THE JOURNAL OF REAL ESTATE RESEARCH

The Pricing of Housing and Mortgage Services for First-time versus Repeat Homebuyers

G. Stacy Sirmans*
Eurico J. Ferreira**

Abstract. This study examines efficiency in the pricing of housing and mortgage services across first-time and repeat homebuyers. A logit model is used to test a number of variables for significant differences across first-time buyers and repeat buyers for a sample of brokered real estate sales. The results show that the housing market is somewhat less than completely efficient in providing its services. The logit results for the adjustable-rate mortgage segment show that first-time homebuyers are more likely to be associated with a higher sale price per square foot and higher discount points than repeat buyers. The results show that first-time homebuyers tend to be younger and have less household income than repeat homebuyers. For the full sample of data, the results show that higher sale price/square foot ratios and lower downpayment/sale price ratios are more likely to be associated with first-time homebuyers.

For the fixed-rate mortgage segment of the data, the only distinguishing variables are down-payment/sale price and buyer age (both lower for first-time homebuyers). Type of buyer cannot be distinguished by sale price/square foot, contract interest rate, discount points, and other variables. For the adjustable-rate mortgage segment of the data, type of buyer can be distinguished by sale price/square foot (higher for first-time buyers), down-payment/sale price (lower for first-time buyers), and discount points (higher for first-time buyers).

Introduction

Informational efficiency in the housing market is of critical importance to homebuyers and sellers. For most households, the single-family home continues to be the largest risk investment and the primary wealth generator. Also, there may be a wide divergence of expertise and/or experience of market participants. For example, first-time homebuyers may be at some disadvantage relative to repeat buyers due to lack of experience. Thus it becomes imperative that information is disseminated in an efficient manner so as to avoid any discriminatory pricing.[1]

The aspect of housing market efficiency dealing with the potential handicaps that first-time buyers may face relative to repeat buyers has important implications in the pricing

*Department of Insurance, Real Estate, and Business Law, The Florida State University, Tallahassee, Florida 32306-1042.
**Department of Management and Finance, Indiana State University, Terre Haute, Indiana 47809.

of housing and/or mortgage services. Buyers/borrowers (whether first-time or repeat) must not only optimize their housing purchase (acquire the "best deal") but they must also search the market to determine the optimal set of mortgage financing terms. Given that first-time homebuyers may have less ability to evaluate these markets due to inexperience, their search costs could exceed that for repeat buyers and price differentials for housing and/or financing could result. Supporting this view, Jones (1989) adds that, for first-time buyers, human capital is limited in its ability to overcome nonhuman capital deficiencies in achieving homeownership.

The purpose of this paper is to test the informational efficiency of the housing market. Specifically, it is examined whether or not first-time buyers incur higher costs in either housing or mortgage financing due to inexperience and/or search and information costs. Since the data are a sample of broker-assisted housing sales, an opportunity exists to determine whether the market is efficient in providing housing and/or mortgage services with brokered transactions.

The Data and Empirical Model

A logit model is used to measure market efficiency in brokered sales by determining whether first-time buyers experience significantly different costs for housing and/or financing relative to repeat buyers. The model also allows a determination of differences in other variables or characteristics (such as age, income, etc.).

The Data

The data are from the National Association of Realtors (NAR) files on home financing transactions for 1987–1989. The Residential Mortgage Finance Panel from which the data is collected has approximately 2,000 member brokers across the United States and the data is collected by region. The Census Bureau defines "A strata" and "B strata" Metropolitan Statistical Areas (MSAs) as cities with populations exceeding one million and between 250,000 and one million, respectively. From this list of MSAs, Executive Officers from Boards of more than 150 Realtors are contacted and asked to provide the names of up to five brokers in their Board who are highly knowledgeable or expert in the area of residential mortgage finance. Questionnaires are sent to the panel members in March, June and September. The questionnaire is also mailed to approximately 1,000–1,500 brokers selected at random.

A total of 5,203 observations for seventy-seven variables are available in these files but only 5,027 observations contain correct values and can be traced to first-time or repeat buyers. Of this total, 3,940 observations are deleted due to missing values related to the independent variables indicated below and hence the remaining 1,087 observations are used to compute the model maximum-likelihood estimates (MLEs).[2]

The Logit Model

The multiple logit model uses a binary dependent variable representing the logarithm of the odds that the homebuyer is a first-time buyer and various independent variables.[3] Such a binary-choice model will provide information across first-time and repeat buyers about their choices such as the type of mortgage used, level of income, age, etc.

