data is required because one doesn't need data on characteristics. Conceptually, the construction of these indexes is effectively taking periodic averages of changes of these pairwise sales over time, but in practice regression techniques due to Bailey Muth and Nourse (1963) or some variant thereof are used. Wang and Zorn (1998) provides a thorough review.

There are other price index construction methods, including user cost (more a theory of price determination than a price index method per se), and hybrid models such as models which combine repeat sales and hedonic information. Hendershott and Shilling (1982) is a nice introduction to user cost. See Case and Quigley (1991) for an example of hybrid models.

Since we want a constant quality, place to place index, hedonic methods are probably our best bet. We may use other techniques, such as repeat sales, to update baseline price indexes, since the poverty measure is annual.

Hedonic Price Indexes

Taken as a whole, hedonic have much to recommend them for our purpose. They adjust for quality. They can be used for both rents and asset prices. They can be used to construct both place-to-place and time series indexes. Generally the technology is well understood. The biggest single problem is that they have very high data requirements. In addition to information of rents or asset prices, one needs data on characteristics. Typically one needs a fairly large sample for reliable estimation as well, in each market.

Ideally, to estimate an hedonic index within a market, one obtains sufficient observations on a full set of structural characteristics, contract conditions (such as length of tenure), neighborhood characteristics, and intra-metropolitan location. While most state-of the-art hedonics use on the order of 40 or 50 characteristics, papers by Butler (1982) and Ozanne and Malpezzi (1985) show that for predicting rents or values (the purpose of the

present exercise) one can do a pretty good job of predicting constant quality prices with a carefully chosen set of about a dozen characteristics. Individual coefficients may be subject to large biases, but for this kind of exercise we are not that concerned about the values of individual coefficients.[2]

For the present exercise, the definition of market areas for estimation is extremely important. Tony Hughes' argument that you'd like this area to approximate labor markets and a housing market, and that a reasonable proxy for this is a metropolitan statistical area is persuasive to me. For non-metropolitan areas a reasonable market definition would probably be a collection of contiguous non-metropolitan counties.

National hedonics with location shifting intercepts (dummy variables) have been tested in several papers. I've done a few myself. But many exercises by Jim Follain, Larry Ozanne, Tom Thibodeau and myself suggest metropolitan level estimation is better. It is possible to have even finer market breakdowns (see Straszheim 1975). But I think past the metropolitan area finer market definitions are subject to diminishing returns, and it certainly complicates the estimation effort. It is also harder to explain. I certainly wouldn't argue for going below the county level, on practical grounds.

Regarding timeliness, since poverty measures are done annually, we need price indexes which are also annual. The American Housing Survey is undertaken every two years and is a pretty good source on those grounds (although there is a lag in provision of the data). The decennial Census obviously suffers from being decennial. We will talk more about how to fill these gaps in the next section. Another issue raised at the workshop that I think we should think about at some point is the issue of volatility. As a practical matter rents are not extremely volatile either cross-section or over time, but asset prices for housing often are. Since we are more concerned with rents at this point, we can probably defer thinking about this until later. If we were to need asset price indexes, (e.g. if we were going to use them for cut-offs) we might want to consider some kind of smoothing, either cross-section using regression techniques or over time using moving averages.

Constructing Rent and Asset Price Indexes by Location Using Readily Available Data

Implementing a new experimental poverty measure with place to place price differences requires a rental price index for metropolitan areas and contiguous non-metropolitan county groups. In addition a place to place price index for one or several base line years, we need some index of rent changes for periods in between baseline calculations. While the highest priority is for a rental index, required to set area thresholds, we will also discuss an asset price index.

For the baseline rental price index, we recommend hedonic indexes, using either the decennial Census, or the biannual American Housing Survey. The American Housing Survey has the advantage of being available every two years, and includes a very full set of housing characteristics for hedonic estimation. The biggest potential problem with the AHS is related to its sample design. First of all, the public use national AHS only identifies a limited number of metropolitan areas. Secondly, even for this limited number, sample sizes are modest (especially when one considers that in a typical metropolitan area only a third of the occupants, and this roughly a third of the observations in the sample, are renters. Finally, the geographic information on the public use AHS files outside these metropolitan areas is rather gross. One can not generally identify the state in which a non-metropolitan observation lies, for example.

