
Appraisal Services

Abstract. This article examines the quality of appraisals as a function of expertise. In particular, we compare novices (beginning real estate students) to experts (practicing certified and/or designated appraisers) on three performance criteria. First, we examine differences in the values that these two groups attach to various property features. Second, we investigate the variation between their final market value estimates. The last task studied is whether appraisers can reliably provide a range about their market value that includes the actual sale price of the property. The results are based on a controlled experiment involving seventy-two novices and sixty-nine experts, where each participant was asked to determine a fair market value of a single-family home. Findings indicate that experienced appraisers do in fact exhibit less variation in their valuation of property characteristics, hence there is greater agreement in their market value estimates than is the case with novices. However, more experienced decision-makers tend to be overconfident in their ability: they are less likely to specify a range that includes the sale price than are novices.

Introduction

Appraising residential property requires performing all three steps in standard models of decision making: selecting relevant inputs, attaching value(s) to nonquantified data and combining the inputs to reach a final decision. One section of the Uniform Residential Appraisal Report (URAR), for example, requires determining which features differ between the property to be appraised—the subject property—and a minimum of three recently sold comparable properties. The appraiser must then attach a dollar value to these distinguishing property features, and sum the values so that an adjustment can be made to the sale price of each of the comparables to equate it to the subject property. Although the features to be considered when undertaking this exercise are essentially fixed, hence a form is provided, there are no pre-set values to attach to the distinguishing property features. For example, there is no generally accepted dollar figure for how the presence of a pool affects a property's value, it depends upon the neighborhood being studied. Some argue that determining a fair value is the art of appraising (Martin, 1993).

In light of the increasing legal scrutiny appraisers have come under (Pardue 1987; Shampton, Waller and Waller, 1988; and Waller and Waller, 1991) in conjunction with

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the strong belief that certification procedures enhance the quality of appraisals (Lahey, Ott and Lahey, 1993), an important question that needs to be addressed is how the decision making of appraisers varies with experience and qualifications. In addition, appraisal clients have been concerned with the consistency of appraisals (White, 1987). Previous research has examined factors that influence the earnings of appraisers (Diskin and Gatzlaff, 1994); not unexpectedly, earnings of appraisers increase with the number of years of experience. This article departs from the previous literature by examining how experience affects the quality of appraisal services.

Economic theory combined with findings from cognitive psychologists (*e.g.*, Chi, Feltovich and Glaser, 1981) would lead us to predict that as workers become more experienced, their ability to perform their job functions increases. In an appraisal context, it seems reasonable to assume that the greater the experience, the greater the agreement concerning the perceived value of individual property features, which in turn would mean the less the variance in market value estimates. Thus, the objective here is to compare the performance of professional appraisers to beginning real estate students on three performance criteria: (1) to what extent do decision makers agree on the value of various property features; (2) what is the variance in their final market value estimates; and (3) how well can they provide a range about their market value estimate that includes the actual sale price of the subject property. With respect to the first objective, in the words of a noted decision theorist, "unless the expert can reproduce his measurements of the cues, there is little more that can be said in defense of his expertise," (Einhorn, 1986).

The findings presented are based on a controlled experiment involving sixty-nine practicing real estate appraisers and seventy-two beginning real estate students. Each participant was given information about a single-family residential (subject) property along with descriptions of three comparable properties. They were asked to determine a fair market value for the subject property. With this data, we can determine how the accuracy of appraisals varies with experience. In particular, we can answer the question: Are there advantages to expertise?

Research Method

To examine differences in performance we compared the performance of practicing appraisers to real estate students. Sixty-nine certified and/or designated residential appraisers participated in the study (referred to as the experts), as well as seventy-two students who were enrolled in Introduction to Real Estate Principles at a major southwestern university (referred to as novices). The mean age of the experts was 43.6 years old, and the average number of years employed within the real estate profession was 15.4 years. All were either certified (98.6%) and/or designated (58.8%). For novices, the mean age was 23.5 years, with an average of 0.26 years of employment within real estate (those with experience worked in construction or office administration).

