

Alternatives to Point Estimates

by Eric T. Reenstierna

Value is a fluid thing. It changes over time, sometimes in leaps with sudden shifts in market conditions and even with the seasons.¹ It changes with the availability and cost of financing. It changes with the decisions of legislative bodies, courts, zoning boards of appeal, planning boards, conservation commissions, and rent control boards, whose rulings are often unpredictable and may be politically motivated. It changes with the status of adjacent property, which may go rapidly from an undeveloped state into private development or into public use, through incorporation into roads, renewal projects, or parklands. Value changes over little more than the whims of buyers, depending on whether Spanish modern, in-ground pools, office windows that open, or suspended ceilings happen to be in or out of style.

The effort of appraisers in the face of change has been to try to make property hold still so that it may be valued. If appraisers can only fix a point in time,

1. Arthur L. Wright and Charles E. Gilliland, "Seasonal Variations in Home Sales Prices and Time Adjustments in the Market Data Approach," *The Real Estate Appraiser and Analyst* (Winter 1981): 29-33.

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fix the financing available, fix the motivations of a seller and a buyer, and determine the specific use to which a property may be put, they stand a reasonable chance of predicting the price at which it is likely to be exchanged. But in the process of estimating each of these variables, appraisers may also succeed in screening from their own and their clients' view all those matters that have a bearing on value in the event that any of the conditions that they have fixed are not borne out in fact.

In recent years Richard Ratcliff, among others, advocated the concept of value as "most probable selling price" and of an appraisal as "an economic analysis under uncertain conditions that can be expressed only in terms of probability."² By considering value in terms of probability Ratcliff opened the door for appraisers to a whole world of probabilistic thinking, complete with ranges, means, medians, modes, standard deviations, and confidence intervals. My purpose in this article is to elaborate on the work of Ratcliff and others in the field of probability as it relates both to the appraiser's method of conceptualizing value and to the reporting of his or her conclusions. Specific appraisal situations will be presented, some the typical sorts of problems that make up the greater part of many appraisers' work, and others special situations that place the appraiser in a more challenging position. The usefulness of both point estimation and the framing of value in terms of probability will be discussed, as will the question of whether either is always fully adequate.

THE PERFECT MARKET

If real estate ownership were in the form of stocks that were traded daily for each property, there would be slight need for appraisers. Price would be taken for value. One need only open a newspaper to find the daily "bid" and "asked" figures, and from that one would know a property's value. Instead, real estate transactions are infrequent. A typical property may sell on average only once over a 10-year period, and other than arm's-length considerations may be involved. The only direct measure we have of value in exchange is by comparison with sales of roughly similar properties. Halbert Smith characterizes the real estate market as a "semi-perfect market," in the sense that it only partially fulfills the conditions of a perfect market in economic theory, in which there are large numbers of buyers and sellers, all of whom are thoroughly knowledgeable and none of whom is able individually to affect the market.³ To begin, it is useful to consider the type of real

2. Richard U. Ratcliff, "Is There a 'New School' of Appraisal Thought?" *The Appraisal Journal* (October 1972): 522-528.

3. Halbert C. Smith, "Value Concepts as a Source of Disparity Among Appraisals," *The Appraisal Journal* (April 1977): 204-205.

property that best meets the conditions of a perfect market, the single-family house.