The maximum-likelihood model can be written as follows:[4]

$$Z = f(SP/SF_i, DP/SP_i, HAGE_i, LOTSIZE_i, INC_i, BAGE_i, S_i, TH_i,$$
$$TM_i, IR_i, PTS_i, ACAP_i, LCAP_i, MGN_i),$$

where

$$Z = \log \left(Prob(First\text{-}Time) / 1 - Prob(First\text{-}Time)\right);[5]$$

$Prob(First\text{-}Time) =$ represents the probability of a homebuyer being a first-time homebuyer;

$SP/SF_i =$ the selling price per square foot of house i;

$DP/SP_i =$ the downpayment per sale price for house i;

$HAGE_i =$ the age in years of house i;

$LOTSIZE_i =$ the size of the lot for house i in square feet;

$INC_i =$ household income represented by various levels, e.g.,

$I_1 = 1$ if income $< \$25,000$, 0 otherwise,

$I_2 = 1$ if income is $\$25,000-\$34,999$, 0 otherwise,

$I_3 = 1$ if income is $\$35,000-\$49,999$, 0 otherwise,

$I_4 = 1$ if income is $\$50,000-\$59,999$, 0 otherwise, and

$I_5 = 1$ if income $> \$59,000$, 0 otherwise;

$BAGE_i =$ the age of the buyer. These categories are:

$AGE_1 = 1$ if age <25 years, 0 otherwise,

$AGE_2 = 1$ if age 25–34 years, 0 otherwise,

$AGE_3 = 1$ if age 35–44 years, 0 otherwise,

$AGE_4 = 1$ if age 45–54 years, 0 otherwise, and

$AGE_5 = 1$ if age >54 years, 0 otherwise;

$S_i =$ the source of the first mortgage. These categories are:

$S_1 = 1$ if assumption, seller financing, or private investor, 0 otherwise,

$S_2 = 1$ if commercial bank, 0 otherwise,

$S_3 = 1$ if S&L or mutual savings bank, 0 otherwise, and

$S_4 = 1$ if mortgage banker, 0 otherwise;

$TH_i =$ the type of home purchased. These categories are:

$TH_1 = 1$ if detached single-family home, 0 otherwise, and

$TH_2 = 1$ if townhouse, rowhouse, apartment condominium, duplex, or triplex, 0 otherwise;

$TM_i =$ the type of mortgage used. These categories are:

$TM_1 = 1$ if fixed-rate mortgage, 0 otherwise, and

$TM_2 = 1$ if adjustable-rate mortgage, 0 otherwise;

$IR_i =$ the contract interest rate on the first mortgage used to finance house i;

$PTS_i =$ the number of discount points charged on the mortgage used to finance house i;

$ACAP_i =$ the annual interest rate cap on the ARM used to finance house i;*

$LCAP_i =$ the lifetime interest rate cap on the ARM used to finance house i; and

$MGN_i =$ the margin present on the ARM used to finance house i*.

*applicable to the adjustable-rate mortgage data segment

Results

Summary Statistics

Exhibits 1, 2 and 3 provide summary statistics for the full data, for the fixed-rate mortgage (FRM) segment, and the adjustable-rate mortgage (ARM) segment, respectively. All are partitioned by first-time and repeat buyers. As can be seen in Exhibit 1, for the overall data, there is a substantial difference between mean sale price for first-time buyers relative to repeat buyers. First-time buyers, however, had a higher mean sale price per square foot relative to repeat buyers. Repeat buyers paid much higher downpayments per sale price on average.

Exhibit 1 shows that homes purchased by first-time buyers tended to be older and much smaller than those purchased by repeat buyers. The statistics also show that first-time buyers bought smaller lots on average, were younger in age, and had lower average incomes than their repeat counterparts.

In regard to mortgage financing, the results show little difference between type of first mortgage instrument (with first-time buyers showing a slightly greater preference for fixed-rate loans), source of mortgage funds, and type of home purchased across first-time and repeat buyers.

