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The Effect of Time-on-Market and Location on Search Costs and Anchoring: The Case of Single-Family Properties

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Abstract Regarding single-family residential properties purchased for investment (non-owner occupied) we examine whether out-of-state buyers pay more than in-state buyers. We focus on the effects of search costs and anchoring. We use data on 2,828 Las Vegas non-owner occupied (investor) residences, 40% of which are purchased by non-local investors. We find that the location of the property affects the empirical results. Specifically, search cost and anchoring effects that appear significant when the location of the property is ignored disappear when location is introduced as an independent variable.

Keywords Search costs · Anchoring · Time-on-market

Introduction

It is widely believed by both academics and practitioners that some types of buyers pay higher prices for real estate. Real estate markets are characterized by heterogeneous goods, infrequent trading and asymmetric information. Buyers must search for desirable properties and the selling price is typically the result of negotiation between the buyer and seller. If search costs, bargaining power or the degree of informational asymmetry vary systematically with buyer characteristics, then the price paid for any given property should also vary with buyer characteristics. In particular, the conventional wisdom is that local buyers have lower search costs, less asymmetric information and may have more bargaining power than out-of-town buyers. Experienced buyers may have lower search costs and less asymmetric information than first-time buyers. Also, out-of-state buyers from areas

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where real estate values are high relative to local prices may have upwardly biased expectations of property values. This bias has been termed the "anchoring" effect.

A number of researchers have examined the effect of buyer characteristics on prices for real estate. Baryla and Zumpano (1995) report that first-time buyers and out-of-town buyers search longer than more experienced and local buyers. Dale-Johnson (1983) argues that, because of tax effects, higher income buyers should be willing to pay higher prices; his empirical evidence supports this view. Song (1995, 1998) also finds that higher income buyers pay higher prices, which he interprets as evidence that they have higher search costs. Miller et al. (1988) determine that Japanese buyers paid significantly more than other buyers in two Honolulu areas in the late 1980s. Since real estate prices in Japan were substantially higher, this result can be interpreted as evidence of either higher search costs or anchoring effects.[1] Myer et al. (1992) find no difference between US and foreign buyers in the wealth effect of corporate real estate divestitures, that is, foreign buyers do not appear to pay a premium. However, their sample size is quite small. Turnbull and Sirmans (1993) conclude that first-time and out-of-town buyers pay the same prices as experienced and local buyers for residential properties. Watkins (1998) finds that first-time buyers and non-local buyers do not pay different prices compared to experienced or local buyers of residential properties in Glasgow in the early 1990s. Harding et al. (2003b) present results that first-time buyers have less bargaining power than experienced buyers, implying first-time buyers pay more. Finally, Lambson et al. (2004) find that non-local buyers of apartment complexes in Phoenix, AZ, pay higher prices than do local buyers. LMS employ an OLS test and have no data on time on the market (TOM). Also, LMS fail to consider the effect of the location of the property (within the metropolitan area) on its price. It is possible that location can proxy for the search and anchoring costs reported in their study. Our study improves on the LMS model by considering property location, TOM, and the simultaneous determination of price and TOM.

In summary, the previous research has either focused on the prices paid for single-family properties intended for owner-occupancy or for commercial properties. Also, studies of commercial properties, such as the LMS paper, do not include data on TOM or location. These may be serious shortcomings because it is well known that price and TOM are endogenous variables (making OLS estimates unreliable) and location within a local community may matter.

This paper makes a contribution by expanding on previous research in the following ways. First, we look at prices paid for single-family properties purchased, not for use as a primary residence, but for investment (non-owner occupied) by both in-state and out-of-state buyers. That is, we examine a previously neglected segment of the market. Second, we look not only at first−time buyers but multiple-property buyers. Doing so will reveal information about the bargaining power of buyers that purchase more than one property. Next, we include a TOM variable and employ a simultaneous equations test to investigate whether out-of-state buyers lie on the same or a different portion of the price–TOM curve than do in-state buyers. Finally, we

[1] Miller, Sklarz and Ordway report that prices were $50–75 per square foot of lot space in Honolulu compared to $1,500–4,000 per square foot in Tokyo.

investigate whether the location of the property within the local community has an effect on the estimates of search and anchoring effects.

We employ a data set of 2,800 non-owner occupied single-family properties in the Las Vegas, NV metropolitan area purchased between January 2000 and March 2004. Forty percent of these properties were purchased by out-of-state buyers. On average, out-of-state buyers purchased houses for $204,000 while local buyers purchased houses for $175,000. Properties purchased by out-of-state buyers are on the market an average of nine fewer days than those bought by local buyers. Most of the non-local buyers came from areas where housing prices over the sample period were higher than housing prices in Las Vegas. The sample averages are consistent with higher search costs for out-of-state buyers and with anchoring effects. They are also consistent with local and non-local buyers being located at different points on a negatively sloped price–TOM curve. That is out-of-state buyers purchase properties somewhat sooner and at a higher price than their in-state counterparts. Given that time-on-market may play a key role in sorting out search costs and anchoring effects we next review the literature on this topic. Then "Empirical Analysis" describes the data, develops the empirical model and presents the empirical results. "Summary and Conclusions" provides brief concluding remarks.