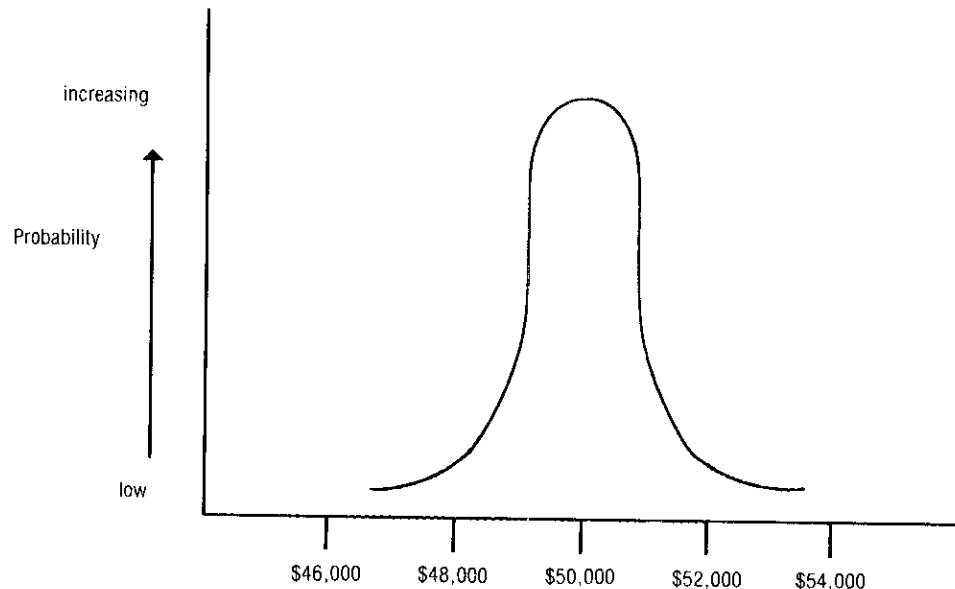
Suppose that we are appraising a house that is one in a large development of a thousand houses, all built identically and all 10 years old. None enjoys a locational advantage; the land is flat, so none enjoys a superior view; and the only difference between the lots is that some are on corners. Over the 10 years, some of the houses have been maintained better than others. Some have garages converted to family rooms, and some have swimming pools.

About 80 arm's-length transactions take place each year. The only adjustments required in the analysis of the sales are for time, corner location, condition, family rooms, and pools. Paired sales allow us to measure precisely the difference in value for each of these factors, and we are able to use abundant sales to obtain value indications.

The value indications are rounded to the nearest \$100 and are tabulated in the graph in figure 1, a symmetric bell curve. Given this information the point estimator would report flatly that "the market value is \$50,000." The appraiser might add that "the range of expected values is \$49,000 to \$51,000." To add the element of probability an appraiser might state that

FIGURE 1

Value Indications for Similar Properties in a Large Market



“there is a 90% likelihood that the property’s selling price would fall in a range from \$49,000 to \$51,000.” A full discussion of probability would present the graph itself and an accompanying explanation. In this case the point estimate would appear to be an adequate expression of the value estimate. Additional information and perhaps confidence are imparted by discussion of the range, but because the range is so narrow, its reporting is not crucial.

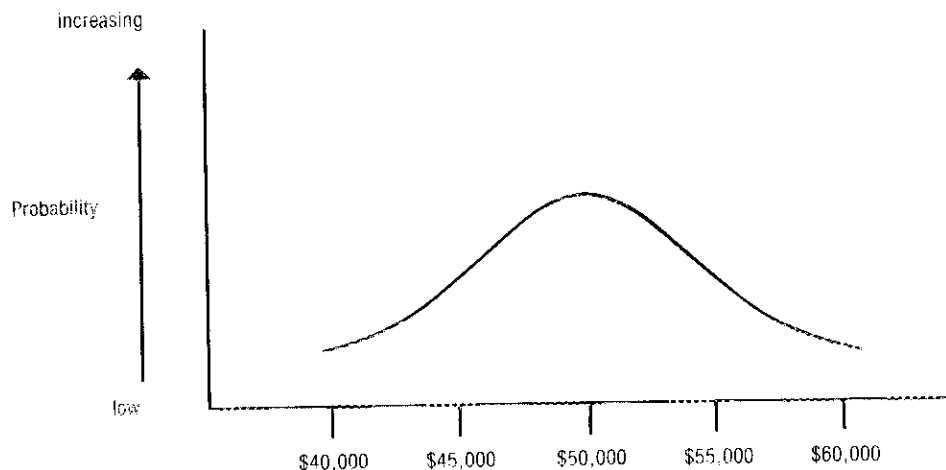
THE SMALL MARKET

For contrast a property in a much smaller market will serve as a second example. For ease of comparison, assume that it is a single-family dwelling in a sparsely settled community. Ten sales are available, but all are of properties different in at least one major respect from the subject, some different in age and architectural style, others much larger or smaller, and some incorporating substantial surplus acreage. We again make our adjustment and lay out our value indications on a graph (see figure 2).⁴ The distribution again indicates a central tendency at \$50,000.