Each participant was given a packet of material that included a detailed description of the neighborhood, a property to appraise and descriptions of three comparable

properties. All property descriptions were based on data provided by the Multiple Listing Service (MLS), but were presented in verbal form: two examples appear in the Appendix. Participants were asked to determine the market value of the property based solely on the information provided. Although the task that participants were asked to complete was not as complex as a real-life appraisal (for example, they could not tour the properties), the more tractable, controlled nature of the experiment increased the internal validity of the study, hence the conclusions can be held with more confidence (Kirk, 1982). The task still required approximately one-half hour to complete, suggesting that participants engaged in detailed, deliberate information processing. To verify that participants found the exercise to be understandable and interesting, and that they were motivated to do a good job, following the appraisal process they were asked several questions eliciting their opinions. Experts and novices provided mean values of 5.89 and 5.90, respectively, for the clarity of the task (where 7 was the highest possible rating); 5.03 and 5.16 for their level of interest in the task; and, 5.88 and 5.71 for their motivation to perform the task. The mean values reported by the experts and novices are not significantly different.

For experimental reasons there were differences in the type of information given to the participants. Some of the participants were given a decision aid, a form similar to that found in the URAR. For those who were not given the decision aid, a scratch sheet was provided instead. Appraisers have completed forms of this nature numerous times, hence the presence or absence of the aid was not expected to affect their performance. Novices, who are inherently less familiar with the task, would stand to benefit from the decision aid.

The second way in which the available data was modified concerns the sale price of the three comparables provided. The comparables and the subject property had all sold within eighteen months, a time that can be characterized as one of stable prices within the relevant neighborhood. However, in one case the market prices of the comparables were equal to the predicted prices of the properties based on a seven-variable multiple regression model. The model was based on forty-five properties provided by the MLS that had been sold in the relevant neighborhood.¹ Therefore, if the appropriate set of distinguishing property features is recognized, the market valuation process is relatively straightforward—the three adjusted comparables will converge onto a single market value. For some of the participants, however, random error or “noise” was added to the sale price of the comparable properties, hence there is no unique value that can be attached to the distinguishing property features that will cause the adjusted prices to converge onto a single market value. The amount of noise added across the three properties summed to zero. Two appraisers who assisted in the design of the experimental stimuli concurred that the amount of noise added was not unreasonable. The layout of the experiment is illustrated in Exhibit 1.²

Empirical Results

Values Attached to Property Features

The first issue examined is the extent to which experts and novices agree on the value of various property features. Conducting pair-wise comparisons to determine a fair

Exhibit 1
2×2×2 Between Subjects Factorial Design

| | Problem Characteristics | | | |
|-------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
| | Decision Aid | | No Decision Aid | |
| | Noiseless (<i>n</i>) | Noisy Data (<i>n</i>) | Noiseless (<i>n</i>) | Noisy Data (<i>n</i>) |
| Novices (<i>N</i> =72) | 19 | 17 | 19 | 17 |
| Experts (<i>N</i> =69) | 16 | 19 | 16 | 18 |

value for a given property feature is fraught with difficulties—rarely do two properties differ on only one feature, hence judgment is required to partial-out the effect of individual features. Clearly, differences in the valuation of property features could lead to widely differing market value estimates. We would expect expert appraisers to exhibit greater agreement in the perceived value of various property features. Thus, after participants provided their market value estimates we asked them to estimate the value of ten housing characteristics.³ Three examples of the features studied appear in Exhibit 2. The dollar values attached to these features, along with the standard deviation of the estimates for both experts and novices, are shown in Exhibit 3.