Exhibit 2 shows summary statistics for the fixed-rate mortgage segment of the data. These averages are consistent with those reported in Exhibit 1. Mean sale price is substantially less for first-time buyers. However, sale price per square foot is much higher for first-time buyers. Downpayment per sale price is less, house size is less, and home age is greater for first-time buyers. Also for first-time buyers, lot size is less, income is less, and buyer age is less.

Repeat buyers paid slightly more points on average for financing but had lower average contract interest rates. There is little difference in source of financing and type of home purchased across type of buyer.

Exhibit 3 presents summary statistics for the adjustable-rate mortgage segment of the data. These averges show that first-time buyers had a substantially lower mean sale price; however, the mean sale price per square foot is much greater for first-time buyers. First-time buyers had lower average percentage downpayments. Averages for other variables are consistent with those previously reported. Regarding financing, first-time buyers had a higher average contract interest rate and also paid higher average discount points.

The averages given in Exhibits 2 and 3 provide some interesting comparisons. For example, average sale price for both first-time and repeat buyers is much higher in the adjustable-rate mortgage segment. This combined with the observation that down-payment ratios are comparable across type of loan indicates that higher loan amounts are being generated with the adjustable-rate loans.

Sale price per square foot is considerably higher for the adjustable-rate loan segment relative to the fixed-rate mortgage segment for both first-time and repeat homebuyers. Also, interior size (square footage) is much higher for both types of buyer and lot size is somewhat higher for the classes of buyer under the adjustable-rate mortgage segment. In addition, for both types of buyer, age and income is less on average under the adjustable-rate mortgage regime.

Exhibit 1
Summary Statistics for Variables Used in Estimation of Full Data Sample
(n=1087)

Variable	Mean Value	Minimum Value	Maximum Value	Standard Deviation
Sale Price	120,899	16,500	800,000	86,884
First-Time	94,927	16,500	565,000	49,780
Repeat	135,341	18,000	800,000	71,091
Sale Price (sq ft)	75.50	29.81	144.81	54.57
First-Time	72.18	29.81	143.13	51.33
Repeat	69.94	39.39	144.81	50.19
Downpayment/Sale Price	.21	.00	1.00	.20
First-Time	.14	.00	1.00	.14
Repeat	.25	.00	1.00	.22
Age of Home	25.39	1.00	99.00	23.62
First-Time	26.96	1.00	99.00	23.18
Repeat	24.47	1.00	99.00	23.84
Interior Size (sq ft)	2,593	620	7,900	1,765
First-Time	1,999	620	6,000	1,559
Repeat	2,922	690	7,900	1,754
Lot Size (sq ft)	17,260	1,210	566,280	46,507
First-Time	13,955	1,210	470,012	40,296
Repeat	19,154	1,210	566,280	49,631
Buyer's Age[1] ($BAGE_j$)	2.83	1.00	5.00	1.11
First-Time	2.33	1.00	5.00	.93
Repeat	3.14	1.00	5.00	1.11
Buyer's Income[2] (INC_j)	3.19	1.00	5.00	1.40
First-Time	2.84	1.00	5.00	1.26
Repeat	3.39	1.00	5.00	1.44
Type of First Mortgage[3] (TM_j)	1.28	1.00	2.00	.45
First-Time	1.25	1.00	2.00	.43
Repeat	1.30	1.00	2.00	.46
Source of First Mortgage[4] (S_j)	3.21	1.00	4.00	.96
First-Time	3.31	1.00	4.00	.94
Repeat	3.15	1.00	4.00	.97
Type of Home[5] (TH_j)	1.35	1.00	2.00	.48
First-Time	1.36	1.00	2.00	.48
Repeat	1.35	1.00	2.00	.47

[1]Discrete variable for the buyer's age with the following class interval values: 1=if <25 years; 2=if 25–34 years; 3=if 35–44 years; 4=if 45–54 years; 5=if >54 years.
[2]Discrete variable for the buyer's income with the following class interval values: 1=if under $25,000; 2=if $25,000–$34,999; 3=if $35,000–$49,999; 4=if $50,000–$59,999; 5=if >$59,999.
[3]Discrete variable for the type of first mortgage used with the following class interval values: 1=if a fixed-rate mortgage; 2=if an adjustable-rate mortgage.
[4]Discrete variable for the source of first mortgage used with the following class interval values: 1=if assumption, seller financing, or private investor; 2=if commercial bank; 3=if thrift institution (S&L or mutual savings bank); 4=mortgage banker.
[5]Discrete variable for the type of residential property with the following class interval values: 1=if detached single-family house; 2=if townhouse, rowhouse, apartment condominium, duplex, or triplex.

