Pricing Strategies and Residential Property Selling Prices

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Abstract. **Research on many consumer goods has indicated that pricing strategies may influence perceptions of quality. Whether such perceptions exist for large assets like real estate, which may therefore allow pricing strategies to influence selling prices is the subject of this study. Large high-rise centrally-located condominium data is used to test whether asking prices are an indicator of value to buyers.**

Introduction

In an informationally efficient and competitive market one would expect a strong positive correlation between product quality and price. Yet many consumer markets have shown weak links between quality and price. Research has indicated that asking prices actually may influence perceptions of quality, independent of real quality, and thus influence the prices consumers are willing to pay. Numerous studies have examined the issue of quality, price, and consumer behavior, yet, these studies are generally on relatively low-priced products when compared with a home purchase.

This study addresses the same issue of consumer perceptions, informational efficiency, and whether the type of "price influence" demonstrated in low-priced markets is possible to detect in decisions as important and costly as home-buying. A further issue is whether there is a discernable optimal pricing strategy, controlling for both time on the market and maximum price objectives.

Prior Research on Price Reliance by Buyers

Price reliance is the degree to which consumers rely on prices as an indicator of quality or value. If markets were informationally efficient then buyers could be price takers and search only to satisfy their own tastes and preferences. Yet, several studies have shown price to be a poor indicator of quality and more related to marketing strategy.

Leavitt (1954), Tull, Boring and Gonsior (1964), Gabor and Granger (1966), McConnell (1968) and Shapiro (1968) have all found that consumers rely on price as an indication of better quality. Yet, many prior studies have also shown that price is a poor indication of quality, at least at the product level, including Morris and Bronson (1969), Sproles (1977), Riesz (1978), Geistfeld (1982) and more recently Gerstner (1985) and Curry (1985). A few of these are discussed next.

In 1968, Benson P. Shapiro separated six-hundred adult respondents into eleven groups. The respondents were asked to rate two similar but different products. Several products

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were rated, such as stockings, cologne, carpeting, sweaters and chairs. The two items in each product category normally would have retailed at the same price. For the experiment, the price of one product was raised 20% and the price of the other product decreased about 20%. Prices were switched with alternating respondent groups so that each item appeared equally at the high and low prices.

The data revealed that price consistently tended to be a communicator of quality, especially on the carpeting and chair, which were the most expensive items in the group. Shapiro concluded that buyers tend to trust the seller's integrity and expect a higher price to be related to higher quality even if such quality difference is not apparent to them. Numerous other studies have had similar results, such as Leavitt (1954), McConnell (1968), Olander (1970), Newman and Becknell (1970) and Curry (1985).

Curry (1985) reinforced the findings of a weak price-quality relationship for specific products, but found a significant positive price-quality relationship across lines of products and brands.

Kent B. Monroe (1971) took the price reliance research one step further by investigating "latitudes of acceptance" of various price levels on a given product. Monroe varied the prices on several products and surveyed the respondents to determine the most acceptable price range. This is similar, but more general, than the idea of an optimal pricing strategy. Monroe's hypothesis that the subjects would have an acceptable range of prices for a considerable purchase was confirmed, where the median quantity demanded for the products actually increased as the price increased, and as the price continued to increase demand began to decline.

Recently, Gerstner (1985) in an exhaustive study of 145 products began an examination of the types of markets where price reliance might be stronger. He hypothesized that the price and quality relationship should be stronger on items more frequently purchased, and for big-ticket items because of the substantial financial commitment. Results indicated that for many products "the relationship between quality and price is weak," with frequently purchased items showing weaker results than nonfrequently purchased items. One explanation was that nonfrequently purchased items tended also to be larger-ticket items that showed a positive but weak correlation between quality and price.

Cubin (1974) studied the relationship between price, quality, and selling time in the housing market. He estimated a regression of sales price on a set of quality variables for a sample of homes that sold in the Coventry, England area between 1968 and 1970. This gave an expected price for each house which was compared to the actual price to determine a quality-adjusted price. Cubin's primary focus was on the relationship between quality-adjusted price and the time taken to sell. He tried both linear and cubic formulations between market time and quality-adjusted price. Both yielded the somewhat unexpected result that, on average, the higher the price the faster the house was sold. Cubin presented several possible explanations for this dilemma and came up with the hypothesis that imperfect knowledge on the part of both buyers and sellers leads the former group to judge quality by asking price.