Background and Literature

There is a substantial body of literature that analyzes the relationship between price and time on the market in residential real estate. While the shape of price–TOM relationship is of interest in its own right, it also has implications for whether out-of-state and local buyers locate on different portions of the price–TOM curve. In our sample, out-of-state buyers paid higher prices for houses that had been on the market fewer days than local buyers. Assume, for the moment, that the price difference is not due to differences in property characteristics. If the price–TOM curve is downward sloping, as in Fig. 1 then these facts imply that out-of-state buyers may be located on a different portion of the price–TOM curve than local buyers.

Theoretical Models of Price–TOM

Both buyer and seller search models analyze only one side of the markets, or are "partial partial-equilibrium theory" as Rothschild (1973, p. 1288) puts it. However, a number of researchers have developed equilibrium search models of the real estate market. In Yavas (1992), buyers' and sellers' search strategies are jointly determined within the model. However, the selling price is determined by a bargaining process that is exogenous to the search process, so that price is independent of time on the market. Yavas and Yang (1995) extend the model to incorporate brokers' search behavior and the endogenous determination of the listing price by the seller. However, the sign of the relationship between price and TOM is ambiguous (p. 356). Arnold (1999) develops an equilibrium model in which the selling price is determined by bargaining between the buyer and the seller, and the bargaining process is embedded in a model of search behavior. Arnold (p. 456) finds that "a higher asking price can coincide with a shorter marketing time." for some value of

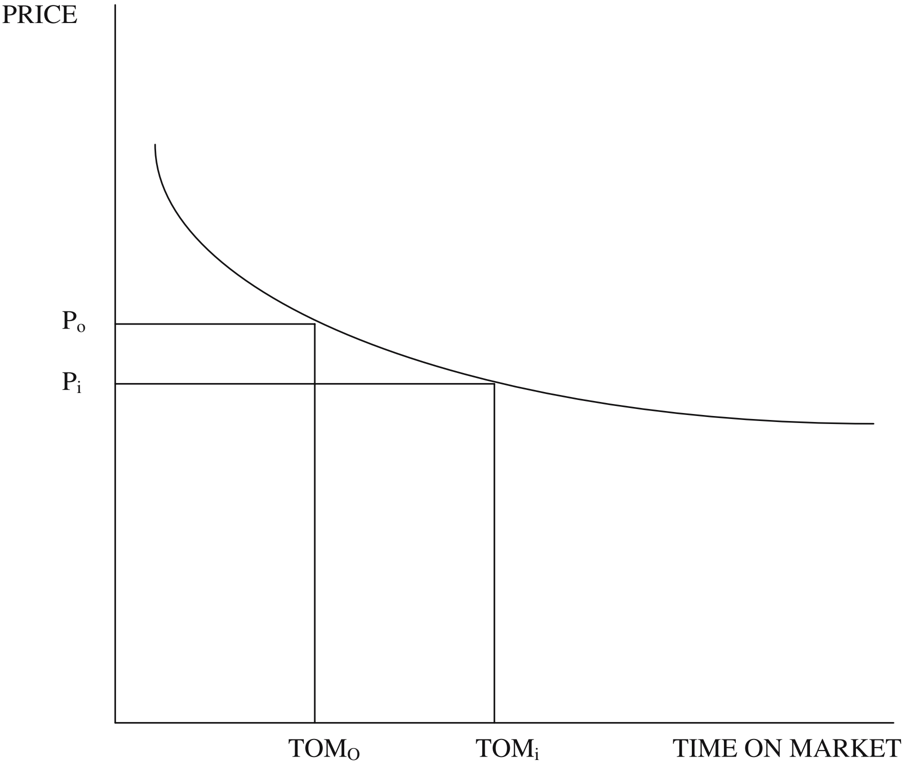

Fig. 1 Price–TOM curve: in-state and out-of-state buyers

the model's parameters; however, there are other parameter values for which this is not the case.

In the model of Haurin (1988), idiosyncratic characteristics, or "atypicalities," increase the variance of the known offer distribution. He shows that this increases the expected time on the market, and it can be shown that this also increases the expected selling price. Haurin develops an empirical measure of atypicality in terms of the value weighted absolute deviation from the mean. In his empirical analysis, Haurin finds that both the selling price and time on the market increase with the degree of atypicality.

Read (1988) argues that sellers can easily value some housing characteristics (e.g., square feet of floor space) but that the value of other, idiosyncratic characteristics (e.g., a scenic view) may be difficult to determine. Sellers must learn about the offer price distribution. Sellers interpret a lack of offers as information that the market value of the idiosyncratic characteristics is low and revise their reservation price downward over time. Thus, Read's model predicts a negative relationship between price and time on the market.

Taylor (1999) develops a model in which potential buyers use time on the market as a signal of possible defects in the house. That is, a house remains on the market for a long time either because it was overpriced or because previous prospective buyers discovered a flaw. Potential buyers infer the second explanation is more likely the lower the initial asking price of the house. Taylor shows that the asking price of the house falls over time.