Exhibit 2
Summary Statistics for Variables Used in Estimation of
Fixed-Rate Mortgage Segment
(n=699)

Variable	Mean Value	Minimum Value	Maximum Value	Standard Deviation
Sale Price	107,765	16,500	800,000	71,043
First-Time	85,100	16,500	359,000	44,684
Repeat	122,909	25,000	800,000	80,726
Sale Price (sq ft)	71.22	50.03	192.41	70.67
First-Time	82.38	50.03	153.17	54.23
Repeat	64.52	69.56	192.41	77.39
Downpayment/Sale Price	.19	.00	1.00	.17
First-Time	.13	.00	1.00	.13
Repeat	.22	.00	1.00	.17
Age of Home	25.80	1.00	99.00	23.96
First-Time	27.88	1.00	99.00	23.31
Repeat	24.40	1.00	99.00	24.30
Interior Size (sq ft)	2,941	620	7,900	1,880
First-Time	1,973	620	4,500	1,582
Repeat	3,619	690	7,900	1,951
Lot Size (sq ft)	15,395	1,210	566,280	56,433
First-Time	11,582	1,210	470,012	48,991
Repeat	17,238	1,210	566,280	61,389
Contract Interest Rate (%)	9.90	6.75	14.50	.79
First-Time	9.98	7.50	14.45	.75
Repeat	9.84	6.75	14.50	.81
Points Charged to Buyer	1.39	.00	7.75	1.20
First-Time	1.29	.00	5.00	1.13
Repeat	1.45	.00	7.75	1.24
Buyer's Age[1]	2.76	1.00	5.00	1.09
First-Time	2.69	1.00	5.00	1.22
Repeat	3.18	1.00	5.00	1.45
Buyer's Income[2]	2.99	1.00	5.00	1.39
First-Time	2.69	1.00	5.00	1.22
Repeat	3.18	1.00	5.00	1.45
Source of First Mortgage[3]	3.22	1.00	4.00	1.02
First-Time	3.14	1.00	4.00	1.04
Repeat	3.35	1.00	4.00	.98
Type of Home[4]	11.36	1.00	2.00	.48
First-Time	1.31	1.00	2.00	.46
Repeat	1.40	1.00	2.00	.49

[1]Discrete variable for the buyer's age with the following class intervals: 1=if <25 years; 2=if 25–34 years; 3=if 35–44 years; 4=if 45–54 years; 5=if >54 years.
[2]Discrete variable for the buyer's income with the following class intervals: 1=if under $25,000; 2=if $25,000–$34,999; 3=if $35,000–$49,999; 4=if $50,000–$59,999; 5=if >$59,999.
[3]Discrete variable for the source of first mortgage used with the following class intervals: 1=if assumption, seller financing, or private investor; 2=if commercial bank; 3=if thrift institution (S&L or mutual savings bank); 4=mortgage banker.
[4]Discrete variable for the type of residential property with the following class intervals: 1=if detached single-family house; 2=if townhouse, rowhouse, apartment condominium, duplex, or triplex.

Exhibit 3
Summary Statistics for Variables Used in Estimation of Adjustable-Rate Mortgage Segment
(n=388)

