Pricing and Time on the Market for Residential Properties in a Major U.K. City

Authors

Stanley McGreal, Alastair Adair, Louise Brown, and James R. Webb

Abstract

The pricing and length of time to sell single-family residential properties is a function of the interaction between buyer and seller behavior. This study estimates value effects in relation to the time on the market for residential properties within the Belfast (U.K.) metropolitan area. Three distinctive characteristics of the market are highlighted. First, the majority of sales are at a premium to the list price. Second, different factors influence time-on-the-market for premium and discount sales. Third, the marketing period is examined for three events: listing to sales agreement, sales agreement to completion, and listing to completion.

Housing markets have many features that are inconsistent with perfectly competitive theory, including costly search which, when coupled with seller and buyer behavior, can produce a sub-optimal market characterized by considerable time lags between the listing of properties and the actual completion of the sales transaction (Arnott, 1989; and Kang and Gardner, 1989). In the residential market in the United States, the listing price of property has been shown by several studies to generally provide the upper boundary for expected offers and eventual sales prices (Horowitz, 1992; and Anglin, 1997). Knight, Sirmans, and Turnbull (1998) considered the list price to be, in effect, a target price that is normally in excess of the vendors' real reserve price. Benjamin and Chinloy (2000) extended this argument further and showed that it is better to price a property at or below market value on the basis that overpricing gives minimal extra return. In the United Kingdom, few studies have examined these relationships. The important effect that the marketing period has on the achieved price has not been the subject of research papers due to the more confidential manner in which data are held in the U.K. The two exceptions are research carried out by Merlo and Ortalo-Magne (2004) on the English market, which is concerned primarily with the transaction history of properties and buyer/seller strategies, and an analysis of the time-to-sale effects in the Glasgow housing market by Pryce and Gibb (2003, 2006). The latter argue that not only does the marketing time have an impact on selling price

but that the timing of the sale in relation to the wider property cycle for that location is crucial. Pryce and Gibb (2006) conclude that the institutional framework for a particular selling system, in Scotland a sealed bid system, will have a profound effect on the probability of sale. However, the peculiarities of the Scottish system are not typical of the market in the rest of the U.K., whereas this study dealing with private sales is representative of the majority of open market house sales within the U.K. (excluding the Scottish system).

This study, by examining the relationship between listing and selling price in a major U.K. city, extends the current knowledge base. In particular, it is hypothesized that sale price is a function of marketing time and that properties with a shorter marketing time (TOM) are more likely to sell above list price. The analysis utilizes data from a major real estate brokerage firm in Belfast,[1] U.K., thereby having the advantage of consistency in practice and marketing procedures that may vary between different real estate brokers. (Although available in most of the U.S., in the U.K. all physical details about a particular residence and selling prices are not public information.) The results suggest a more complex situation than that prevailing within the U.S. Adding to the uniqueness of the analysis, a major portion of the homes are sold at a premium to the list price, although a significant percentage also sold at a discount. The paper explores differences between time to agreement and time to final completion and specific nuances that can occur between these dates.

The remainder of this paper is structured as follows. Section two provides a detailed review of key issues arising from the literature, most of which are drawn from the U.S., reflecting the relative lack of analysis of TOM in other parts of the world. Section three outlines the research design and data, with a focus on the statistical distributions that characterize the main variables. Section four contains the results and section five draws conclusions from the study.

Literature Review

Several distinct themes run through the literature on TOM, namely buyer search behavior, seller pricing behavior, the physical characteristics of properties, and liquidity. These themes provide an analytical richness to the subject area. Knight, Sirmans, and Turnbull (1998) theorized that if housing markets are efficient, the information captured in listing prices at any point in time will be reflected in houses transacting at that same point in time. However, the high cost of information and the asymmetry of information between buyers and sellers cause inefficiency in housing markets. They concluded that listing price appears to be useful in predicting subsequent selling price, but recognized the complexity of the process including the negotiations between buyer and seller. Jud, Winkler, and Kissling (1995) investigated the relationship between listing and selling price as an indication of liquidity in the housing market. Their analysis indicated that liquidity is a function of both transaction costs and market information.

