The Buyers Response Technique—A Framework for Improving Comparable Selection and Adjustment in Single-Family Appraising

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Abstract. **The purpose of this paper is to illustrate how the Buyers Response Technique (BRT) may be used as an adjunct or alternative framework to estimating appropriate adjustment size when performing the sales comparison approach for single-family houses. The BRT builds upon the traditional appraisal forms used in the appraisal profession, while capturing the benefits of selected marketing research techniques. The goal is to illustrate a technique the appraiser can use to achieve more accurate market value estimates in the appraisal of single-family houses by incorporating information provided by recent purchasers.**

Introduction

The purpose of this paper is to introduce and illustrate a new technique for assisting in the selection and adjustment of comparables when estimating market values of single-family residences via the sales comparison approach. Both appraisers in the field and academicians have for years puzzled over the question that is most basic to all valuation: How much will a buyer pay, at the margin, for a specific amenity or feature when purchasing a single-family residence, and which sales are most comparable?

The use of marketing research techniques, such as surveys of recent buyers of detached single-family homes, forms the basis of our approach, which we refer to as the Buyers Response Technique (BRT). The specific questions for which responses were sought are a result of an examination of the Uniform Residential Appraisal Report (URAR). The URAR formed the basis of the survey because the ultimate goal is a superior, or at least adjunct, method to assist in the estimation of adjustment size when completing the Market Data Analysis section of the URAR.

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Review of Previous Work

Traditional appraisal theory is largely based upon the matched pairs technique.[1] While this technique has merit when matched pairs are available, such cross-comparables rarely exist. Additionally, even if one or two or even three matched pairs are available for each feature/amenity requiring an adjustment, such small sample sizes result in large variances about the mean or fail to reflect the mean accurately. Such large variance situations obviously call into question the credibility of such pairs in making adjustment estimates. Again, large variances are typically the result of the few cases that are normally available when matched pairs are used, and the appraiser is left wondering which value to use—the high, the low or some average.

Often, when practicing appraisers are faced with this dilemma, they seek the opinions of other appraisers as to how to adjust for differences in size, parking arrangements, location, etc. Other appraisers attempt to utilize a percentage of the differential cost of the amenity/feature.[2] These approaches also have merit, but they rely on opinions of those who observe the market and not on the opinions of those who, in fact, "make the market"—the buyers. The Buyers Response Technique attempts to incorporate the opinions of buyers in this quest for accuracy.

Unfortunately, the appraisal literature thus far does not offer, in our estimation, a satisfactory remedy to the problem outlined above. This, of course, is the motivation for our article which we hope offers a viable alternative. It is worth mentioning, however, that some earlier work has attempted to introduce the concept of using database information to make adjustments. In fact, as early as the mid-1960s, Ratcliff urged the profession to begin to incorporate market behavior data into the adjustment process. DeLisle has gone further, outlining in detail the steps that should be followed in the contemporary appraisal process. This process he feels, should very much involve measuring buyers' sensitivities to differences in features/amenities. He also states that such sensitivities should reflect the behavior of the most likely buyers. Such analysis would obviously only be possible with the development of a database.

Earlier empirical work has begun this process. For instance, it has been demonstrated that seasonal factors may influence time adjustments [7]. Floodplain data was used to measure the effects of floodplain location on adjustments for comparable sales [6], and various regression techniques for incorporating buyer behavior have been offered [1], but no previous work has provided a complete framework that the practicing appraiser can cost-effectively introduce and maintain.

Methodology

As our goal here is to illustrate how data might be gathered and analyzed by a practicing appraiser, we sought to build a database drawn from two Central Texas communities in which one of the authors has worked. By doing so we sought to model a setting in which the author works, in order that the results would be useful beyond this paper. While a database, once developed, should be useful for some time, periodic update would obviously be necessary as buyer preferences and amenities evolve.

The Buyers Response Technique (BRT) consists of using recent home buyer responses to a series of questions in order to develop a database that will facilitate the residential appraisal adjustment process. The questions asked of recent buyers essentially center around the relative

values they place of various amenities, or features a home may have. Such information has long been gathered by marketing researchers in order to measure consumer sentiments about potential or existing products. The data gathered from home purchasers is then used to develop area market adjustments, using the averages of the data collected.