Variable	Mean Value	Minimum Value	Maximum Value	Standard Deviation
Sale Price	157,672	18,000	800,000	107,846
First-Time	128,555	18,000	565,000	103,276
Repeat	171,562	31,200	800,000	107,334
Sale Price (sq ft)	99.72	43.72	152.49	56.49
First-Time	126.75	43.72	141.80	50.04
Repeat	86.35	75.78	152.49	39.75
Downpayment/Sale Price	.20	.00	.90	.13
First-Time	.15	.00	.90	.13
Repeat	.22	.00	.80	.10
Age of Home	24.63	1.00	99.00	23.19
First-Time	26.60	1.00	99.00	22.88
Repeat	23.54	1.00	99.00	23.31
Lot Size (sq ft)	19,344	1,321	522,720	54,213
First-Time	12,668	1,321	435,603	46,721
Repeat	22,698	1,367	522,720	57,369
Interior Size	2,381	620	7,900	1,442
First-Time	1,527	620	6,000	1,541
Repeat	2,991	620	7,900	1,366
Contract Interest Rate (%)	8.36	6.50	11.30	.96
First-Time	8.44	6.75	11.38	.96
Repeat	8.31	6.50	11.00	.95
Points Charged to Buyer	1.68	0.00	8.75	1.09
First-Time	1.76	0.00	8.75	1.11
Repeat	1.63	0.00	4.00	1.07
Buyer's Age[1]	2.78	1.00	5.00	.98
First-Time	2.40	1.00	5.00	1.96
Repeat	2.96	1.00	5.00	.95
Buyer's Income[2]	3.62	1.00	5.00	1.31
First-Time	3.20	1.00	5.00	1.28
Repeat	3.88	1.00	5.00	1.26
Source of First Mortgage[3]	3.20	1.00	4.00	.78
First-Time	3.21	1.00	4.00	.76
Repeat	3.19	1.00	4.00	.79
Type of Home[4]	1.33	1.00	2.00	.47
First-Time	1.47	1.00	2.00	.50
Repeat	1.27	1.00	2.00	.44

[1]Discrete variable for the buyer's age with the following class intervals: 1=if <25 years; 2=if 25–34 years; 3=if 35–44 years; 4=if 45–54 years; 5=if >54 years.
[2]Discrete variable for the buyer's income with the following class intervals: 1=if under $25,000; 2=if $25,000–$34,999; 3=if $35,000–$49,999; 4=if $50,000–$59,999; 5=if $59,999.
[3]Discrete variable for the source of first mortgage used with the following class intervals: 1=if assumption, seller financing, or private investor; 2=if commercial bank; 35 if thrift institution (S&L or mutual savings bank); 4=mortgage banker.
[5]Discrete variable for the type of residential property with the following class intervals: 1=if detached single-family house; 2=if townhouse, rowhouse, apartment condominium, duplex, or triplex.

The Logit Results for the Full Sample

The logit results for the full sample, the fixed-rate mortgage segment, and the adjustable-rate mortgage segment are given in Exhibits 4, 5 and 6, respectively.[6] Exhibit 4 indicates that, for the full sample, sale price per square foot and downpayment are significantly different across first-time and repeat buyers. Results for the sale price/square foot variable shows that first-time buyers are more likely to pay more per square foot for housing than repeat buyers. Moreover, the odds are higher that first-time buyers make lower downpayments than repeat buyers. Home age and lot size are not significantly different across buyers. The coefficients of INC_2 and INC_3 are positive and significant

Exhibit 4
Maximum Likelihood Estimates of the Logit Model for the Full Sample of Data

Variable	Beta[1]	Standard Error	Wald Chi-Square[2]	P-Value[3]	R-Index[4]
Intercept	−.8725*	.3537	6.9000	.0136	—
SP/SF	.0009*	.0005	3.3800	.0660	.0290
DP/SP	−3.7147*	.5400	47.3200	.0001	−.1640
HAGE	.0034	.0028	1.4800	.2238	.0000
LOTSIZE	−.0010	.0002	.5800	.4457	.0000
INC_1**	.0450	.3028	.0200	.8829	.0000
INC_2	.4542*	.2609	3.0300	.0818	.0250
INC_3	.4307*	.2527	2.9000	.0884	.0230
INC_5	−.3278	.2604	1.5800	.2081	.0000
$BAGE_1$**	1.1814*	.3253	13.1800	.0003	.0820
$BAGE_2$	1.4885*	.2515	35.0200	.0001	.1400
$BAGE_3$	.2279	.2678	.7200	.3947	.0000
$BAGE_5$	.0965	.3110	.1000	.7564	.0000
S_1**	−.3223	.2388	1.8200	.1772	.0000
S_2	−.0026	.2058	.0000	.9899	.0000
S_3	.1482	.1644	.8100	.3673	.0000
TH_2**	−.1782	.1584	1.2700	.2606	.0000
TM_2**	−.1268	.1518	.7000	.4033	.0000

Model Chi-Square	262.05
Model Index R	.468
−2 Log L	1419.85
Observations Included	1087.00

*significant at .10 level

**To assure that perfect collinearity does not exist between the variables, one variable was omitted from the model for each category. The excluded dummies were INC_4 ($50,000–59,999), $BAGE_4$ (45–54 years), S_4 (Mortgage Banker), TH_1 (Detached Single–Family Home), TM_1 (Fixed-Rate Mortgage).