A comparison of the graphs, however, demonstrates that this is a very different \$50,000 from that reported in the first example. To report the same point estimate would give no indication of the value estimate’s greater uncertainty and of the much broader range of possible selling prices in the event that the property is put up for sale. The appraiser, as the expert on the matter

FIGURE 2

Value Indications for Properties in a Small Market



4. Of course 10 sales are too few to create a graph of this type. But a composite of value indications from a large number of sales in small markets yields a graph like that shown. For simplicity in the presentation, the source of the graph is taken to be this small sample alone.

of value, has more than the point estimate to report. The range of likely selling prices, for example, is of interest to a client-seller who might want to list the property toward the high end of a range that is very different in each case. A loan officer may want the same information in order to assess the relative risk of obtaining repayment of the principal in the event of a liquidation sale. The only way for the appraiser to communicate this information is to report range and probability in some fashion. While in the first example the point estimate is an adequate expression of the value estimate, in the second a discussion of range and probability is more informative. A display of the graph in this case is the most suitable means of communicating the value estimate.

ASYMMETRIC AND DOUBLE-HUMPED CURVES

The above two examples are of properties whose values are described by symmetric curves in which the mean, median, and mode are identical and are the most probable selling price. Some situations, however, produce asymmetric curves and multihumped curves that create difficulties in reporting by any means other than a graph.

Kerry Vandell describes a property for which different user-use combinations produce different value indications.⁵ When combined in a single graphic representation, these produce an asymmetric and double-peaked curve. Vandell's dilemma is that the "most probable selling price" changes depending on whether it is defined as the mean (average value), median (value at which 50% of the indications are greater and 50% less), or mode (value occurring most frequently). No single point estimate can convey all of this information to the client.

Another example demonstrates how even wider divergences may occur. Suppose we are appraising a special-purpose property, a recently completed church. The location is an urban neighborhood that at different times has been home to different waves of immigrants, first Irish and then Italians. The latter, in turn, have been replaced by Portuguese. The Portuguese built the architecturally distinctive church in a very visible location, to serve not only as a place of worship but seemingly as a statement that they "have arrived."

The replacement cost of the property is \$1,000,000. Because this is a new building and a special-purpose property, the cost approach carries considerable weight. But the problem becomes more complicated. The appraiser is aware of sales of several churches in surrounding cities and towns. Most of these are substantial stone buildings that, though not modern, were well maintained. They were sold for redevelopment for nonchurch use as offices

5. Kerry D. Vandell, "Toward Analytically Precise Definitions of Market Value and Highest and Best Use," *The Appraisal Journal* (April 1982): 253-268.

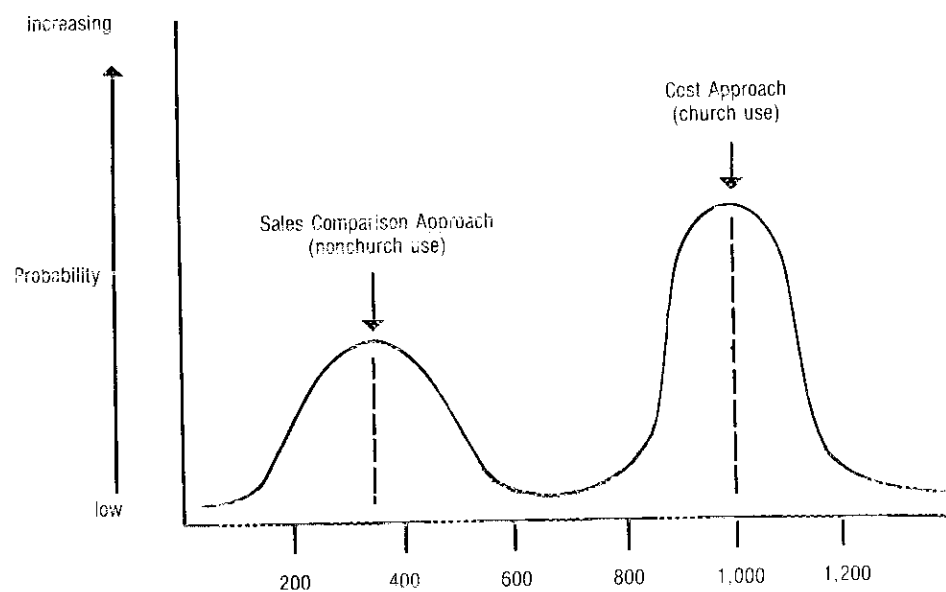
and residential condominiums after their congregations dwindled and were not replaced. Comparison of the subject property with these produces a value indication in the \$250,000-\$300,000 range.