Given that only recent buyers were included, respondent selection was not random. It was felt that the opinions of recent buyers who would be more familiar with various amenity packages would provide the most relevant input. Within the two communities the respondents were further stratified by subdivision in order to determine whether adjustments should be varied, not only by community but also by subdivision. Obviously, some subdivisions in which the most likely future appraisal work was to take place were targeted. With these sample selection criteria available, the number of cases needed could be kept down (and also the cost) and yet real differences between communities and neighborhoods could emerge. The same approach could be used by any appraiser, and the time and cost of gathering such data is not great.

As the purpose of the BRT is to provide insights into how much buyers perceive an amenity or difference between homes is worth, the respondents were asked to assign a value to various amenities, as well as what they felt the marginal value of such items as additional floor space were worth. Given that the process is simply one of ascertaining what the buyer would pay for the addition of an amenity, in effect these are bivariate questions (e.g., how much one less, or an additional bedroom would be worth). When dealing with questions such as more or less square footage, theoretically continuous variables are involved, e.g., one could ask what each additional or less square foot is worth. As a practical matter, such issues were handled using categories, such as additional 100 square feet, as rarely would a few feet materially affect the appraisal of a home. It is also important to ask respondents both what more and fewer of such incremental features as size and number of bedrooms are worth, as such features are likely to have diminishing marginal utility.

One-way analysis of variance (ANOVA) with Scheffe's Tests are used to test for significance of differences between demographic categories in order to determine which such factors affect buyer valuations. A Scheffe's Test simply allows for the comparison of multiple category means, and reports which of the various category means are statistically significantly different from the others. In this article differences that are significant at the .05 level are reported. However each BRT user must decide for him or herself when a difference is significant. All the statistical techniques used here are available in many personal computer statistical software packages.

To sum, when adjusting comparables there are certain differences in amenities/features that exist in a large percentage of cases. There are other differences that rarely exist. We illustrate a means for bridging this gap and additionally provide a method for measuring demographic impacts on valuation differences. By comparing responses across demographic profiles, subdivisions, and communities, we not only garner information useful in the adjustment process, but also gain insights into which comparables are most appropriate, and do so in a relatively simple, straightforward, and cost-effective way.

Questions Addressed

The specific demographic issues that were examined in our illustration are as follows:

- Does the demographic profile of the head of the household influence the values

placed on amenities/features? Factors included were age, educational level, and annual earnings.
- Does the price of the house or its size/number of bedrooms affect the values placed on amenities/features?
- Do respondent valuations vary significantly from one community or subdivision to another?

Specific features examined included:

- Fireplace vs. no fireplace
- Swimming pool vs. none
- Open patio vs. no patio (or deck)
- Covered patio vs. open patio (or deck)
- An additional 100 square feet of living space
- 100 square feet less living space
- Fenced yard vs. no fencing
- Wood vs. chain link fencing
- Ceiling fans vs. no fans
- An additional bedroom
- One less bedroom
- An additional full-bath
- One less full-bath
- An additional half-bath
- One less half-bath
- Garage vs. carport
- 2-car garage vs. 1-car garage
- Additional value of lakefront lot
- Additional value of golf course lot
- Central air/heat vs. none
- Laundry room vs. none
- Heat pump vs. standard central air/heat
- Double-pane windows vs. single-pane

Analysis of Results

The first step is to calculate some descriptive statistics in order to determine whether the sample averages appear representative of the communities the appraiser wishes to examine, based on the appraiser's previous experience. Some of the household profile data for the sample collected for this illustration are presented in Exhibit 1.

While the above values may or may not be representative of neighborhoods with which the readers are familiar, we found them to be quite in line with our expectations of Central Texas neighborhoods. The average size of approximately 1,700 square feet of living area and average price of $75,049 were almost exactly a duplicate of local and regional averages.