Anglin (1997) considered the perspective of buyer search behavior and the trade-off between sale price and the expected time-till-sale. Several variables are identified as being of importance in explaining buyer behavior, including those associated with the provision of information, such as the role of the real estate agent. The latter is supported by Sirmans, Turnbull, and Benjamin (1991). They argued that TOM is largely dependent on the performance of the selling agent, as well as overall market conditions. However, the key finding from Anglin's work is the significance of the number of neighborhoods searched. In particular, the buyer who searched in more neighborhoods looked at more houses and took significantly longer to buy a house. Given the dynamics between buyers and sellers in the residential sector, buyer behavior and the strategies employed by buyers necessarily impinge on TOM. In theory, if buyers' options are more limited and search is restricted to within well-defined neighborhoods, then TOM should be reduced.

Springer (1996), in an analysis of single-family transactions in Arlington Texas from 1991 through 1993, indicated that seller motivations affect both marketing time and selling prices. However, the results differ considerably when comparing lower priced to higher priced houses and support the existence of informational imperfections on the market for single-family housing.

Anglin, Rutherford, and Springer (2003) examined the trade-off that exists between the time to sell a house and the price achieved. Based on the premise that TOM depends on list price, a critical element of their model is the degree of overpricing that occurs, with results showing that as this increases, so too does the expected TOM. Anglin, Rutherford, and Springer showed that TOM varies more with spatial location and market conditions than it does with property characteristics. Their analysis supported the complexity of market behavior and indicated that there is no direct trade-off between the selling price and TOM. They found that increases in list price increase TOM and that the effect is magnified for houses with a low variance of list prices.

Several studies have highlighted the complexity between list price and TOM (e.g., Asabere, Huffman, and Johnson, 1996). Arnold (1999) has shown that a lower list price is not necessarily related to a shorter TOM. Yavas and Yang (1995) have demonstrated that higher list prices lead to longer marketing times, advancing the position forwarded in earlier papers by Miller and Sklarz (1987), Kang and Gardner (1989), and Asabere, Huffman, and Mehdian (1993), who argued that setting list price above market price impacts on TOM. Kang and Gardner (1989) also showed that the older the property, the longer the selling period. Forgey, Rutherford, and Springer (1996) discussed how TOM is influenced by a wider set of factors, including size of the house and Baryla, Zumpano, and Elder (2000) demonstrated that economic conditions influence the duration of search by buyers.

Liquidity in residential markets is frequently measured by the relationship between time to sale and transaction price, with a property that sells quickly for a price at or near its fair market value considered to be more valuable than a property

requiring either a longer marketing period to achieve the same price or a large discount to sell in an equivalent time period (Forgey, Rutherford, and Springer, 1996). A more liquid property is expected to command a premium in the market, whereas, in contrast, the inability to resell quickly at or near fair value is reflected by a discount. Forgey, Rutherford, and Springer provided evidence for an optimal marketing period with a price premium for houses that sell faster than expectations. Increased search effort was seen to lead to a higher probability of sale, and either a higher transaction price or a shorter time on the market or both. Forgey, Rutherford, and Springer showed that thinner markets exist for higher priced housing and higher list prices are associated with atypicality and more uncertainty in market prices. Their model suggests that buyers will pay a premium for properties that are more liquid in comparison to other property, though the implicit price of liquidity is a relatively minor component of housing value.

Jud, Seaks, and Winkler (1996) investigated whether the seller's choice of real estate agent influences liquidity. Their study found no evidence that particular agents or firms are able to market a property faster than others, a finding they argued is consistent with efficient information flow and objectivity (Gwin, Ong, and Gwin, 2002) of the Multiple Listing Service (MLS). Also, reflecting on the role of the brokerage firm, Yang and Yavas (1995) identified that properties listed and sold by the same agency did not sell any more quickly than others with different brokerage arrangements. Studies by Baryla and Zumpano (1995) and Baryla, Zumpano, and Elder (2000) indicated that the probability of a buyer finding a home increased over time, with a broker-assisted search reducing time by increasing the number of properties viewed.