Empirical Research on Price–TOM

As the preceding discussion makes clear, the theoretical literature yields mixed results regarding the sign of the price–TOM relationship. The empirical literature that has investigated the price–TOM relationship has not helped to clarify whether the relationship is positive or negative. Selected empirical studies of the price–TOM relationship are summarized in Table 1. Some empirical studies find a positive relationship; other studies find a negative relationship, while still other studies find

Table 1 Selected studies of time on the market

Authors	Journal (date)	Location (period)	Dependent variable	Methodology	Result
Zuehlke	REStat (1987)	Tallahassee, FL (1982)	TOM	Duration	Negative (5–10%)
Turnbull, Sirmans, Benjamin	AE (1990)	Baton Rouge, LA, (1988–1989)	Log(LP)	OLS	Negative (NS)
Turnbull, Sirmans	RSUE (1993)	Baton Rouge, LA, (1984–1987)	Log(LP)	OLS	Negative (NS)
Asabere, Huffman, Mehdian	JRER (1993)	Philadelphia, PA (1986–1990)	Log(TOM)	OLS	Pos. if overpriced (1%), Neg. if underpriced (1%)
Baryla, Zumpano	JRER (1995)	National (1987)	Log(TOM)	Duration	NS
Yang, Yavas	JRER (1995)	State College, PA (1991)	TOM	Duration, IV	Positive (1%)
Yavas, Yang	REE (1995)	State College, PA (1991)	TOM	2SLS	Negative (10% in some subsamples)
Jud, Seaks, Winkler	JRER (1996)	Greensboro, NC (1991–1993)	Log(TOM)	Duration	Overpricing positive (1%)
Glower, Haurin, Henderschott	REE (1998)	Columbus, OH (1990–1991)	Log(TOM)	Duration	Pricing error NS
Huang, Palmquist	JREFE (2001)	Seattle, WA (1974–1976)	Log(TOM), SP	FIML	Negative (1%)
Knight	REE (2002)	Stockton, CA (1997–1998)	Log(TOM)	2SLS	Positive (5%)
Anglin, Rutherford Springer	JREFE (2003)	Arlington, TX (1997)	log(TOM)	Duration	Overpricing positive (1%)
Harding, Knight, Sirmans	REE (2003a)	Baton Rouge, LA (1993–1995), Modesto, CA (1996–1999)	Log(SP)	IV	Baton Rouge: Neg. (5%) Modesto: NS

AE Applied Economics, *JREFE* Journal of Real Estate Finance and Economics, *JRER* Journal of Real Estate Research, *REE* Real Estate Economics, *REStat* Review of Economics and Statistics, *RSUE* Regional Science and Urban Economics, *LP* listing price, *SP* selling price, *TOM* time on market, *NS* not significant no significant relationship. The differences in market conditions, time periods, model specifications and estimation techniques among the different studies make it difficult to determine which studies best reflect the underlying economic conditions.

Empirical Analysis

Data

We examine the sales of single-family residences in the Las Vegas metropolitan area between January 2000 and March 2004. There were approximately 170,000 sales of single-family properties (owner and non-owner occupied) over this period for which we have data. The data, provided by the Greater Las Vegas Association of Realtors (GLVAR), include the properties' physical characteristics, occupancy at the time of sale (owner/seller, rented, vacant),[2] the transaction price, and the number of days the house was on the market (listing to sales contract). The vast majority of these houses are bought as owner-occupied residences. Given the rapid population growth of Las Vegas, undoubtedly many of these homes were purchased by out-of-state buyers. However, we cannot identify whether buyers are local or non-local from the GLVAR data.

To identify out-of-state buyers, we use data from the Clark County Assessor's Office (CCAO). The CCAO has data on all properties in Clark County, including much of the same information as the GLVAR data. The CCAO data also contains information on the ownership of the property, including a variable "absentee owner by zip code." This variable was used to identify local and out-of-state buyers. There are approximately 100,000 single-family properties in Las Vegas that are owned by absentee owners. In addition, the CCAO data was used to determine if the owner was an individual, partnership, corporation or trust, and the total number of Las Vegas properties owned by the buyer. Our final sample consists of properties with absentee owners for which the owner is either from Clark County or is from 1 of 30 metropolitan areas. The metropolitan areas selected are the thirty largest for which housing price data are available from the Federal Housing Finance Board (FHFB).

The GLVAR and CCAO data were merged by parcel number[3] To ensure that the sample is representative of residential properties in the Las Vegas area, and to eliminate, early on, atypical properties, we included houses for which the sale price was greater than $40,000 and less than $700,000 and the price per square foot was over $50. We also required that the living space be less than 6,000 ft^2 and the lot size be less than 20,000 ft^2. The final sample contains a total of 2,828 properties; of these 1,133 are owned by out-of-state buyers and 1,695 are owned by local buyers.

[2] We include these occupancy variables in the model below. The reader should be aware that the occupancy status refers to the property at time of sale. All properties purchased were converted to investor properties. That is, the variable for owner occupancy refers to a property that was owner-occupied at time of sale to a buyer who subsequently used it as an investor property.

[3] Both the GLVAR and CCAO data include the date of the sale. We exclude observations for which the recorded sales dates differ by more than 8 days. We use the GLVAR sale date to measure time on the market.