[1]maximum-likelihood estimated regression coefficient for each variable

[2]Wald Chi-square statistic or the square of the ratio of the regression coefficient estimate to the standard error estimate

[3]probability value based on the chi-square that the parameter is equal to zero

[4]provides a measure of the variable partial contribution to the model

suggesting that the income for first-time buyers is more likely to be in the $25,000 to $49,999 range than that for repeat buyers.

The results show that first-time buyers cannot be significantly distinguished from repeat buyers in preference to mortgage type. Also, first-time buyers show no significantly different preference for source of mortgage funds or type of house relative to repeat buyers. Buyer age shows that first-time homebuyers more likely are younger (less than thirty-five years of age) than their repeat counterparts.

Exhibit 5
Maximum Likelihood Estimates of the Logit Model for the Fixed-Rate Mortgage Data

Variable	Beta[1]	Standard Error	Wald Chi-Square[2]	P-Value[3]	R-Index[4]
Intercept	−2.7210*	1.2347	4.86	.0275	—
SP/SF	−.0005	.0010	.28	.5942	.0000
DP/SP	−3.3334*	.6216	28.76	.0001	−.1540
HAGE	.0012	.0034	.13	.7216	.0000
LOTSIZE	−.0001	.0001	.48	.4888	.0000
INC_1**	.4179	.3698	1.28	.2584	.0000
INC_2	.6516*	.3262	3.99	.0458	.0420
INC_3	.5268*	.3178	2.75	.0973	.0260
INC_5	−.2021	.3345	.36	.5458	.0000
$BAGE_1$**	1.2877*	.4182	9.48	.0021	.0810
$BAGE_2$	1.6915*	.3330	25.80	.0001	.1450
$BAGE_3$	.4496	.3554	1.60	.2058	.0000
$BAGE_5$	.0030	.4086	.00	.9941	.0000
S_1**	−.4222	.2855	2.19	.1392	−.0130
S_2	−.2663	.2625	1.03	.3104	.0000
S_3	.1886	.2168	.76	.3843	.0000
TH_2**	.2248	.2014	1.25	.2641	.0000
IR	.1303	.1160	1.26	.2617	.0000
PTS	.0590	.0756	.61	.4354	.0000

Model Chi-Square	193.34
Model Index R	.473
−2 Log L	937.40
Observations Included	699.00

*significant at .10 level

**To assure that perfect collinearity does not exist between the variables, one variable was omitted from the model for each category. The excluded dummies were INC_4 ($50,000–59,999), $BAGE_4$ (45–54 years), S_4 (Mortgage Banker), TH_1 (Detached Single–Family Home).

[1]maximum-likelihood estimated regression coefficient for each variable

[2]Wald Chi-square statistic or the square of the ratio of the regression coefficient estimate to the standard error estimate

[3]probability value based on the chi-square that the parameter is equal to zero

[4]provides a measure of the variable partial contribution to the model

The Logit Results for the Fixed-Rate Mortgage Segment

Exhibit 5 contains the results of applying the logit model to the fixed-rate mortgage segment of the data. The results show that the odds are not significant that sale price per square foot is different across buyer type. However, holding other factors constant, lower downpayment/sale price ratios are more likely to be associated with first-time buyers.