The next step is to calculate means and standard deviations for the various valuation variables included in the illustration. Exhibit 2 presents the variable abbreviations used in the rest of the paper. Exhibit 2 also reports the amounts, on average, recent buyers said they

Exhibit 1
Summary Data Presentations
Household Profiles

Variable	N	Mean	Standard Deviation	Variable Definition
NBDS	80	2.988	.2989	Number of bedrooms
NBTHS	80	2.050	.4539	Number of bathrooms
HOSAGE	76	10.0685	2.4616	Age of house
HOSSIZ	77	1693.7	491.28	Size of home
AGEHD	76	41.6	12.46	Age of head of household
INCM	74	$3,212.76	1,604.81	Household income per month
Cost	79	$75,049	23,928	Purchase price of home

would pay for more or less of a feature/amenity, standard deviations of those responses, and variable definitions.

The means reported in Exhibit 2 are roughly in line with the expectations of practicing appraisers in the communities in which the data were collected. However, the size of the standard deviation or dispersion of values about the means were in some instances surprisingly large. This wide dispersion points out the potential danger of using one or a few "comps" on which to base adjustments. If the comp being used was purchased by someone who saw

Exhibit 2
Summary Data Presentation
Household Features

Variable	N	Mean	Standard Deviation	Variable Definition i.e., the value respondent places on a feature
PPATIO	71	1057	1083	patio vs. none
PCPTO	72	966	1095	covered patio
SQFM	74	2006	1916	100 sq. ft. more area
SQFL	77	2445	1819	100 sq. ft. less area
PFNYD	77	838	1074	fenced yard
PCFN	77	424	1193	ceiling fans
PEXBD	76	2719	2970	an extra bedroom
PLSBD	68	4951	3461	one less bedroom
PEXBH	74	1410	1657	an extra full-bath
PLSBH	62	2302	2452	one less full-bath
PHFBH	74	770	1486	an extra half-bath
PLHFBH	65	1220	1925	one less half-bath
PGAR	69	3001	2190	garage vs. carport
P2CGR	65	2136	1062	2-car gar. vs. 1-car gar.
PLKFRT	64	4257	3357	lakefront lot
PGLFCR	66	2157	3366	golf course lot
PCAH	63	3185	1711	central air/heat
PLNDRY	69	1173	1243	laundry room
PHETP	70	917	1281	heat pump vs. central
PWPW	74	571	284	double-pane windows
PFP	68	1667	1748	fireplace vs. none
PPOOL	71	3450	4190	pool vs. none

Exhibit 3
Categories and Frequency Distributions of Selected Demographic Variables

Variable	Category Definition	Category Strata	Percentage in Category
TOWN	Community 1	n.a.	37%
	Community 2	n.a.	63%
HOSAGE	New	Under 6 yrs.	33%
	Middle	6 yrs to 10 yrs.	35%
	Old	Over 11 yrs.	32%
HOSSIZ	Usmall	Less than 1435 s.f.	26%
	Small	1435–1600 s.f.	20%
	Medium	1601–1735 s.f.	23%
	Large	1736–2100 s.f.	16%
	Ularge	Over 2100 s.f.	15%
AGEHD	Under 30	n.a.	20%
	Under 40	n.a.	29%
	Under 52	n.a.	31%
	Over 52	n.a.	20%
OWNED	BH	Bachelors	45%
	CL	Some college	15%
	GD	Graduate Degree	25%
	HS	High School Grad.	15%
Cost (of home)	Under 51	Less than $51,000	16%
	Under 62	$51,001–$61,00	17%
	Under 67	$61,001–$67,000	13%
	Under 74	$67,001–$74,00	15%
	Under 85	$74,001–$85,000	15%
	Under 115	$85,001–$115,000	14%
	Over 115	Over $115,000	10%
MSTA	Yes	Married	85%
	No	Single	15%

a great deal of marginal value in a feature and, therefore, paid a premium for a home with that feature, an appraisal based on such a comp would be skewed to the high side (or the opposite might occur). Using community averages, once they are known, might be a safer approach. Even so, as earlier suggested, we feel an even safer scheme is to try to determine whether demographic variables can account for the variance in values in order that adjustments may be more finely tuned. We will address this possibility below. One additional issue which Exhibit 2 results show is the diminishing marginal value of additive features such as bedrooms, baths, and square footage. In each case one fewer of any of these items would result in a substantially greater revision in value than one more of these features.

Exhibit 3 lists the demographic variables, included in the illustration, which were used to assess whether, in fact, demographic differences can explain some of the dispersion of the feature/amenity values reported by recent buyers. The category ranges used were either natural categories, such as various college degrees conferred, or were split into reasonably equal cell sizes.