Other than Cubin (1974), none of the prior research has involved ticket prices greater than that of cars, and most of the price quality research has been on consumer products typical of those appearing in *Consumer Reports* magazine, such as appliances, electronic goods, food, and food-related items. Results have consistently indicated weak relationships on these goods between price and quality, suggesting to buyers the value of search and to sellers that within certain acceptable latitudes a higher price may not decrease demand significantly, suggesting the possibility of an optimal pricing strategy.

Seller's Perceptions of Real Estate Values

Gerald Barton, a large developer (Landmark) has said "none of us knows what real estate is worth—its perception" (*Newsweek*, October 14, 1985, p. 67).

The discussion so far has centered on the influence of price on buyer's behavior. In this regard only non-real estate items have been studied. However, an equally important question deals with the ability of a seller to know what a product is worth, especially in large-ticket localized markets like real estate. Only one known study has dealt with this issue. Kish and Lansing (1954) dealt specifically with the ability of an owner to estimate the value of his home. 569 homeowners were asked to estimate the market value of their homes. Estimates for these same homes were later made by professional appraisers. The proportion of discrepancies between the two estimates was large; only 37% of the value estimates were within plus or minus 10% of each other. However, the mean respondent estimate was only 3% over the mean appraiser's estimate suggesting only a small owner-optimistically-upward bias. Homeowner differences almost as often were below the appraiser estimate as above the estimate.

Independent of whether appraisers are much better at judging value relative to homeowners, the point is well taken that sellers can easily misjudge values. This difficulty in judging value by sellers has several implications.[1] In order to avoid missing the highest price-bidding buyers, sellers will tend to overprice more than underprice. Hence, the typical real estate buyer expects the typical seller to accept a selling price below that of the listing or asking price. To the extent buyers realize that asking prices are not equivalent to expected selling prices, they may give greater reliance to independent value estimation in order to appropriately bid on the property. This would reduce the type of price reliance found in lower-priced consumer markets.

Real Estate Seller's Objectives

At the extreme, two seller pricing strategies exist. One is to drastically overprice, hope for some price reliance effects, and make large concessions as necessary to bidding buyers. The other is to price near perceived market value in order to attract the maximum number of buyers and potential bids, but then only make small price concessions.

It has been demonstrated by Belkin, Hempel, and McLeavey (1976) that the proportion of list price realized by the seller diminishes with time on the market; or stated another way, that price concessions are inversely related to time on the market. These results, also confirmed by Miller (1978) indicate one of the difficulties in examining pricing strategies in terms of their impact on selling price. An initially selected asking price may have its effect felt through selling time and/or the resulting selling price. A lower initial asking price may reduce selling time but have little impact on selling price. Therefore, one must consider the concurrent objectives of the seller, which suggest antithetical pricing strategies: to maximize selling price and to minimize selling time. Stated another way, the seller wishes to maximize the present value of the net selling price based on his own opportunity cost of time.

An Empirical Test

Examining pricing strategies and price reliance in large-ticket markets like real estate is especially challenging. This is due to the presence of heterogeneity of asset attributes making the assessment of "value" more difficult by market participants. However, such uncertainty based on imperfect information, incomplete information, or attribute heterogeneity also may lend itself to more potential for price reliance. In order to minimize the problem of value assessment and heterogeneity, a sample of similar high-rise condominiums were used in the following empirical tests.

Hypotheses to be Tested

General Hypothesis:

There exists an optimal pricing strategy for real estate such that a seller may maximize the net present value of the selling price by choosing an appropriate asking price.

Specific Hypothesis:

(1) Asking a higher price relative to value will result in a larger selling price up to a point where buyers will be discouraged and fail to bid.

(2) Asking a higher price relative to value will result in a greater time on the market in order to facilitate a sale.

(3) Asking a lower price relative to value will result in a faster sale (less time on market) up to a point where further decreases in the asking price have no effect on time, only upon selling price.

It is not known, a priori, whether the above hypothesized relationships between asking price, value, selling price and time on the market are backward bending nonlinear quadratics such that true "optimals" exist. Empirical analysis of residuals is used to determine such relationships.