Two conclusions can be immediately drawn from Exhibit 3. First, as predicted, there is a much smaller variation in the valuation of housing characteristics by experts than by novices. Based on the Bartlett-Box *F*-test for equality of variance, the standard deviation of the property features is significantly smaller for experts than novices at $p < .01$ for each of the ten characteristics. Therefore, we can conclude that experts agree more than novices do when valuating property features. Second, there are large differences in the mean values of housing characteristics between experts and novices. For five of the ten characteristics the mean value reported by experts was significantly different from the mean value of novices at $p < .01$. The largest differences can be seen in the last four characteristics listed in Exhibit 3. Novices believed that the inclusion of an assumable loan increased the value of the house by \$1,724, while the valuation by experts was roughly \$1,000 less than this amount. The sale price of a

Exhibit 2
Method Used to Elicit the Value of Property Characteristics

Assume that you were shown two more pieces of property in the neighborhood that you just examined—call these properties A and B. How much more or less do you think property A would be worth relative to property B, if property A had:

An additional 100 square feet of living area? +/- \$ _____
 A garage instead of a carport? +/- \$ _____
 1.75 bathrooms instead of 1 bathroom? +/- \$ _____

Exhibit 3
Mean Estimates for the Value of Ten Property
Characteristics

| Characteristic | Novices | Experts |
|---------------------------------|------------------|-----------------------------|
| Additional 100 square feet (\$) | 1,766 (2,386) | 1,893 (865) |
| Additional fireplace (\$) | 1,166 (1,428) | 1,134 (379) |
| Garage (\$) | 1,771 (1,118) | 1,143 ^a (615) |
| Carport (\$) | 1,166 (955) | 1,254 (403) |
| Slump block wall (\$) | 1,185 (1,128) | 1,101 (625) |
| 1.75 vs. 1.0 bathrooms (\$) | 1,534 (1,331) | 1,870 (858) |
| Assumable loan (\$) | 1,724 (2,483) | 751 ^a (1,039) |
| Desert landscaping (\$) | 1,138 (1,200) | 123 ^a (435) |
| 1976 home vs. 1974 home (\$) | 1,416 (1,968) | 54 ^a (200) |
| Owner-occupied (\$) | 1,394 (2,611) | 379 ^a (882) |

Note: Standard deviations are in parenthesis.

^aMean values are significantly different at $p < .01$.

property can be affected by the inclusion of an assumable loan. The valuation of an assumable loan will be affected by several factors including the time period in which the buyer can be expected to hold the house, and the additional downpayment required to assume the loan. The effect of financing concessions on the sales price of single-family homes is discussed in detail by Sunderman, Cannaday and Colwell (1990). Another example is the fact that novices valued desert landscaping approximately \$1,000 higher than the experts did. The “true value” of landscaping (known only to an omniscient decision-maker) is largely dependent on its condition, although desert landscaping within this southwestern city is generally preferred. Nevertheless, the large differences in valuation suggest widely differing baseline or expected values for different types of landscaping.

The biggest variation between differences in the estimates came from the age of the house. Novices estimated that a home that was built in 1976 had an average value that was \$1,416 higher than a similar house that was built two years earlier in 1974. Experts felt that when dealing with homes that were all built by the same contractor approximately 15 years ago (this information was provided in the description of the neighborhood), the two year difference in the age of the home would have little effect on the value of the house. According to the experts, a home that is two years newer should sell for \$54 more than the older home.

Another difference concerns whether or not the house has a garage instead of a carport. Novices attached a greater premium to the garage than did the experts. The final difference concerned whether the house was owner-occupied versus tenant-occupied. Informal discussions with two appraisers suggested that owner-occupied houses tend to be better maintained, but this was not reflected in the mean values reported: appraisers attached only a \$379 premium, significantly smaller than the \$1,394 mean value provided by novices. Small differences existed in the remaining characteristics, but these differences are not statistically significant.