Table 2 Descriptive statistics

Characteristic	Full sample		In-state		Out-of-state		*t*-statistic
	Mean	Std. Dev.	Mean	Std. Dev	Mean	Std. Dev	
PRICE	186,600	92,580	174,799	92,568	204,278	89,809	35.64
TOM	43.88	56.48	47.59	59.07	38.34	51.88	−6.42
AGE	16.56	14.44	20.87	15.06	10.12	10.518	−0.62
BATH	2.45	0.69	2.63	0.694	2.57	0.66	71.12
BED	3.27	0.737	3.25	0.734	3.31	0.74	87.39
LVSQFT	1,756.2	653.39	1,711.67	659.79	1,833.77	638.23	46.77
LOTSQFT	6,108.00	2,891.5	6,399.04	2,934.23	5,673.35	2,771.74	35.51
GAR	1.81	0.862	1.654	0.9555	2.05	0.629	44.92
FIRE	0.703	0.616	0.7054	0.6059	0.700	0.631	3.08
POOL	0.186	0.389	0.1933	0.395	0.176	0.381	−13.04
PRSQFT	106.04	24.76	101.45	23.03	112.89	25.66	96.20
OWNER	0.516	0.5	0.4596	0.4985	0.6012	0.49	5.65
VACANT	0.430	0.495	0.4832	0.5000	0.3512	0.4776	−6.52
TENANT	0.053	0.224	0.0572	0.2322	0.0475	0.2129	−18.89
INDIVIDUAL	0.926	0.262	0.9134	0.2814	0.9445	0.229	69.62
PARTNERSHIP	0.0138	0.1165	0.020	0.140	0.0044	0.0662	−12.46
CORP	0.0162	0.126	0.0218	0.1461	0.0079	0.0887	−17.48
TRUST	0.0441	0.2054	0.0448	0.2069	0.0431	0.2032	−19.82
PROPERTIES	1.79	2.673	1.704	3.00	1.897	2.084	−2.31

PRICE is the transaction price, *TOM* is time on the market measured as days from the listing to the sales contract, *AGE* is the age of the house in years, *BATH* is the number of bathrooms, *BED* is the number of bedrooms, *LVSQFT* is the living space in square feet, *LOTSQFT* is the lot size in square feet, *GAR* is garage space measured in number of cars, *FIRE* is number of fireplaces, *POOL* indicates a pool, *PRSQFT* is the transaction price per square foot of living space (PRICE/LVSQFT), *OWNER* indicates the house was owner-occupied at the time of the sale, *TENANT* indicates the house was tenant-occupied at the time of the sale, *VACANT* indicates the house was unoccupied at the time of the sale, *INDIVIDUAL* indicates the buyer was an individual, *PARTNERSHIP* indicates the buyer was a partnership, *CORP* indicates the buyer was a corporation, *TRUST* indicates the buyer was a trust, *PROPERTIES* is the number of Las Vegas area properties owned by the buyer

Table 2 reports the descriptive statistics for the overall sample and for the local and out-of-state buyer sub-samples The overall sample average price is $186,600. In-state buyers paid an average price of $174,799 and out-of-state buyers paid an average of $204,278 or approximately 17% more. The average time on the market is 43.88 days, with properties bought by local buyers being on the market and average of 47 days and properties bought by non-local buyers being on the market an average of 38 days. Both differences are statistically significant at the 1% level.

Given the sample size, the differences in the means between out-of-state and local buyers are statistically significant for all variables in the data set with the exception of age of the house. Out-of-state buyers purchased houses with more square feet of living space (1,834 ft^2) than in-state buyers (1,712 ft^2), more garage space (2.05 cars versus 1.65 cars) but with smaller lot sizes (5,673 ft^2 versus 6,399 ft^2). Houses bought by out-of-state buyers were more likely to be occupied by the seller/owner at the time of the sale; 60% were seller/owner-occupied compared to 46% for local buyers. Houses bought by local buyers were more likely to be vacant (48%) than houses bought by out-of-state buyers (35%). The vast majority of houses were purchased by individuals; 91% of local buyers are individuals while 94% of out-of-

Table 3 Characteristics of property owners

City	Number	Distance (miles)	Price differential (2000)
Atlanta	4	1,746	$20,600
Boston	19	2,373	$102,600
Chicago	60	1,522	$62,700
Cleveland	24	1,831	$4,400
Columbus, OH	7	1,762	−$7,500
Dallas	6	1,071	−$6,500
Denver	75	607	$90,700
Detroit	6	1759	$31,200
Greensboro	2	1,964	−$35,900
Honolulu	193	2,758	$83,300
Houston	24	1,226	−$18,500
Indianapolis	4	1,595	−$10,800
Los Angeles	198	228	$135,400
Louisville	7	1,622	−$16,800
Miami	8	2,177	$17,000
Milwaukee	9	1,518	$2,000
Minneapolis–St. Paul	21	1,286	$49,000
New York	26	2,232	$163,200
Philadelphia	2	2,173	$36,600
Phoenix	19	254	$900
Pittsburg	3	1,920	−$25,500
Portland, OR	28	754	$30,100
Rochester, NY	2	2,039	−$53,300
St. Louis	4	1,374	−$21,900
Salt Lake City	24	363	$17,000
San Diego	204	261	$183,600
San Francisco	111	413	$282,700
Seattle	35	872	$85,700
Tampa	3	1,987	−$28,000
Washington, DC	5	2,085	$101,900
Total non-local	1,133		
Las Vegas	1,695	0	$0
Total	2,828		

state buyers are individuals. The average number of properties owned by in-state buyers is 1.70 while the average number of Las Vegas area properties owned by out-of-state buyers is 1.90, suggesting that out-of-state buyers are more experienced.

Table 3 provides additional information on the out-of-state buyers in the sample, including the number of buyers by metropolitan area, the distance of the metropolitan area from Las Vegas and the housing price differential. The price differential is the difference between the median home price for the metropolitan area and the median home price for Las Vegas.[4] The metropolitan areas with the largest number of buyers are Los Angeles (198), Honolulu (193), San Diego (204) and San Francisco (111). The average distance from the buyer's home city to Las Vegas is 1,067 miles, and 49% of the buyers are from cities within 500 miles of Las Vegas. Most of the out-of-state buyers (94%) are from areas where the housing is more expensive than in Las Vegas. The cities with the largest price differentials in 2000 are San Francisco ($282,700), San Diego ($183,600), New York ($163,200)

[4] Here we only show the price differential for the year 2000. In the empirical tests we include the price differential for the year in which the property was sold.

and Los Angeles ($135,400). The average price differential for the sample in 2000 is $117,536.