Glower, Haurin, and Hendershott (1998) analyzed the seller perspective. They suggested that seller motivation affects sale price and that variations in marketing time are in part due to random variation, but also could reflect systematic differences in the seller's desire to sell. Using a survival model, they demonstrated that setting prices too high extends the duration of the marketing period. They concluded that the effect of atypicality is small, but at the same time demonstrate that a property with an atypicality measure one standard deviation greater than average sells for a 16% premium. Glower, Haurin, and Hendershott also hypothesized that some of the variation in TOM in the residential market is systematically related to the seller's characteristics. Their results suggest that highly motivated sellers reduce TOM by up to 30%, compared to sellers with a low motivation to sell. Genesove and Mayer (1997) also investigated the importance of seller motivation using an owners' equity position as an indicator to assess the effect on listing price and TOM. The findings suggest that a high loan-to-value (LTV) ratio will persuade a seller to list the property at a higher price and will incur a longer TOM.

In an earlier study, Haurin (1988) argued that the marketing time of atypical houses is relatively longer than for standard houses due to unusual structural features or locational amenities. Haurin considered that the greater the variance of the distribution of offers for a house, the longer is the expected duration of

marketing time for the house. Using failure time models, Haurin showed that a house with an atypicality measure of two standard deviations above the mean is predicted to take 20% longer to sell than would the typical house. Seasonality influences were apparent in Haurin's study, with a spring or summer listing reducing marketing time by 20% compared to a winter listing date. Yavas and Yang (1995), also concluded that TOM is influenced by seasonality and brokerage-related variables, such as the season in which the house is listed, interest rate at the month of sale, the size of the brokerage firm, and the volume of listing activity, while Kalra and Chan (1994) showed that TOM is influenced by macroeconomic factors notably employment.

European studies on TOM are considerably fewer than for the U.S. Nevertheless, two reported analyses show similarities with American studies. For Glasgow, Scotland, Pryce and Gibb (2003) conclude that stigma effects attached to unsold properties lengthens TOM, with a signaling effect reducing the chances of sale. The same study also highlighted that over-pricing extends TOM. For Stockholm, Sweden, Bjorklund, Dadzie, and Wilhelmsson (2003) found that transaction price increases with TOM, reaching an optimum around the 150th day, after which price declines with transaction price falling below expected price after 270 days.

In summary, there is a rich literature base on TOM for U.S. studies but a very limited literature base elsewhere. Within these studies, there is variability of opinion regarding whether list price represents an upper boundary though the concept of an optimal marketing period emerges strongly, with more liquid property commanding a price premium relative to list price. The pricing strategy of sellers is also identified as an important consideration with overpricing increasing the TOM.

Research Design and Data

The variables considered in this study are listed in Exhibit 1. The data are based upon information collected on the sale of used single-family dwellings from one large real estate brokerage firm that has a number of office sites within the Belfast metropolitan area. The advantage of utilizing data from one company is to reduce the variability that may exist between different firms due to varying corporate practices, thereby minimizing the influence of the selling agent on TOM, as discussed by Sirmans, Turnbull, and Benjamin (1991). In the U.K., particularly in the Belfast market, it is not common to have joint or multiple agents, although the vast majority of sales are through a single agency.

The degree to which the data are representative of the Belfast housing stock is apparent through this company's share of the market.[2] Also, the profile of sales provides evidence that the subject company does not differ significantly from the overall market in Belfast (Exhibit 2). There is no reason to consider that the company, for which the sales data relates to, operates in a manner different to other firms. For these reasons, results from the analysis are considered to be typical of the market throughout the Belfast metropolitan area.

Exhibit 1 | Regression Variables

Variable
Sales price
Square feet
Bedrooms
Reception rooms
Terraced house (dummy)
Semi-detached house (dummy)
Detached house (dummy)
Semi-detached bungalow (dummy)
Detached bungalow (dummy)
Apartment (dummy)
Garage (1) *or not* (0)
Modernization needed (1) *or not* (0)
Central heat (1) *or not* (0)
Age (range)
Days 1 (listing to sales acceptance)
Days 2 (sales acceptance to possession)
Days 3 (total of Days1 and Days 2)
Quarter of listing (time dummies)

Exhibit 2 | Comparison of Market Share of Subject Company and Overall Sample for 2002–2003

Construction Type	Subject Company	Overall Market
Terraced / townhouse	36%	32%
Semi-detached House	37%	32%
Detached House	12%	15%
Semi-detached Bungalow	3%	3%
Detached Bungalow	3%	7%
Apartment	9%	11%

TOM is based upon the analysis of sales over nine successive quarters from the first quarter of 2002 through the first quarter of 2004 (T1-T9). The period of analysis covers a period when market conditions were relatively buoyant, with appreciable rates of house price growth in the Belfast metropolitan area. Similar market conditions have immediately preceded and succeeded the time period considered (Exhibit 3). On this basis, the results can be generalized over a longer time period.