The decennial Census, in contrast, has a much greater geographic coverage in the public use files. The problem with the Census is that there is only a very small set of variables available for hedonic regressions. Butler (1982) and Ozanne and Malpezzi (1985) argue that for prediction purposes (as here) a small set of hedonic variables will usually be sufficient. But it must said that the Census set is especially small, and is missing a few key variables which are important to any hedonic, such as number of bathrooms.

Of course Census, and hence the working group for the experimental index, has access to internal files with more locational identifiers. Undoubtedly Census could construct a place to place price index using the AHS that would have better locational characteristics than public users. However even Census can't get around the problems caused by smaller sample sizes in smaller metropolitan areas, or other fine geographic breakdowns. Ultimately how much of a problem this creates is an empirical question that could be resolved with some straightforward comparative work, estimating hedonics using Census' internal locational information with both data sets.

In the immediate term, for initial work, we have Census price indexes constructed by myself and colleagues Richard Green and Greg Chun. Our published paper, Malpezzi, Green and Chun (1998), presents price indexes constructed using a bundle that is the average of metropolitan characteristics for 242 metro areas. However, we also have the original coefficients which can be used to price other bundles. They may also be of use in predicting market rents for subsidized units, another important issue in constructing the experimental measure.

In addition to hedonic for the 242 identified metro areas that we reported in the paper, we also have hedonic results for each state's residual sample households (i.e. households in a given state in non metro areas or in small MSAs not identified on the public use files). We are happy to send all these unpublished coefficients to any interested user.

Given the aforementioned sparse set of housing characteristics in the Census, we are not arguing that these indexes can't be improved on (with a data set that contains a fuller set). Bus these hedonics will be better than

simple medians, and they have the great virtue of being readily available. They also have pretty good geographic coverage.

The next issue is how to compute area rent <u>changes</u>, since neither the decennial Census nor the AFH is available on an annual basis (and also because both are available only with a lag, even internally). For calculating rent changes between base line years, we recommend using BLS's rent index, available for about 30 metropolitan areas. For other areas, we can either use the FMR changes that HUD has developed using phone surveys, or we could use the BLS approach of estimating rent changes by city size class and census region. Of course the choice of method for calculating rent changes becomes more important if one uses the decennial Census, where the time between baselines is greater.

If one is interested in a place-to-place asset price index, then Fannie Mae and Freddie Mac repeat sale indexes for owner occupied housing should be available on a small area basis. There are private sector alternatives to the Fannie and Freddie Repeat Sales measures, such as the Case, Shiller and Weis price indexes. But it is not clear what the advantage would be of using Case-Shiller-Weis, if any, and it would certainly be less controversial (as a participant noted) to use a quasi-public source.

Private sector alternative for rent changes may develop, such as the National Multi-Housing Council's effort. As noted by others at the workshop, there may be political issues involved in using private sector information for such a sensitive level measure as the poverty rate. But I conject that as long as the measure is experimental - and methods of construction could change if it becomes non-experimental -we needn't worry as much about such an issue. Certainly it would be useful to compare and contrast the BLS/FMR rent change data to any information generated by the Council.

An Agenda for Related Research

Clearly some research needs are immediate. We need to decide whether to use the AHS or the decennial Census as our baseline data source. An evaluation needs to be made of several options for changing rents (BLS, or BLS augmented with the FMR phone surveys, for example). The bundle used to construct the baseline price index must be chosen.

The latter point is related to a longer run research issue. In a world of perfectly elastic housing markets within metropolitan areas, and with no discernable cost differences or transactions costs across metropolitan areas, the choice of a bundle would not be much of an issue. But if we lived in such a world we wouldn't need place-to-place price indexes, because the price of housing would be everywhere the same.