The Empirical Model

Since price and time on the market are endogenous, we estimate a simultaneous equations model. The model has the structure

$$T_i = P_i\gamma_{12} + \boldsymbol{H}_i\beta_{11} + u_{i1} \tag{3.1}$$

$$P_i = T_i\gamma_{22} + \boldsymbol{H}_i\beta_{21} + \boldsymbol{B}_i\beta_{22} + u_{i2}, \tag{3.2}$$

where P_i is the price, T_i is time on the market, $\boldsymbol{H}_i$ and $\boldsymbol{B}_i$ are vectors of property and buyer characteristics, the γ_{jk} and β_{jk} are the parameters to be estimated and the u_{ij} are the error terms. We estimate the model using two-stage least squares.

The TOM equation, (3.1), is identified through the exclusion of the buyer characteristics (β_{12}=0). Housing characteristics included in the TOM equation include the age of the structure and its square (AGE and AGESQ), the number of bathrooms and bedrooms (BATH and BED) and the number of square feet of living space and its square (LVSQFT and LVSQFTSQ) and the lot size and its square (LOTSQFT and LOTSQFTSQ). We also included the number of cars of garage space (GAR) and indicators for a fireplace (FIRE) and for a pool (POOL).

Following previous research we include measures of atypicality in the TOM equation. We approached the measurement of atypicality as follows. Normally, hedonic equations produce incorrect signs on some variables. Below, in our initial OLS test, we observe such on the bedroom and bath variables. The typical explanation for these results is that, given total square feet, additional bathrooms and bedrooms can represent a dis-amenity. Observing this we precede as follows. We develop three variables: living square feet divided by the number of bedrooms, living square feet divided by number of bathrooms, and the ratio of the living square feet to the lot size. Properties with too many (few) bedrooms or bathrooms for the size of the house will be atypical. Similarly, properties with a house that is too small (large) for the lot size will also be atypical. Next, for each house we compute the absolute value of the difference in this variable and the average for all properties in the sample. These differences are calculated without regard to the value (from the hedonic equation) of a characteristic. However, we also calculate a measure of atypicality based on Haurin (1988). That measure is defined as:

$$I = \Sigma\, p_i|h_i - h| \tag{3.3}$$

Where, h_i and h are each property's characteristics and the average characteristic in the sample, respectively and p_i is the value of the characteristic determined by its coefficient in an hedonic regression.[5] Thus, we construct four measures of atypicality.

Next, we include indicator variables for whether the house was seller/owner-occupied or vacant at the time of the sale (OWNER and VACANT), the omitted

[5] Thus the index measures the absolute difference between a property's characteristic and the average in the sample multiplied by the value of that characteristic from the OLS hedonic equation. We do not report the equation used to estimate the Haurin measure but it is a straightforward OLS hedonic equation.

dummy being rented. We also include a value, DATE and its square, DATESQ, representing the day of the sale. Next, we include 43 (of 44) dummy variables for the zip code of the property's location. We also construct two dummy variables indicating a properties location in two upscale suburban communities, Henderson (HEND) and Summerlin (SUM)

In the price equation we include the same independent variables and add buyer characteristics: (1) type of buyer, (IND, TRUST, CORP, partnership the omitted dummy), (2) number of local properties owned by the buyer (PROP), (3) distance of buyer from Las Vegas (DIST) and (4) the difference in average house prices (PRICEDIF) between the city of the buyer and that of Las Vegas.

Finally, we test both linear and log versions of the model. We find that the functional form can influence our findings.

Price Equation Estimates

Before estimating the simultaneous equation model and as a starting point for the empirical analysis, we want to determine if we can replicate Lambson, McQueen and Slade's main results with our data. To carry this out, we regressed the price on the housing and buyer characteristics, excluding the atypicality variables. The regression results are reported in Table 4.

In the linear version (column one), all of the housing characteristics are significant. The occupancy status of the property and buyer characteristics are unimportant with the exception of the number of properties owned by the buyer (experience). One explanation for this result may be that buyers of multiple properties may have a different motivation than single-property buyers. The former may be more likely to purchase properties for purely investment reasons while the later may purchase a single property as an option for eventual occupancy in retirement. Buyers for purely investment purposes would approach the purchase decision from a profit perspective while future retirees may approach the purchase decision with non-pecuniary considerations.

Neither the search cost variable (DIST) or the anchoring variable (PRICEDIF) is significant. The results change in the log–linear version of the model. In particular, the search cost variable (log of distance) is positive and significant while the anchoring variable is not.[6] This is consistent with the results in Lambson, McQueen and Slade in regards to search costs.[7]

Next, we estimate the same model but add variables for location. Here the location variables are the zip codes. Table 5 shows the results of this test. The important result is that in neither model are the search cost and anchoring variables

[6] The log version of PRICEDIF variable is created by dividing the log of the out-of-state price by the log of the in-state price. Also, we add the value "one" to FIRE and GAR so that we can create the log transformation of these variables. Because the log of the square foot variables (house and lot) and the log of their squares would be perfectly correlated we create the transformation by squaring the log of the un-squared values. Finally, in this and subsequent tests the inclusion of some variables in the log version were nearly perfectly correlated with others and were, therefore, omitted in the log–linear version.