Sample Data and Value Model

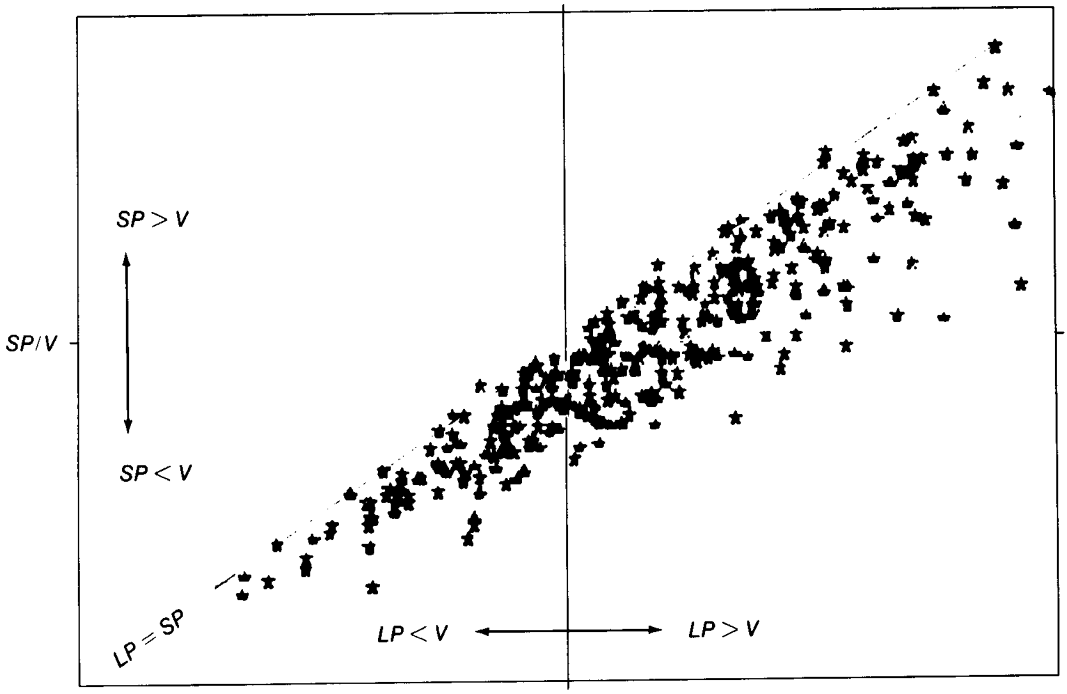
An initial sample of 668 high-rise condominiums which sold during mid-1984 to mid-1985 were collected. All of these condominiums were located in the eastern portion of Oahu, Honolulu in Hawaii, most within a few miles of each other. Forty-one attributes or parameters were collected on each condominium including quantity and quality measures such as living area square feet, and "ocean view." Financing was fairly stable during the data collection period and thus financing-induced value changes were minimal. Another circumstance during the sample observation time period was that real estate prices in general were fairly flat with very low inflation and few changes in nominal condominium prices on Oahu. The sample was pared down further for the development of a valuation control model via multiple regression analysis.[2] Final empirical analysis was performed on a sample size of 605 observations.

The valuation control model reached an overall correlation coefficient of .908 (adjusted R-square) and is more fully described in the Appendix.

Residual Analysis Between Listing Price, Predicted Price, and Selling Price

In Exhibit 1 is a graph depicting on the center vertical axis selling price over predicted price, and on the center horizontal axis list price over predicted price (value estimate). Through the center of the diagram and connecting the upper right and lower left corners is a line

Exhibit 1
List Price, Selling Price and Value



representing list price equal to selling price. To the left of the vertical axis, *LP/PP,* the listing price is below predicted price and thus either a quicker sale or a smaller average decline from list price to selling price should occur. To the right of the axis, *LP/PP,* there should be a larger decrease from list price to selling price and or more time on the market. Empirical results confirm these general relationships as shown in Exhibit 2, where the sample is divided into two groups, those where $LP > PP$ and those where $LP < PP$.

Exhibits 1 and 2 confirm some general expectations, and validate the valuation model as a general indicator of value.

Exhibit 2
Average Price Decline and Time on Market by Groups

	List Price > Predicted Price	List Price < Predicted Price
(1) Selling Price as a Ratio of Listing Price (Standard Deviation)	.91265 (.075) SEM = .00319	.93550 (.051) SEM = .00345
	t-test for mean differences = 4.0175	
(2) Average Time on Market in Days (Standard Deviation)	133.81 (106.0) SEM = 5.37	120.15 (108.5) SEM = 7.35
	t-test for mean differences = .2753	

In the lower left-hand quadrant, where list price is below predicted price (value proxy) one would expect selling price to be nearer the listing price when compared to the upper right-hand quadrant. The further one lists below predicted price the more linear the relationship with selling price should become. However, in the upper quadrant as one continues to select a higher listing price relative to "value" the expected selling price should be further and further away from list price given a similar time on the market. Thus, a nonlinear relationship should occur and seems to be verified by examining Exhibit 1.