Exhibit 4 reports the results of the Scheffe's Tests in which each of the features/amenities was stratified by the various demographic variables included in Exhibit 3, and then each of the strata means was compared. In those instances where there was a difference at the .05

level, the demographic feature is reported as having a material impact upon the feature/amenity's valuation. As this is an illustration, we do not attempt to offer an exhaustive list of demographic variables which might be examined, and in any case, the variables included would likely vary by region of the country.

The first column gives the abbreviated variable name (see Exhibit 3 for definitions). The second column provides some value ranges of the responses, along with the cumulative distribution of the responses. The distributions do not total to 100% due to extreme outliers that were excluded from the analysis. The third column provides a listing of those demographic factors for which ANOVA results suggest a statistically significant difference across strata. For instance, when the column lists, "OWNAGE (old > young)," there was a significantly higher value reported by older respondents than younger respondents for that house feature.

The ANOVA results revealed, as expected, that some features are affected by selected demographic factors while others are not. While the size of the adjustments required given different demographic profiles may vary by region, what is obvious from our illustration is that demographics do influence value perceptions. A benefit of this type of market investigation is that if there is insufficient significance to reject the null hypothesis (that no difference exists) then the "comp" base can be broadened without losing adjustment validity. However, when there is significance, similar buyer/house profiles will result in more accurate adjustments.

Some of the more interesting results reported in Exhibit 4 are the relatively low values reported for pools, and the relatively high value of a two-car garage versus a one-car garage. Additionally, as suggested earlier, there is a clear diminishing value to amenities and features which is evidenced in the value of one more bath versus the value placed on having one fewer bath.

While not central to our illustration, the final portion of the questionnaire deals with some of the factors which motivate buyers to select the homes they do. The respondents were asked which was more important to them, price or location. Sixty-five percent responded that location was more important than price, which reinforces what appraisers have long known, that the comps used need to be in the vicinity of the home being appraised. When asked to list the three most important factors in their purchase decision, respondents most frequently cited the reasons listed in Exhibit 5. The percentage of respondents giving the reason is also provided.

Conclusions

The purpose of this article was to illustrate the use of the Buyer Response Technique (BRT) in building a data set from which single-family home appraisal adjustments can be made. The motivation for the development of the BRT was to provide a means by which practicing appraisers could improve the accuracy of residential appraisals using actual buyer-derived data in a cost-effective way. The technique used here required relatively little in the way of data collection outlays, and yet provided numerous insights into how adjustments should be made in the markets included.

The illustration also demonstrated that while adjustment values on average may not provide any great deal of useful information, there is a wide variance about those averages. It also demonstrated that the use of demographic variables can more effectively define what the appropriate adjustment amount should be. In effect, the illustration's results reinforce the need for BRT, or some technique like it, in order that more appropriate adjustments can be