[7] We tested the linear model on two halves of the sample, upper and lower. The sample split with an equal number of properties in each half at approximately $165,000. In neither regression were search costs important while anchoring was significant only in the lower one-half sample (coefficient=19.87, *t*-statistic=3.53).

Table 4 Price equation, OLS estimates

Variable	Linear model		Log–linear model	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
CONSTANT	99,698,916	6.95***	−89.98	22.03***
AGE	−3,370.67	14.74***	−0.0013	0.116
AGESQ	42.72	9.82***	−0.0242	9.16***
BATH	4,310.53	2.36***	−0.011	0.683
BED	−18,860.61	13.33***	−0.187	11.52***
LIVSQFT	24.38	3.84***	−3.768	12.75***
LIVSQFTSQ	0.01589	13.32***	0.3027	15.42***
DATE	−5,358.81	7.02***	10.47	28.70***
DATESQ	0.072	7.10***		
FIRE	12,406.15	7.51***	0.057	5.95***
GAR	7,058.70	4.96***	0.091	9.29***
POOL	18,798.36	8.16***	0.090	11.27***
LSQFT	4.932	6.05***	−0.075	2.16**
LSQFTSQ	−0.000137	3.16***	−0.0095	4.29***
OWN	1,942.24	0.53	−0.0094	0.726
VAC	−3,443.81	0.93	−0.053	4.06***
IND	2,671.85	0.32	0.1284	5.27***
TRUST	13,736.02	1.50	0.167	6.02***
PART	−13,341.4	1.30	−0.050	1.50
PROP	−1,367.08	3.48***	−0.027	5.17***
DIST	1.578	1.47	0.0049	4.99***
PRICEDIF	1.278	0.12	0.224	1.168
ADJ R^2	0.789		0.859	
F-STATISTIC	506.87***		826.81***	
N	2,828		2,719	

t-statistics reported below coefficient. DATESQ is omitted in the log model because of multicollinearity
*Indicates significance at the 10% level
**Indicates significance at the 5% level
***Indicates significance at the 1% level

important. This is the first evidence that location may matter insofar as measuring the variables of interest.

Next, in addition to the zip code variables we add two dummy variables for the upscale suburban neighborhoods, Henderson (HEND) and Summerlin (SUM).[8] For brevity Table 6 reports only the variables of interest.[9]

The linear version indicates that homeowners pay a premium to live in the two upscale neighborhoods. As in the previous test, search costs and anchoring effects are non-existent in the linear model but appear to be significant in the log–linear model. The results here suggest that out-of-state buyers pay about two-tenths of a percent more for their properties for each mile distant from Las Vegas. This translates into 4.15% more for each 1,000 miles. Since the average distance for out-of-state buyers in our sample is 1,066 and the average price is 186,600 this suggests that such buyers pay an additional $8,255 for investment properties.

[8] We omit from the zip code list those that are the two suburban neighborhoods.

[9] The two suburban locations consist of relatively high-priced properties. For this reason there appeared, in our initial tests a high degree of multicollinearity. Several tests revealed that the best solution to this problem was a restriction of the sample to properties between $40,000 and $700,000.

Table 5 Model estimates with zip code location variables

Variable	Linear model		Log–linear model	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
CONSTANT	1.15E+08	8.96***	−86.08	24.24***
AGE	−2,325.91	9.12***	0.0053	0.523
AGESQ	30.19	6.40***	−0.0168	6.44***
BATH	3,779.04	2.30**	−0.036	2.75***
BED	−14,367.88	11.26***	−0.118	8.25***
LIVSQFT	3.71	0.335	−4.79	18.74***
LIVSQFTSQ	0.019	17.22***	0.371	21.97***
DATE	−6,151.79	9.04***	10.746	32.91
DATESQ	0.083	9.13***		
FIRE	11,793.7	7.97***	0.041	4.84***
GAR	8,060.13	6.33***	0.106	12.21***
POOL	19,603.78	9.54***	0.1011	14.37***
LSQFT	4.26	5.84***		
LSQFTSQ	−7.85E−05	1.99*		
OWN	5,415.2	1.66*	0.0082	0.73
VAC	−193.23	0.059	−0.0279	2.48***
IND	1,054.37	0.143	0.1011	4.66***
TRUST	6,331.73	0.775	0.1151	4.65***
PART	−11,711.17	1.28	−0.048	1.65*
PROP	−1,416.65	4.055***	−0.034	7.37***
DIST	−1.21	1.25	0.00096	1.04
PRICEDIF	−11.40	1.18	0.187	1.111
ADJ R^2	0.839		0.889	0.341
F-statistic	234.74***		381.80***	
N	2,828		2,828	

t-statistics reported beside coefficient. Variables omitted in the log model because of multicollinearity. For brevity the coefficients on the zip codes are not shown

*Indicates significance at the 10% level

**Indicates significance at the 5% level

***Indicates significance at the 1% level

At this point, the OLS results suggest that property location and functional form both have a significant impact on the estimation of the search costs and anchoring effects.

Since TOM, an omitted variable in previous research, can have an impact on price we next turn to testing the simultaneous model.

Table 6 Results with suburban neighborhoods included

Variable	Linear model		Log–linear model	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
DIST	−0.137	0.164	0.00215	2.44***
PRICEDIF	−7.57	0.916	0.3186	1.98**
HEND	38,573.62	6.10***	0.211	8.66***
SUM	52,579.63	8.01***	0.2611	10.32***
ADJ R^2	0.851		0.892	
F-statistic	247.86***		374.37	

Simultaneous Equation Estimates

Here we estimate the structural model in Eqs. 3.1 and 3.2. The results are reported in Tables 7 and 8.