The prices of different characteristics certainly vary across metropolitan areas (see Follain and Malpezzi, Malpezzi Ozzane and Thibodeau). But within metropolitan areas, over a period of one or several years, we can observe shifts is the relative prices of housing of different quality. Olsen (1969) is the classic exposition of the perfectly <u>elastic</u> housing market, and therefore the best point of departure for studying an <u>inelastic</u> situation. Thibodeau (1992) and Malpezzi and Green (1996) provide evidence that in fact housing prices at different quality levels do vary across metro areas. Further research on the extent to which rents and prices in the "middle" of the distribution are good or bad guides to what is happening at the "bottom" of the market could be fruitful.

In the long run it would certainly be worthwhile to consider adding at least a few housing questions to the decennial Census. Anyone who heard my presentation knows what my first choice of a variable would be. The number of bathrooms is a superb hedonic variable.

Another direction to consider is increasing the AHS sample. Both the raw sample size and possible stratification schemes could permit better tabulation by smaller metro areas and rural areas by state.

A very long run issue would be studying the effects locational amenities have on rents and prices (I believe Tony Yezer first pointed this out in our discussion). The point is that at least some high price areas may have better locational amenities as well as higher underlying costs. Some classic papers in this area include Blomquist, Berger and Hoehn (1988), Gyourko and Tracy (1992) and Roback (1990). However, I want to emphasize that I don't foresee this as an easy row to hoe. While conceptually many of us would agree that correcting for such amenities makes sense, we are a long way away from being able to do it in any practical way. Perhaps this issue is better stricken from the agenda for now.

Two other thoughts come to mind related to the amenities issue. First, Tony Yezer pointed out that Edward Glaeser has written a recent paper that argues transfer programs should not vary their benefit by location. The essence of the Glaeser argument is that having a uniform transfer level, in a mobile world, introduces some perverse incentives. Particularly if prices reflect amenities, rational pensioners will all move to places with high amenities, since any increase in rents they would incur by doing so would be paid by the government. Among other issues, this would increase the total cost of such transfer programs to the Treasury.

While there is some evidence (some cited by Glaeser, most notably the welfare literature; see Peterson and Rorn 1990), personally I don't think that mobility is so high that this is a big issue. Even if it were, one could argue that the purpose of the poverty measure itself is not to encourage or discourage people to move one place or another, but rather to measure what is. If thousands of poor people move to high amenity areas, we still want to measure the phenomenon, and their relative deprivation. The counter-argument, of course, is that eventually program resources follow the changing poverty line.

Another reason amenities might be a red herring is that the prices of these amenities, even if correctly measured, are driven by a large number of consumers. It's doubtful that the marginal consumer of many such incentives is low income. We would have good reason to suspect that the valuation of many specific amenities would be very different for low income households than for higher income households.

The final issue for additional research is examining other prices that vary spatially. This is probably another issue that makes sense conceptually, but may not be worth the candle in practice. Once one accepts that things other than housing prices vary by space, it is hard to know where to draw the line. Then we really get into a Pandora's box of measuring an enormous number of prices by location. I know BLS does this for a small set of metropolitan areas, but to do it on a much larger scale would have enormous practical and budgetary implications, and it is not clear - given the evidence cited by Ed Olsen - that we'd really get that much of an improvement. Most analysts, and for that matter most of the American people, accept that housing prices vary a lot from place to place I think the country would accept a poverty index that varied housing thresholds and had national thresholds for other goods and services. If by doing so we capture a very large fraction of the place to place variation, then I think we have made a great advance.

Acknowledgment

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[1]. Department of Real Estate and Urban Land Economics, The School of Business
The University of Wisconsin, 975 University Avenue, Madison, Wisconsin 53706
(608) 262-6007 or smalpezzi@bus.wisc.edu

[2]. Paradoxically, the same omitted variable bias that biases individual coefficients bails us out in making the prediction. As an example, consider a simple world in which rents depend on only two variables; bedrooms and bathrooms. Suppose further that bedrooms and bathrooms are very highly correlated (approaching 1). Suppose a bedroom is worth $50 and a bathroom is worth $50 in monthly rent. If we have a survey that only asks the bedrooms question, and regressed rent on bedrooms, we'll get an estimated coefficient of around $100. That is twice the true coefficient value, but the same omitted variable bias that fouls up the coefficient means that we'll more or less correctly predict rents for any unit with a given number of bedrooms (and by assumption a similar number of bathrooms).