Accuracy of Market Value Estimates

Another hypothesis regarding the performance of expert appraisers relative to novices is that their market value estimates should be closer to the actual sale price of the property. Of course, the actual sale price does not need to be a perfect indicator of a property's fair market value; the property, for example, may have been bought or sold under duress. Therefore, the sale price of property can be written as:

$$S_t = FMV_t + e_t \quad (1)$$

where S_t is the sale price of the property in time period t , FMV is the fair market value of the property and e is a random error term. It is possible, although unlikely, that the direction and magnitude of the error term could bias the results. However, there are two reasons why the potential for bias is small. First, the subject property was chosen because it was considered prototypical of the properties in the neighborhood. Second, its sale price was perfectly predicted by a regression model based on forty-five properties in the relevant neighborhood. Therefore, the test results assume that the sale price is equal to the fair market value; these two reasons support this assumption.

If we look at the mean absolute error (*i.e.*, the positive difference between each participant's estimate and the subject property's actual sale price of \$63,000), the experts had an average error of \$2,901, whereas the novices had an average error of \$5,347, a difference that is significant at $p < .01$.⁴ However, for experts, not only were their errors smaller on average, but also the standard deviation of their errors was significantly smaller, as would be expected given the smaller variance in individual property features. Experts had a standard deviation of \$1,519, while novices had a standard deviation that was over twice as large at \$3,191, a difference significant at $p < .001$. As a further illustration of the experts superior decision-making ability, if we rank order the errors from small to large, the worst 33 out of the 141 participants in the experiment were novices. Indeed, one novice overestimated the sale price of the subject property by \$17,000 (27%); the largest error by an expert was \$6,000 (9.5%), not small, but a huge improvement.

Perhaps the most striking difference between the experts and novices is that the experts were much more likely to underestimate the sale price of the house. In particular, there were only four experts who provided a market value estimate that was above

the actual selling price of \$63,000, whereas fifteen novices did. Thus, the estimates given by the novices were much more randomly distributed about the actual sale price than were the experts'.

One reason for this difference is related to the state of the real estate market in Arizona at the time the survey was conducted in 1993. Property prices had fallen prior to the study in Arizona, and had only stabilized in the last eighteen to twenty-four months. Therefore, if appraisers expected this downward trend to continue, they may have reduced the appraised value by the expected decrease in real estate prices. McDonald (1985) has shown that expected price increases have a positive effect on the selling price of a house—it seems reasonable to assume that the reverse would be true, too. The beginning real estate students may not have had as much exposure to the local real estate market and therefore may not have taken these expectations into their valuations.

Another reason for the tendency to underestimate the value of the property may be the incentives that professional appraisers face versus the incentives of the novices. There has been an increasing amount of litigation involving appraisers regarding the accuracy of their appraisals (Pardue, 1987; Shampton, Waller and Waller, 1988; and Waller and Waller 1991). For example, if the appraiser overestimates the value of a property and then the borrower defaults and the remaining mortgage exceeds the value of the property, the appraiser may be liable for damages. Experts should be more aware of the potential liability problems that could occur if the appraisal is too high; if so, they may take this into consideration when determining the value of the property. It is likely that novices have had little exposure to liability problems, and therefore did not consider it when determining the value of the property. This problem should have a limited impact in this situation, since the appraisers participating in the experiment do not have to worry about potential litigation from an inaccurate estimate.

Finally, one reason for the difference could be that the sale price of the property differs from the fair market value. There are many unobserved variables in a real estate transaction and some of these may affect the sale price. If the sale price were greater than the fair market value, then the underestimation of the sale price by appraisers would be expected. However, if this were true we would expect novices to underestimate the sale price as well.

When examining the accuracy of appraisers' valuations, one question that can be asked is whether the inclusion of a decision aid had a significant impact on the judgment error. One would expect that the decision aid would have a greater affect on novices than on experts because the decision aid imposes structure onto the problem, which helps those with less experience focus on the important factors in the process. However, the more experienced the appraiser is, the less important is the decision aid—after all, professional appraisers should know which features to consider. To test this hypothesis, we examined the effect of the decision aid on the mean judgment error; experts and novices were studied separately. For novices, the presence of a decision aid had a significant effect on their judgment errors. Novices who used a

decision aid had an average judgment error of \$4,874, while those who did not have a decision aid had an average error of \$5,819. In contrast, the presence or absence of a decision aid had virtually no effect on experts (\$2,905 versus \$2,897, respectively).