Table 7 shows the results of the linear version of the model. As in most previous studies property characteristics fail to substantially explain time-on-market. Here, TOM is shortened by the existence of a pool and a location in Henderson or Summerlin. TOM is lengthened by a bathroom atypicality. The Haurin measure of atypicality is insignificant.

The price equation reveals that TOM is negatively related to the sales price. The bedroom measure is the sole atypicality that matters. Most importantly, the variables for search costs and anchoring are insignificant. That is, once TOM is considered the direct measures of search costs and anchoring are not important. Search costs and anchoring may lead out-of-state buyers to purchase properties sooner than otherwise.

Table 7 Price–time on the market relationship, two stage least squares estimates, linear model

Variable	Time-on-the-market		Price	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
CONSTANT	6,8397.04	0.209	162,468.6	3.20***
P	0.00048	0.815		
TOM			−2,163.97	7.95***
AGE	5.018	1.63*	−762.56	0.912
AGESQ	−0.0453	1.52	14.03	0.921
BATH	−5.725	1.160	2,102.58	0.402
BED	−6.588	1.55	−12,510.41	2.94***
LIVSQFT	−0.075	21.13	55.08	1.82*
LIVSQFTSQ	2.35E−05	1.43	0.0134	1.74*
LOTSQFT	2.08E−07	1.36	0.3858	0.361
GAR	−8.135	1.48	−3,755.49	0.875
FIRE	−11.705	1.44	−4,092.23	0.812
POOL	−0.196	2.14**	11,284.6	1.66*
OWN	−16.226	1.30	−9,247.25	0.891
VAC	−10.137	1.02	−9,218.58	0.882
IND			10,063.6	0.423
TRUST			17,200.08	0.654
PART			−47,211.81	1.64*
DATE	−3.551	0.204		
DATESQ	4.63E−05	0.200		
BATHATYP	0.0543	1.99**	26.05	1.13
BEDATYP	0.040	0.726	257.34	7.30***
HAURIN	−0.000622	1.58	0.0334	0.268
HEND	−309.185	1.63*	6,565.45	0.313
SUM	−301.61	1.61*	10,135.66	0.492
PROP			442.82	0.393
DIST			1.0832	0.348
PRICEDIF			−33.894	1.09
F-statistic	4.87***		18.14***	
N	2,672		2,672	

t-statistics reported below coefficient
*Indicates significance at the 10% level
**Indicates significance at the 5% level
***Indicates significance at the 1% level

Table 8 Price–time on the market relationship, two stage least squares estimates, log–linear model

Variable	Time-on-the-market		Price	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
CONSTANT	607.13	6.85***	23.87	2.04**
P	1.136	1.36		
TOM			−0.268	12.47***
AGE	0.214	1.44	−0.031	0.368
AGESQ	0.0156	2.23**	−0.0026	0.136
BATH	0.019	0.122	−0.0559	1.381
BED	−0.381	0.194	−0.142	3.25***
LIVSQFT	−9.736	2.11*	−3.988	1.26
LIVSQFTSQ	0.682	2.07*	0.329	1.54
LOTSQFT				
GAR	−0.433	3.21***	−3,755.49	0.875
FIRE	−0.315	3.07	−0.0269	−1.003
POOL	−0.305	2.58***	0.053	2.38**
OWN	−0.0177	0.125	0.0336	1.028
VAC	0.0847	0.602	0.0186	0.560
IND			0.1507	2.34**
TRUST			0.2029	2.74***
PART			0.0093	0.113
DATE	−54.94	5.54***		
DATESQ				
BATHATYP	0.068	2.00**	6.21E−05	0.876
BEDATYP	−0.0002	0.31	0.0006	6.63***
HAURIN			2.05E−07	0.322
HEND	−4.303	2.29**	−0.0055	0.084
SUM	−4.293	2.32**	−0.0186	0.285
PROP			−0.0415	2.76***
DIST			0.0039	1.09
PRICEDIF			0.5131	0.892
F-statistic	9.37***		41.19***	
N	2,810		2,672	

t-statistics reported below coefficient. DATESQ and HAURIN are omitted in the TOM equation because of multicollinearity

*Indicates significance at the 10% level

**Indicates significance at the 5% level

***Indicates significance at the 1% level

Table 8 contains the results of the log–linear version. The TOM equation is very similar to the linear model. Larger garages and a pool shorten the TOM.[10] The price equation is also very similar to the linear model. The only significant change is that prices are reduced by the experience (PROP) of the buyer. Again, neither the search cost nor anchoring variables directly impact prices.[11]

[10] An unobserved variable that may affect TOM is "seller motivation." This variable has been proxied in other studies by the list price/selling price relationship. Unfortunately our database does not include an original list price. While having such information may help explain the TOM equation it is unlikely to affect the search cost/anchoring variables in the price equation.

[11] An anonymous referee suggested testing the model by splitting the sample at the average TOM (44 days) to test the stability of the search cost/anchoring effects. Doing so showed no change in the results for the less than 44 days sub-sample. The upper portion of the sample produced no results because of multicollinearity.