Considering the disparity between the value indications derived from applying the cost and sales comparison approaches, an appraiser concludes that the value indicated by the cost approach depends on the will and the ability of the community to support the church, that is, on a continuation of churchgoing spirit by a community that remains in the immediate neighborhood in large numbers and has the financial means to support the church. So long as these conditions are met, the value of the property is at cost; otherwise, the highest and best use may be for nonchurch use and value slips to the level indicated by the sales.

An opinion of highest and best use must be formed before an estimate of value can be made. Assume that in the appraiser's judgment, over a short projection period, there is a 75% likelihood that the community will continue to meet the criteria for church use and a 25% possibility that it will not. Two graphs are constructed, one showing a bell curve with a peak at the \$1,000,000 value indicated by the cost approach, the other with a peak between \$250,000 and \$300,000 and with an area under the curve one-third that of the first ($75\% \div 25\% = 1/3$). A composite of the two graphs yields the distribution shown in figure 3.

FIGURE 3

Value Indications for a Property with Different Possible Uses
(in thousands of dollars)



This curve defies verbal description, or it requires a description so convoluted as to be unintelligible. The measures of central tendency (only one of which is at a peak) diverge widely, so a choice of one over the others as an expression of "most probable selling price" creates serious difficulties. The question then becomes how to report the result to the client. To elaborate on a point estimate with a statement of range would appear inadequate. To report both peaks and a verbal statement of their relative probabilities is better. But, as in the previous example, the most adequate and complete expression is the graph itself, accompanied by an explanation of the conditions that result in the different selling prices.

A THIRD VARIABLE

Another dimension is added to price and the frequency or likelihood of occurrence with the consideration of another variable, time—specifically, the amount of time that is "reasonable" for exposure to the market in the application of the value definition to some special cases.

Joseph D. Albert, H. Stan Banton, and Thomas D. Pearson discuss the valuation of a property in a situation of bilateral monopoly, in which a parcel is landlocked and to which access can only be gained over one adjacent, privately owned parcel through purchase, plottage, or assemblage under joint ownership.⁶ If access is available the value of the landlocked piece is \$176,500; if access cannot be gained it is \$0. The owners of the adjacent tract would be justified in paying \$176,500 for the landlocked piece in that, as rational participants in the market, they should see that the combination of the landlocked piece with their own enhances the value of their holding by that much. On the other hand, they might refuse to pay any more than a nominal amount because the landlocked property is worth no more than that to any other market participant. The authors conclude that in this case they are unable to assign a point estimate of value.

Turning to landlocked parcels in general (and not only those which are accessible only through one other tract), we might conclude that sales in the market would show a distribution from nominal prices to prices at the level of other, nonlandlocked parcels. Examination of several transactions involving such parcels known to this writer, however, indicates only the prices equivalent to those for nonlandlocked parcels, with little or no discounting for poor access. The transactions share some common characteristics: they are infrequent, they are purchased by third parties assembling a larger holding and able to provide access, and they occur when development has become feasible.