Both visual analysis of Exhibit 1, and examining Exhibit 2 results, indicate the expected general relationships. Average time on the market is longer where list price exceeds predicted price,[3] and the selling price is smaller as a percentage of the list price.[4] The standard deviation of selling price over predicted price is nearly 150% as large as that for the group where list price is under predicted price. There appears to be more uncertainty in the market place as list price over predicted price increases.

Pricing Strategy Models

The general question is whether asking a larger price relative to true value can affect selling price via price reliance as an indication of value. A variable defined as "pricing strategy" must be independent of the general price level of competition so that the tests can be performed over a range of values that exist in the market. The ratio of list price over predicted value, *LP/V*, suits this purpose. The dependent variable will be the ratio of selling price over value, or *SP/V*. Please note that *V* is the regression model estimate of value unique to each observation and not a constant over the range of observations. In the first model test below, with a sample of 605, a simple linear model is examined:

Model (1)	Adjusted $R^2 = .914$	F-value = 3065.22
	$SP/V = .1095 + .8168\,(LP/V)$	(t-value)
	(55.36)*	*significant at .01 level

Model (1) above includes all properties where $LP < 2.5 * V$, over all times on the market.

However, it is apparent from Exhibit 1 that the variances of the data are heteroscedastic. When heteroscedasticity is present ordinary least squares estimation places more weight on the observations that have large error variances than those with small error variances. Because of this implicit weighting, ordinary least squares parameter estimates are unbiased and consistent, but they are not efficient — i.e., the variances of the estimated parameters are not the minimum variances.

Since it appears that the error variances vary directly with the independent variable, *LP/V*, we assume that

$$\mathrm{Var}(e_i) = C\left(\frac{LP^2}{V}\right)_i$$

We then divide through the equation $\left(\frac{SP}{V}\right)_i = A + B\left(\frac{LP}{V}\right)_i + C_i$ by $\left(\frac{LP}{V}\right)_i$

to estimate the transformed regression equation

$$\frac{(SP/V)_i}{(LP/V)_i} = \frac{SP}{LP_i} = \frac{A}{(LP/V)_i} + B + \frac{E_i}{(LP/V)_i}$$

where the transformed error term is homoscedastic since

$$\text{Var}\left[\frac{E_i}{(LP/V)_i}\right] = \frac{1}{(LP/V)_i^2}\text{Var}(E_i) = C$$

In this case, the original intercept term has become a variable term while the slope parameter associated with the variable *LP/V* has become the new intercept term. The ordinary least squares regression estimate of the intercept results in the value of *B* being 0.8391 with a *t*-value of 57.47. Thus, the revised estimate of the slope coefficient is slightly higher than that obtained with the original regression equation.

To test the hypothesis that a regression coefficient, *a*, is equal to a specified value, *A*, we use the fact that the statistic

$$t = \frac{A-a}{\sqrt{1-r^2}}\sqrt{N-Z}$$

has a student's *t*-distribution with *N*-2 degrees of freedom. At a .005 significance level, we would reject the hypothesis that the slope coefficient is as large as 1 if $t > t_{.995} = 2.58$ for (605-2) = 603 degrees of freedom. Since $t = 4.056$ for the transformed regression equation, we can reject the hypothesis that the slope coefficient can be as large as 1.

In conclusion, the slope, 0.8391, of the pricing strategy variable is less than one, indicating an increase in *LP/V* does not proportionately increase *SP/V*.

To test for the expected "nonlinear" relationship between *SP/V* and *LP/V*, the data set was divided into two regimes — i.e., where $LP < PP$ and $LP > PP$. The regression results of *SP/V* as the dependent variable and *LP/V* as the independent variable were as follows:

Model (2A) $LP < PP$ $N = 218$
Adjusted $R^2 = .856$ F-value = 593.91
$SP/V = .0624 + .8643\ (LP/V)$
(24.37)

A similar transformation as in Model (1) was applied to handle the heteroscedasticity problem. The new estimate for the slope coefficient turned out to be .8588 with a *t*-value of 28.35.

Model (2B) $LP > PP$ $N = 387$
Adjusted $R^2 = .839$ F-value = 917.48
$SP/V = .1542 + .7817\ (LP/V)$
(30.29)

The transformed equation resulted in a revised estimate for the slope coefficient of .8088 with a t-value of 25.85.