We next examined how the mean absolute errors of the appraisers varied with descriptive characteristics, namely, years of employment, type of certification (*i.e.*, whether the appraiser was certified or designated, the latter requiring more rigorous training) and the level of education achieved. The fitted regression model was not significant ($F[4, 63]=1.41, p=.24$), hence, neither more years of experience nor higher levels of certification achieved improves the decision quality of appraisers. In fairness, however, it should be noted that all but one of the experts had five or more years of work experience. Learning theorists have concluded that in most fields of inquiry, learning occurs most rapidly in the early stages of development. Therefore, in light of the experts' vast work experience, the nonsignificant findings are not overly alarming.

Validity of Judgments

The aforementioned analysis of decision accuracy examined market value point estimates only. It would be unusual for someone to consistently provide market value estimates that equaled the actual sale price. However, it seems reasonable to assume that individuals could at least provide a range within which the subject property actually sold. Individuals who are less confident in their decision making ability could provide wider ranges. Participants were therefore asked to provide three estimates: an upper limit that they believed the property actually sold for, a best estimate for the fair market value and a lower limit for the sale price. Descriptive statistics for these variables appear in Exhibit 4. As can be seen, experts, on average, provide a significantly smaller confidence range than do novices ($p<.001$).

Despite the narrower ranges, we would expect that the experts would more often provide an interval that included the actual sale price of the subject property. One way to test this is by using a logit model. The dependent variable in the logit model is $\ln[p/1-p]$, where p is the probability that the sale price falls within the ranges provided. We coded each subject's interval a 0 if their range did not include the actual sale price of the property, and 1 if it did. We would expect experts to have a higher

Exhibit 4
Width of Confidence Ranges^a

| | Mean | Std. Dev. | <i>p</i> -value |
|---------|---------|-----------|-----------------|
| Novices | \$7,769 | \$7,308 | <.001 |
| Experts | \$3,582 | \$2,329 | |

Note: Confident range is upper limit minus lower limit.

^aSeparate variance estimate.

Exhibit 5
LOGIT Model of Ability to Specify Correct Range

| Variable | Beta ^a | S.E. | Wald. Stat. | df | Signif. |
|-----------|-------------------|------|-------------|----|---------|
| Constant | -0.885 | .221 | 16.068 | 1 | .001 |
| Expertise | -1.035 | .376 | 7.581 | 1 | .006 |
| Aid | 0.702 | .332 | 4.469 | 1 | .035 |
| Noise | 0.803 | .369 | 4.735 | 1 | .030 |
| Exp×Aid | -0.527 | .304 | 3.005 | 1 | .083 |
| Exp×Noise | -0.157 | .304 | 0.266 | 1 | .606 |
| Aid×Noise | -0.498 | .304 | 2.683 | 1 | .101 |
| E×A×N | -1.550 | .912 | 2.888 | 1 | .089 |

Note: Model Chi-square: Chi-square[7]=15.634, $p=.029$

^aNovices, no aid and noisy data were all coded -1; experts, the aid and noiseless data were coded 1.

probability of specifying the correct range than novices. The results from the logit model are shown in Exhibit 5. The three primary independent variables in this analysis are: (1) expertise (coded 1 if the appraiser was an expert, -1 for a novice); (2) aid (coded 1 if a decision aid was provided, -1 if no aid); and (3) noise (coded 1 for noiseless data, and -1 for noisy data). Interpreting the beta coefficients must be done with caution. Unlike ordinary least squares regression, to determine the effect of a change in an independent variable the exponent of beta must be multiplied by the odds ratio (Neter, Wasserman and Kutner, 1985). Instead, we focus on the signs of the coefficients only. Each of these variables should have a positive coefficient, since each should increase the probability of providing an appropriate range. For completeness, the interaction of the variables is included in the model.