Interpretation of Results

The results can be interpreted in the following manner. Search costs and anchoring effects may exist for out-of-state buyers. In an effort to economize on search costs (and perhaps, asymmetric information) out-of-state buyers may gravitate to properties that are in newer, upscale suburban neighborhoods. Properties in these areas are generally higher priced (given their physical characteristics) and sell sooner for a variety of reasons including restrictive covenants, security issues, and conformity of properties. The purchase of a property in such location may reflect risk-reducing behavior on the part of out-of-state buyers. That is, risk avoidance leads them to purchase properties in higher priced neighborhoods that have a shorter TOM. A test of the search cost and anchoring effects without regard to location or TOM produces significant coefficients on these variables. When location and TOM are included the significance of these variables is either reduced or disappears.

Summary and Conclusions

In a test of search costs and anchoring effects we find that there appears to be a direct impact on the price of (investor) residential properties when using an OLS approach without regard to the property's location. After considering the location of the property and TOM the direct impact of the search cost and anchoring variables disappear. We conclude that search costs and anchoring may still be important. They may, however, manifest themselves in a preference by risk-averse, out-of-state buyers to purchase properties in more upscale, uniform neighborhoods and to purchase properties sooner on a downward sloping price–TOM curve.

References

Anglin, P., Rutherford, R., & Springer, T. (2003). The trade-off between the selling price of residential properties and time-on-the-market: The impact of price setting. *Journal of Real Estate Finance and Economics, 26*, 95–111.

Arnold, M. A. (1999). Search, bargaining and optimal asking prices. *Real Estate Economics, 27*, 453–481.

Asabere, P., Huffman, F., & Mehdian, S. (1993). Mispricing and optimal time on the market. *The Journal of Real Estate Research, 8*, 149–156.

Baryla, E., & Zumpano, L. (1995) Buyer search duration in the residential real estate market: The role of the real estate agent. *Journal of Real Estate Research, 10*, 1–13.

Dale-Johnson, D. (1983). Clientele effects on the demand for housing price appreciation. *American Real Estate and Urban Economics Association Journal, 11*, 382–396.

Glower, M., Haurin, D., & Hendershott, P. (1998). Selling time and selling price: The influence of seller motivation. *Real Estate Economics, 26*, 719–740.

Harding, J. P, Knight J. R., & Sirmans, C. F. (2003a). Estimating bargaining effects in hedonic models: Evidence from the housing market. *Real Estate Economics, 31*, 601–622.

Harding, J. P., Rosenthal, S. S., & Sirmans, C. F. (2003b). Estimating bargaining power in the market for existing homes. *Review of Economics and Statistics, 85*, 178–188.

Haurin, D. (1988). The duration of marketing time of residential housing. *Journal of the American Real Estate and Urban Economics Association, 16*, 396–410.

Huang, J.-C., & Palmquist, R. B. (2001). Environmental conditions, reservation prices and time on the market for housing. *Journal of Real Estate Finance and Economics, 22*, 203–209.

Jud, G. Donald, Seaks, T. G., & Winkler, D. T. (1996). Time on the market: The impact of residential brokerage. *Journal of Real Estate Research, 12*(13), 447–458.

Knight, J. R. (2002). Listing price, time on the market, and ultimate selling price: Causes and effects of listing price changes. *Real Estate Economics, 20*, 213–237.

Lambson, V. G., McQueen, G. R., & Slade, B. (2004). Do out-of-state buyers pay more for real estate? An examination of anchoring-induced bias and search costs. *Real Estate Economics, 32*, 85–126.

Miller, N. G., Sklarz, M. A., & Ordway, N. (1988). Japanese purchases, exchange rates and speculation in residential real estate markets. *Journal of Real Estate Research, 3*, 39–49.

Myer, N. F. C., He, L. T., & Webb, J. R. (1992). Sell-offs of U.S. real estate: The effect of domestic versus foreign buyers on shareholder wealth. *Journal of the American Real Estate and Urban Economics Association, 20*, 487–500.

Read, C. (1988). Price strategies for idiosyncratic goods—The case of housing. *Journal of the American Real Estate and Urban Economics Association, 16*, 379–395.

Rothschild, M. (1973). Models of market organization with imperfect information: A survey. *Journal of Political Economy, 18*, 1283–1308.

Song, S. (1995). Determinants of bargaining outcome in single family housing transactions: An empirical examination. *Urban Studies, 32*, 605–614.

Song, S. (1998). Home buyers' characteristics and selling prices. *Applied Economics Letters, 5*, 11–14.

Taylor, C. R. (1999). Time on the market as a signal of quality. *Review of Economic Studies, 66*, 555–578.

Turnbull, G., & Sirmans, C. F. (1993). Information, search, and house prices. *Regional Science and Urban Economics, 23*, 545–557.

Turnbull, G., Sirmans, C. F., & Benjamin, J. (1990). Do corporations sell houses for less: A test of housing market efficiency. *Applied Economics, 22*, 1389–1399.

Watkins, C. (1998). Are new entrants to the residential property market informationally disadvantaged? *Journal of Property Research, 15*, 57–70.

Yang, S. X., & Yavas, A. (1995). Bigger is not better: Brokerage and time on the market. *Journal of Real Estate Research, 10*, 23–33.

Yavas, A. (1992). A simple search and bargaining model of real estate markets. *Journal of the American Real Estate and Urban Economics Association, 20*, 533–548.

Yavas, A., & Yang, S. X. (1995). The strategic role of listing price in marketing real estate: Theory and evidence. *Real Estate Economics, 23*, 347–368.

Zuehlke, T. (1987). Duration dependence in the housing market. *The Review of Economics and Statistics, 69*, 701–709.