As seen, the results seem to confirm the notion that when asking price for a property is less than predicted price, a smaller decline from list price to selling price should occur than when asking price exceeds predicted price.

Conclusions

The existence of an optimal pricing strategy for large-ticket heterogeneous markets, like real estate, is much easier to assert than prove statistically. General relations were demonstrated as expected, including a lower selling price relative to the value estimate and longer selling time when property is priced higher relative to the value estimate. Such results also do not negate the existence of efficiency within real estate markets. This conclusion is in contrast to Cubin (1974) who suggested that "sellers who ask for a price below the ruling average (for a house of that particular quality) experience more difficulty in selling than a seller who asks for a price 'at par'."

Additionally, a "nonlinear" relationship was found where asking a larger list price has a marginally decreasing impact on selling price, as one moves further above the value estimate.

Three problems were revealed in this research in trying to examine the type of price reliance and potential for an optimal pricing strategy found in other studies — the first being the existence of two non-independent objectives of a seller, selling at a higher price and selling more quickly; the second being the difficulty of establishing a control model via the use of a multiple regression valuation model. Observations where list price exceeded the value estimate may have included many positive attributes not controlled for in the valuation model, even with an overall correlation coefficient above .9. Similarly, observations where list prices were below the value estimate likely included some lower-quality attributes or influences not controlled for by the valuation model. A third problem is the possibility of a biased sample created because some overpriced real estate listings simply did not sell, and thus only "successful" overpricing was included in this sample.

If any optimal pricing strategy can be inferred from this empirical study for real estate (or other large-ticket heterogeneous) markets, it seems to be to ask (or list) at a price at least equal to or above that of the typical pricing spread for other similar property. Since value is never known with certainty in such imperfect markets, some degree of overpricing, above the typical spread, allows for the possibility of price reliance and in this study did not increase time on the market as much as selling price. One can always make significant price concessions, as many apparently do in the real estate market studied.

Pricing reliance in the real estate market such as that found in low-ticket markets cannot be confirmed primarily because of the limitations of the valuation model and because of the possibility of a biased sample with respect to the success of "overpricing." That level above which overpricing deters bids and which would create a backward bending nonlinear relationship between list price and selling price was never found. Finding such a level of overpricing that deters bids would be necessary to solve for a true optimum pricing strategy, but without data on the unsuccessful overpricing attempts this may not be possible.

APPENDIX

A. Condominium Valuation Model Description at Step 13	
Dependent Variable: Selling Price	
Multiple Correlation Coefficient	.911
Adjusted Correlation Coefficient	.908
F-value for Analysis of Variance	136.64
Standard Error of Estimate	18,149.08
Intercept	-3,031.43

Variable	Regression Coefficient	*t*-Value
Living Area Sq. Ft.	105.55	17.77
Ocean View* Sq. Ft.	17.98	6.68
Floor Level Range* Sq. Ft.	.87	5.84
Water Front* Sq. Ft.	79.69	5.86
Lanai (Porch) Area Sq. Ft.	63.59	4.06
Area 1* Sq. Ft.	-20.29	-3.50
Area 6* Sq. Ft.	-7.11	-2.28
Number Parking Stalls	4244.15	2.49
Area 3* Sq. Ft.	9.97	2.40
Security Guard	7223.79	2.93
Area 4* Sq. Ft.	7.53	2.07
Mountain View* Sq. Ft.	5.19	2.08
Sauna	-4771.14	-1.90

The actual model was taken out 21 steps with only a slight improvement in overall fit, reaching an adjusted correlation of .909.

Notes

[1]One might argue that the advice of real estate agents would tend to check mis-pricing errors, however, economic incentives for agents do not prevent over or underpricing. Some agents have an incentive to suggest or allow higher list prices in order to get a listing (contract to sell) on a property in competition with agents who feel the property is worth less. Furthermore, nearly half of all listings typically expire without a sale, resulting in no commission to agents. Thus, there is some incentive to allow underpricing, as well, in order to increase the probability of a commission payment. These two economic incentives work against objective valuation advice by agents.

[2]Sales under 50 days and requiring over 250 days were eliminated in order to develop a valuation control model without unusual circumstances of buyer/seller duress forcing atypical behavior. This approach did produce a better overall fit and higher correlation coefficient.

[3]The difference is not significant at a .01 level.

[4]The difference is significant at a .01 level.

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