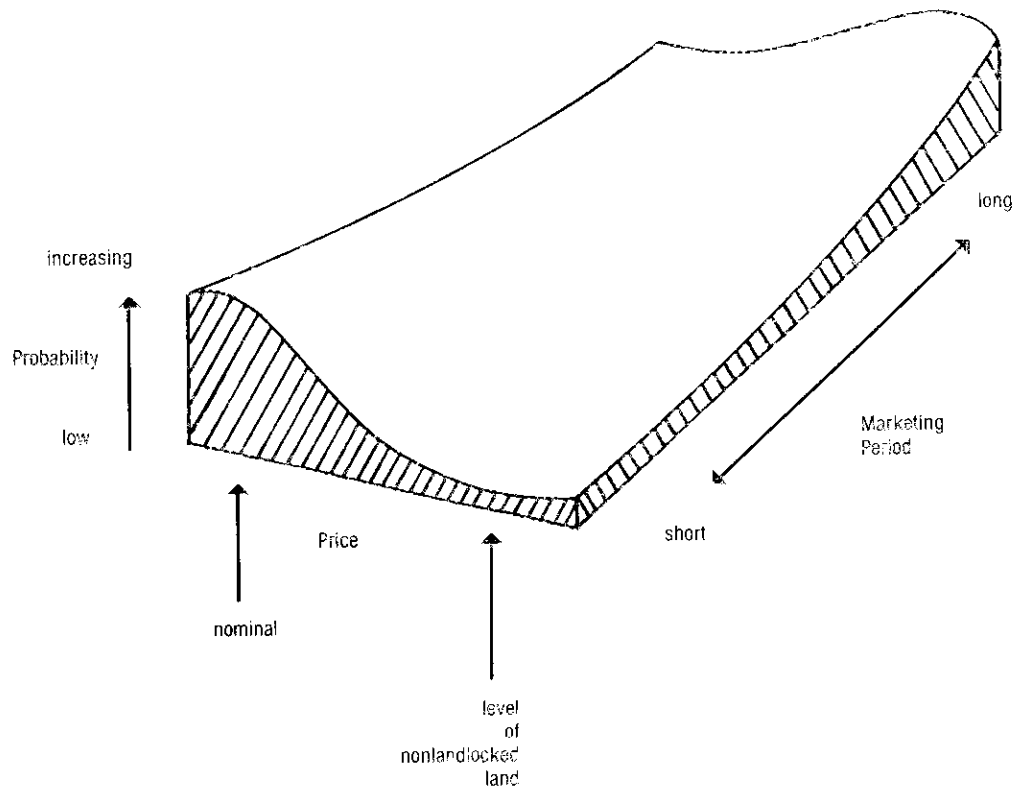
Thus if the owner of a landlocked parcel is forced to sell after a marketing period measured in months and "reasonable" for other nearby

6. Joseph D. Albert, H. Stan Banton, and Thomas D. Pearson, "Valuing Real Estate Under Conditions of Bilateral Monopoly," *The Appraisal Journal* (October 1982): 532-536.

parcels, the best offer would likely be far less than for an accessible tract; but if the owner were permitted to wait until growth made development feasible, little or no penalty would be paid for lack of access. The result is shown in the three-dimensional graph in figure 4.

Before an estimate of value can be delivered in this case, it is first necessary to consider the application of the market value definition to the problem. Most definitions call for exposure to the market for a reasonable length of time. Given that landlocked parcels appear to sell only when development reaches them, it could be argued that the length of time it takes for this to occur is a reasonable marketing period. Depending on the appraiser's position on the proper length of marketing, a point estimate at a nominal value (short period), higher value (long period), or some other value (the projected value at the time development arrives, discounted to a present value) can be delivered. But, as in the previous examples, the point estimate omits most of the picture. A graphic display is more complete.

FIGURE 4
Variables Affecting Value Indications for a Landlocked Property



VALUATION IN UNCERTAIN STATES OF NATURE

One other common situation for which an alternative to reporting value as a point estimate may be useful is in the appraisal of property for which highest and best use cannot be ascertained on the appraisal date, generally because it depends on a ruling by a regulatory body that will take place after the presentation of a case that the appraiser cannot make.