The results suggest that the effect of expertise was negative: experts were less likely to provide an interval that included the price of the house than were novices. Apparently, the confidence with which professional appraisers hold their decisions exceeds what is justified by their better decision-making ability. This was largely true for all four problem-solving conditions (see Exhibit 6).

Exhibit 6
Number of Participants Providing a Correct Range^a

| | Noiseless Data | | Noisy Data | |
|---------|----------------|--------|------------|--------|
| | Aid | No Aid | Aid | No Aid |
| Novices | 10/19 | 6/19 | 6/17 | 3/17 |
| Experts | 4/16 | 2/16 | 1/19 | 6/18 |

^aValue in denominator is the maximum possible.

Conclusion

This article examined how the quality of appraisal services varies between novice and expert appraisers. Experts exhibit more agreement when valuating property features and provide market value estimates that are more in-line with recent sales. However, experts are more likely to underestimate the value of a house than are novices. The liability which appraisers face may give them a powerful incentive to avoid market value estimates that exceed the sale price of the house—they would prefer to err on the conservative side. Within the pool of experts, there is no apparent benefit to obtaining higher levels of certification or having more years of experience. Another counter-intuitive finding is that experts were less likely than novices to specify a range that included the actual selling price of the house. Thus, experts appear to be more confident in their decision-making ability than their better accuracy justifies. Participants received a summary of the survey findings that flagged this tendency.

Appendix

Subject Property

Please estimate the market value of this property.

This lovely ranch-style home was built in 1976 and is situated on a 70×100 (7000) square foot lot in a quiet neighborhood. It has 1300 square feet of living area, three bedrooms and one and three-quarters bath. There is a dining area, but no breakfast area. This well-maintained, easy care beauty has large bedrooms and a delightful, separate family room. The house is constructed of slump block material, and features an evaporative cooler and a forced-air gas heater. The front yard is low care desert landscaping and the backyard is grass. There is a large workshop behind the carport, and a basketball court and children's playhouse in the backyard. Everything for the young family! There is a one-car carport, and the large yard has a covered patio and is surrounded by a slump block wall. No special financing concessions are available. Arrange to show with owner.

Comparable Property #1

This house sold for: \$50,000

Month that house sold: December 1991

Number of days that house was listed before selling: 72

Financing: No qualifying cash to assumable loan at 10% was assumed with a balance of \$45,000. Payments are \$460 per month.

Description of property at time of sale

This ranch-style home is located approximately one half mile from the subject property. It was built in 1974 and is situated on an 72×100 (7,200) square foot lot. This 1040 square foot home has three bedrooms and one and three-quarters bath. There is a breakfast area, but no dining area. This neat, family-oriented house with north/south exposure shows well. There is newer paint, a fan in the master bedroom

and mirrored closet doors in the master bath. The house is constructed of slump block material, and features an evaporative cooler and a forced-air gas heater. The roof is six years old. The large, grassy landscaped yard is surrounded by a wood fence. There is no carport. Arrange to show with tenant or with listing agent. Dog in backyard is friendly.

Notes

¹The linear unbiased estimator had an R^2 of .92 and a standard error of \$3093 ($p < .01$).

²For a more detailed description of the research methodology, see Spence (1993).

³The reason for asking participants to provide these values after developing their market value estimate is that having them value features first may cause them to change their decision-making behavior, called a carry-over effect. To enhance the validity of our conclusions, it was important to have participants reach a market value estimate the way they normally would, rather than to have them change behavior because we prompted them to consider a possibly different set of distinguishing property features.

⁴Because of unequal within cell variances, the test of significance was based on the natural log of the mean absolute errors.

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