Exhibit 6
Maximum Likelihood Estimates of the Logit Model for the Adjustable-Rate Mortgage Data

Variable	Beta[1]	Standard Error	Wald Chi-Square[2]	P-Value[3]	R-Index[4]
Intercept	−.7942	1.4499	.30	.5839	—
SP/SF	−.0020*	.0009	4.28	.0387	.0700
DP/SP	−7.7571*	1.6208	22.91	.0010	−.2140
HAGE	.0047	.0058	.66	.4157	.0000
LOTSIZE	−.0001	.0001	.10	.7529	.0000
INC$_1$**	.1225	.7978	.02	.8780	.0000
INC$_2$	.2232	.5435	.17	.6813	.0000
INC$_3$	.2992	.5085	.35	.5563	.0000
INC$_5$	−.3521	.5013	.49	.4825	.0000
BAGE$_1$**	1.0214*	.6104	2.80	.0943	.0420
BAGE$_2$	.8299*	.4634	3.21	.0733	.0510
BAGE$_3$	−.2589	.4792	.29	.5890	.0000
BAGE$_5$	.3304	.6337	.27	.6020	.0000
S$_1$**	−.2992	.9418	.10	.7507	.0000
S$_2$	−.3555	.4055	.77	.3806	.0000
S$_3$	.1331	.2965	.20	.6533	.0000
TH$_2$**	−.9928*	.3156	9.89	.0017	−.1310
IR	.1678	.1452	1.34	.2477	.0000
PTS	.2621*	.1377	3.62	.0569	.0060
ACAP	.4197	.9507	.19	.6588	.0000
LCAP	−.9371	.9456	.98	.3217	.0000
MGN	−.7817	1.3803	.32	.5711	.0000

Model Chi-Square	104.25
Model Index R	.438
−2 Log L	363.67
Observations Included	388.00

*significant at .10 level

**To assure that perfect collinearity does not exist between the variables, one variable was omitted from the model for each category. The excluded dummies were *Income$_4$* ($50,000–59,999), *Age$_4$* (45–54 years), *Source$_4$* (Mortgage Banker), *HouseType$_1$* (Detached Single–Family Home).

[1]maximum-likelihood estimated regression coefficient for each variable

[2]Wald *Chi*-square statistic or the square of the ratio of the regression coefficient estimate to the standard error estimate

[3]probability value based on the *chi*-square that the parameter is equal to zero

[4]provides a measure of the variable partial contribution to the model

Also, the odds are not significant that lot size and home age are different across type of buyer. The coefficients for the income variables show the same results as those indicated in Exhibit 4 for the full sample.

Again, first-time and repeat buyers are not distinguished by the source of mortgage funds or type of home they choose. The buyer age coefficients suggest that as age increases the buyer tends to be a repeat buyer.

In regard to fixed-rate financing, the results show no significant difference in either the contract interest rate or the number of discount points paid across first-time and repeat buyers.

The Logit Results for the Adjustable-Rate Mortgage Segment

Exhibit 6 contains the results for the logit model for the adjustable-rate mortgage segment of the data. The sale price/square foot variable is significant indicating a greater likelihood that first-time buyers pay higher prices per square foot than repeat buyers.

The downpayment/sale price ratio is more likely to be less for first-time buyers. Lot size, home age, income, and source of mortgage funds are not significantly different across buyer type. Significance of the coefficient for type of house indicates that first-time buyers using adjustable-rate mortgage financing are more likely to buy a single-family home than a townhouse, condo, etc. The age variables again show that first-time buyers tend to be younger than their repeat buyer counterparts.

In regard to adjustable-rate mortgage financing, first-time buyers cannot be distinguished from repeat buyers by the contract interest rate; however, first-time buyers are more likely to pay more points. The results show that other adjustable-rate loan characteristics such as annual interest rate caps, lifetime interest rate caps, and margins cannot be used to distinguish first-time and repeat buyers.

Summary

This study has examined the issue of market efficiency in brokered sales by testing for differentials in the pricing of housing and/or mortgage services for first-time homebuyers relative to repeat buyers. A logit model was used to measure for significant differences in housing and mortgage characteristics across first-time and repeat buyers. Overall, the results support the notion that the housing market is less than completely efficient in providing services to buyers since there is some differentiation between first-time and repeat buyers in regard to the cost of housing and financing. First-time buyers are seen to be more likely associated with a higher sale price/square foot than repeat buyers when an adjustable-rate mortgage is used. Also, in this segment, first-time buyers have a higher probability of paying more discount points than their repeat buyer counterparts.