Exhibit 4
ANOVA Results with Frequency Distributions

Dependent Variable	Selected Response Ranges & Cumulative Frequencies	Factors Affecting Response
PPATIO	$0–$300, 21%; $301–$700, 59%; $701–$1,500, 77%; $1,501–$2,500, 95%	None
PCPTO	$0–$200, 30%; $201–$600, 47%; $601–$800, 60%; $801–$1,100, 80%	None
SQFM	$0–$300, 30%; $301–$700, 41%; $701–$1,000, 53%; $1,001–$1,500, 57%; $1,501–$2,000, 70%; $2,001–$3,000, 77%; $3,001–$4,000, 82%	*MSTA* (yes > no) Cost (low > high) *TOWN* *HOSSIZ* (small > big) *OWNAGE* (young > old)
SQFL	$0–$300, 24%; $301–$700, 35%; $701–$1,000, 45%; $1,001–$1,500, 47%; $1,501–$2,000, 62%; $2,001–$3,000, 68%; $3,001–$4,000, 77%	*MSTA* (no > yes) Cost (high > low) *TOWN* *HOSSIZ* (big > small) *OWNAGE* (young > old)
PFNYD	$0, 23%; $1–$200, 31%; $201–$400, 38%; $401–$600, 60%; $601–$800, 66%; $801–$1,000, 76%; $1,001–$1,200, 82%; $1,201–$1,500, 90%	None
PEXBD	$0, 28%; $0–$1,500, 44%; $1,501–$3,000, 69%; $3,001–$4,500, 75%; $4,501–$6,000, 92%	*AGEHD* (young > old)
PLSBD	$0, 19%; $1–$1,500, 28%; $1,501–$3,000, 44%; $3,001–$5,000, 63%; $5,001–$7,000, 85%	*MSTA* (yes > no)
PEXBH	$0, 33%; $1–$750, 55%; $751–$1,500, 74%; $1,501–$3,000, 88%	*MSTA* (yes > no) *OWNED* (grad > bach) Cost (high > low) *OWNAGE* (young > old)
PLSBH	$0, 15%; $1–$4,000, 50%; $4,001–$8,000, 75%	*MSTA* (no > yes) Cost (low > high)
PHFBH	$0, 32%; $1–$300, 50%; $301–$600, 68%; $601–$1,000, 88%	None
PLHFBH	$0, 27%; $1–$300, 39%; $301–$700, 55%; $701–$1,000, 73%; $1,001–$1,500, 80%; $1,501–$3,000, 90%	None
PGAR	$0–$500, 22%; $501–$1,000, 33%; $1,001–$2,000, 55%; $2,001–$4,000, 70%; $4,001–$6,000, 88%	*OWNAGE* (old > young) Cost (high > low) *MSTA* (yes > no)
P2CGR	$0–$500, 23%; $501–$1,000, 42%; $1,001–$2,000, 60%; $2,001–$3,000, 76%; $3,001–$4,000, 82%; $4,001–$5,000, 99%	*TOWN* *HOSSIZ* (big > small) *OWNAGE* (old > young) *OWNED* increasing* Cost (high > low) *MSTA* (yes > no)
PCAH	$0, 16%; $1–$1,000, 30%; $1,001–$2,000, 47%; $2,001–$3,000, 66%; $3,001–$4,000, 75%; $4,001–$5,000, 82%; $5,001–$6,000, 88%	*TOWN* *HOSSIZ* (big > small) Cost (high > low) *MSTA* (yes > no)
PHETP	$0, 38%; $1–$500, 62%; $501–$1,000, 82%; $1,001–$1,500, 87%	*TOWN* *HOSSIZ* (big > small) *OWNAGE* (old > young) Cost (high > low)
PLNDRY	$0, 24%; $1–$500, 44%; $501–$1,000, 69%, $1,001–$1,500, 75%; $1,501–$2,000, 92%	*TOWN* *HOSAGE* (new > old)
PFP	$0, 19%; $1–$1,200, 49%; $1,201–$2,400, 83%; $2,401–$3,600, 92%	None
PPOOL	$0, 44%; $1–$2,000, 59%; $2,001–$4,000, 63%; $4,001–$6,000, 73%; $6,001–$8,000, 80%	None

Note: > Indicates the direction of reported value difference, e.g., "old > young" indicates that older buyers reported a higher value than younger buyers.

* Indicates that each level had a different value from all other levels.

Exhibit 5
Ranking of Reasons Given for Home Selection

Reason Number	Reason and Percent of Respondents Giving That Reason
1	Location, 54%; Price, 29%; Floor Plan, 5%
2	Price, 26%; Floor Plan, 23%; Size, 19%
3	Floor Plan, 25%; Price, 20%; Size, 13%

made. Additionally, it was illustrated that certain features, such as additional square footage or baths, are subject to diminishing marginal utilities. When adjustments are made those adjustments must reflect the direction of the adjustment, i.e., are we adding or taking away units.

In the final analysis, the adjustment process in single–family appraisal is extremely complicated in terms of what buyers would actually pay, at the margin, to have or not have certain features or amenities. One can only conclude that at least some buyer–generated data need to be gathered in the markets in which the appraiser is practicing. We offer BRT as a relatively low cost means of doing so.

Notes

[1]See *Appraising the Single Family Residence* (Chicago, Ill.: American Institute of Real Estate Appraisers, 1978), along with numerous other appraisal textbooks.

[2]While both authors are academicians, these observations have been documented by one of the authors who also has been a practicing appraiser for almost a decade and has completed in excess of 1,600 single-family appraisals in a half dozen geographic areas.

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