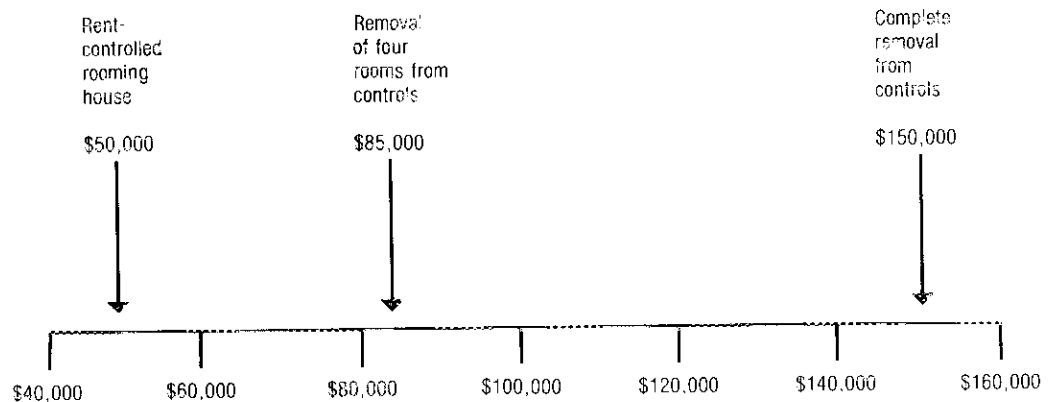
An example is in the appraisal of a heavily regulated property. Assume that we have been asked to appraise a rooming house in a community with a strong rent control ordinance. Nearby properties include older houses that have been remodeled as residential condominiums supporting a high level of value. The subject is a similar, older building that could be attractively renovated. The rent control ordinance forbids removal of controlled units from the rental market for owner-occupancy without a removal permit. No renovation may be undertaken without a removal permit, of which the rent board has issued very few. However, even local tenant advocates admit that rooming houses have been a source of neighborhood problems because of the clientele they attract. The rent board may modify its policy. There are indications that the board will formulate a policy allowing partial owner-occupancy of the homes with the goal that such use will lead to better upkeep. The amount of space permitted the owner-occupant would then be determined by the size of the occupant's family. The appraisal assignment is to estimate current value before any specific plans can be presented to the rent board or a decision made.

The appraiser formulates several use scenarios. The income capitalization approach yields a value of \$50,000 in a case where removal permits and owner-occupancy are denied. The use of four rooms by an owner-occupant leads to a value of \$85,000. Permission for renovation of the entire building into condominiums produces a \$150,000 value. To complicate matters further the land value is estimated at \$125,000, indicating that under all but the least restrictive scenarios the building, which cannot be razed without a removal permit, has a detrimental effect on value.

For an appraiser who wishes to express market value as a single point estimate, a standard approach is to choose one scenario—one that produces the most conservative value or that appears most likely to be borne out—and deal only with that use and the value it produces. But here again an appraiser deprives his or her client of valuable information. The appraiser can turn to a graphic representation, but in this case the graph is of little additional value because what is being described is not a range of probabilities but different and mutually exclusive situations that no one other than the rent board is in a position to determine. The only complete solution is to set forth all the scenarios and value conclusions. An aid to communication in this case would be a display of the values along a spectrum as shown in figure 5. The value here is expressed not as one number but as an array along a range.

FIGURE 5

Value Indications In Various Scenarios of Use



INCREASING FREQUENCY OF "SPECIAL" CASES

One may question whether the expression of value as a point estimate is not sufficient in the majority of situations, whether the alternative methods presented here are not applicable in only a few special instances and therefore do not require the rearranging of our methods. It is true that where the market for a particular property conforms closely to the perfect market model, the point estimate, though less informative than a graphic display, is adequate. But increasingly, some aspect of the special case enters into many of what at first appear to be straightforward valuation assignments, to the point in the everyday practice of an appraiser where the "normal" cases become less frequent and the special cases predominate.

The procedure for the landlocked piece is applicable in other situations, as is the method for the bilateral monopoly of Albert, Banton, and Pearson, in any case where the key to a higher and better use is held by one and only one party that is not the landowner. For example, consider a parcel of low-density zoned residential land that is one of the few remaining vacant tracts in its locale. A private owner could develop a maximum of only 20 housing units on the site, but the local housing authority, which alone as a public agency can obtain a use change, can develop 100 units of housing for the elderly. The housing authority wants to buy the land. Should it pay a price based on the use for low density or high density? The resolution is the same as with the bilateral monopoly. Albert recognizes that "the appraisal of any

parcel where the potential for plottage exists will encounter similar problems,"⁷ and this becomes a greater problem for appraisers because it requires a detailed knowledge of the needs and economic means of specific individuals in a community. Smith cites a similar example of an appraiser who ignores the potential for plottage in the appraisal of a small store which is bought by an abutter at a price 22% higher than the appraised value and is cleared for site expansion.⁸ If appraisers are to avoid misadvising clients in such situations, at a minimum they must be aware of and mention such possibilities, especially in the case of commercial property where plottage is most prevalent.