The results for the full sample show that first-time homebuyers are more likely to pay a higher sale price/square foot and a lower downpayment. First-time buyers also tend to be younger and have less income than their repeat counterparts. Home age, lot size, type of mortgage, source of mortgage funds, and type of house are not significantly different across buyer type.

For the fixed-rate mortgage data, the results show that buyer type cannot be distinguished by these variables: sale price/square foot, home age, lot size, source of financing, type of house, contract interest rate, and discount points. The only variables

that are significantly different across type of buyer are downpayment/sale price and buyer age. First-time buyers are seen to have lower downpayment ratios and tend to be younger than repeat buyers.

The results for the adjustable-rate mortgage segment of the data show significant differences in sale price/square foot (higher for first-time buyers), downpayment (lower for first-time buyers), type of house, buyer age, and discount points (higher for first-time buyers) across type of buyer. Type of buyer cannot be distinguished by lot size, home age, income, source of mortgage funds, contract interest rates, margins, or annual/lifetime caps.

Notes

[1]Informational efficiency or inefficiency in the housing market would not necessarily imply the existence of asymmetric information. Since the transactions examined in this study were broker-assisted, any discriminatory pricing based on asymmetric information would require broker complicity. For example, a broker would have to show first-time buyers their overpriced listings and repeat buyers their under- or fairly priced listings. This is not likely to happen. More likely, the broker would show all clients a representative set of properties within their stated price range and would provide all clients the same advice and information. The authors acknowledge an anonymous reviewer for pointing this out.

[2]The SAS Logistic Procedure deletes any observations having missing dependent or independent variables.

[3]Some of these independent variables are not continuous variables which makes the logit regression preferable to a discriminate analysis approach.

[4]A total of twenty independent variables had their relationship with the dependent tested with a stepwise option. Due to their lack of significance and for simplicity, a number of those independent variables were not included in the logit model.

[5]Z can also be indicated as the natural logarithm of $P/(1-P)$, where P is the probability that a homebuyer is a first-time homebuyer, given certain knowledge about the independent variable.

[6]Due to significant collinearity between sale price and square feet, these variables were reduced to a ratio of sale price per square foot.

References

Colton, K. W., Housing Policy Challenges of the 1990s, *Secondary Mortgage Market*, 1990, 7, 2–5.

Crone, T. M. and L. O. Mills, Forecasting Trends in the Housing Stock Using Age-Specific Demographic Projections, *Journal of Housing Research*, 1991, 2, 1–20.

Garrett, J., Mortgage Banking: Implications of Demographic Change for Home Building and Finance, *Real Estate Review*, 1990, 19, 14–16.

Gretchen, A. A., D. W. Berson, M. H. Obrinsky and B. Valgeirsson. Demographic and Economic Trends, *Journal of Housing Research*, 1990, 1, 21–42.

Griblin, I., Promoting Home Ownership for First-Time Buyers, *Real Estate Finance Journal*, 1989, 5, 82–83.

Hendershott, P. H., Choices of a New Generation, *Secondary Mortgage Markets*, 1987/88, 4, 8–10.

Jones, L. D., Current Wealth and Tenure Choice, *AREUEA Journal*, 1989, 17, 17–40.

Lachman, L. M., Demographics: The Key to Successful Real Estate Projects in the 1990s, *Real Estate Finance Journal* 1990, 6, 16–21.

Mankiw, G. N. and D. N. Weil, The Baby Boom, the Baby Bust, and the Housing Market, *Regional Science and Urban Economics*, 1989, 19, 235–58.

Obrinsky, M., Young, First-Time Homebuyers Face Financial Hurdles, *Savings Institutions,* 1988, 109, 32–33.

Peek, J. and J. A. Wilcox, A Real, Affordable Mortgage, *New England Economic Review*, January–February 1991, 51–66.

Schneider, H., Housing's Dark Shadow, *Mortgage Banking*, 1989, 50, 26–36.

Turnbull, G. K. and C. F. Sirmans, Information, Search, and House Prices, unpublished paper, 1991.

Wachter, S., The Limits of the Housing Finance System, *Journal of Housing Research*, 1990, 163–85.

Welfeld, I., Our Nonexistent Housing Crisis, *Public Interest*, 1990, 101, 55–61.