Situations in which the state of nature is uncertain affect an ever-greater proportion of valuation assignments as highest and best use becomes more and more dependent on regulatory actions. There was a time when few complications of this sort occurred. Before zoning and other restrictions were in place, landowners had control of a full bundle of rights and could do with their property pretty much as they pleased. But as population density increases, less distance separates neighbors and each develops a greater and greater stake in what is done with the neighbors' land. Public agencies, filling a need to ensure that open space remains open or to protect tenants from eviction or rent increases, act on behalf of all or a segment of the community. They restrict what had once been unrestricted and transfer, with or without compensation, parts of the bundle of rights from the landowner to the public domain. As long as population density increases and the public wishes to make such easy use of a means to benefit itself, appraisers can expect valuation situations of this type to occupy more and more of their practice.

ALTERNATIVE TECHNIQUES

Definitions of highest and best use and market value that predate consideration of probability are founded on the supposition that the real estate market is a perfect market. In a perfect market selling prices fall into a small range that can be expressed adequately by a point estimate. Experience teaches us that the real estate market is far from perfect; to the extent in any particular case that it is not, the point estimate is less and less suitable.

To be acceptable any expression of value must meet two criteria: be comprehensible to the client and describe value adequately. If appraisers must err, it would be better to do so on the side of complete and accurate reporting. The client can always be further educated in the complexities of value, but once an oversimplified point estimate is delivered, the decisions that are made with it as a basis cannot always be undone.

A graphic depiction of the value estimate like those shown here provides the most complete picture of the value conclusion and is the method most

7. *Ibid.*, 536.

8. Smith, 208.

appropriate in the majority of assignments. A graph with explanatory text brings together for client and appraiser all the important elements of the valuation, including the separate indications from different approaches to value, the single most probable price, the breadth of the range, and the characteristics of buyers who might be found to pay prices at different levels. Narrative expressions of range and probability not accompanied by a graph are better than point estimates but are inadequate to the extent that they cannot communicate what a graph can.

In many cases, a graph, a point estimate, or any expression of a single most probable selling price is inappropriate. In those cases for which the state of nature cannot be ascertained, the best that the appraiser can do is provide separate value estimates for each possible state and perhaps a judgment of which is most likely. For clarity these might be depicted as values along a spectrum. With a bilateral monopoly or any property with the potential for plottage, where the divergence of the market in question from the perfect market model is extreme, an appraiser may be forced to accept that the limit of services may be to report the high and low ends of a negotiating range.

CONCLUSIONS

Appraisal exists to meet a need. Clients need objective estimates to ascertain the value of the property they wish to buy, sell, take, tax, or use as collateral for a loan. In the process of meeting this need appraisers have discovered that value is not such a hard and fast thing, that the market is prone to uncertainty, that appraisers' readings of the market are subject to additional uncertainties, that value can be best expressed in terms of probability and range, and that in some cases it is prone to fluctuation on the basis of use decisions by regulatory agencies or business decisions by the one or two participants who may be all that make up some markets. This news is disheartening to clients who want to believe that they are committing their funds to something more ascertainable. But it is the news, and it is the job of appraisers to report it.

Probabilities and graphic analysis are not new to practicing appraisers, but the means of communicating them to clients is. To a greater or lesser extent, depending on the assignment, the point estimate has always been at odds with the information appraisers have wished to convey. Appraisers have needed graphs and other tools for communicating value conclusions. It requires little additional trouble to make use of them and communicate more fully to clients what has been learned. In the process they can expand the scope of their services beyond the confines of the point estimate into other matters that are a part of the domain of appraising.