After data cleansing (elimination of observations with missing data), the initial sample of 1,714 sales was reduced to 1,684 observations. Information on properties withdrawn from the market or re-listed was not available. The distribution of sales varies over the study period, with a higher volume in 2002 than 2003 (Exhibit 4). The highest volume of sales occurred in the third quarter of 2002 (n = 302) and lowest volume in the first quarter of 2003 (n = 124), in part reflecting seasonality and cyclical effects in the local market.

A unique feature of this study centers on the differing interpretations of TOM. The real estate brokerage firm records information relating to the period from listing to date of sales agreement (*DAYS1*). This is essentially the marketing period

Exhibit 3 | Price Means for Belfast Metropolitan Area: 1995–2004

Year	Price Means	Percentage Change
1995	£46,563	18.02%
1996	£53,665	15.25%
1997	£60,188	12.16%
1998	£65,442	8.73%
1999	£76,761	17.30%
2000	£88,393	15.15%
2001	£93,791	6.11%
2002	£105,055	12.01%
2003	£110,728	5.40%
2004	£116,374	5.10%

Exhibit 4 | Number of Sales by Quarter

Quarter/Year	1Q/02	2Q/02	3Q/02	4Q/02	1Q/03	2Q/03	3Q/03	4Q/03	1Q/04	Total
Total	176	237	302	142	124	188	149	208	158	1684

for the property. Information is also recorded on the period between agreement to purchase and time until sales completion (*DAYS2*), which in the U.K. market encapsulates the period in which condition surveys are undertaken on the property, mortgage advances agreed upon, legal documents on ownership scrutinized by solicitors (lawyers) as part of the conveyance of the property, and other matters that may affect the sale (namely planning permissions and building control). In the U.K., a seller may legally sell to someone else other than the first person entering into an agreement to purchase, until completion of the transaction (all papers and monies pass). Hence, this period can be highly variable and is also influenced by personal factors concerning both the buyer and seller. The *DAYS3* variable is the aggregate of *DAYS1* and *DAYS2*. For these reasons, it is hypothesized that *DAYS1* provides the more significant measure of TOM and that *DAYS2* is likely to introduce noise into the system. The analysis presented in this paper seeks to identify the significance of the different interpretations of TOM.

The listing price and sale price are known for each property, along with a number of characteristics including floor area, number of bedrooms, number of reception rooms (living room, dining room, lounge, sitting room), type (condos, semi-detached bungalows-single story, detached bungalows, terraced houses, semi-detached houses, detached houses), garage (or not), modernization needed (or not), central heating (or not), and age range. Only properties on the resale market are included in this study. New construction is omitted. The modal distribution by age is properties constructed in the period 1960–1980 (n = 522), though different age bands are represented. Few properties are older than 1919 (n = 52). This is consistent with the wider characteristics of the housing stock.

The distribution of sales for the metropolitan area is presented for *DAYS1* (Exhibit 5). The pattern of evidence is variable with 29% (n = 495) of the properties agreed for sale (*DAYS1*) by day 30 and 47% (n = 787) by day 60. The entire transaction process as represented by *DAYS3* is significantly longer, with less than 5% (n = 79) completed by day 60 and close to 20% (n = 333) by day 90.

The mean list price for the 1,684 properties (£88,012)[3] and the mean sale price for these properties (£88,351), although similar statistically (standard deviation of £39,224 and £39,527 respectively), disguises substantial differences on an individual property basis. Indeed, what makes this data set different from those for the U.S. is the threefold division, namely properties selling at a premium to the list price (n = 736: 44%), selling at the list price (n = 427: 25%), and selling at a discount to the list price (n = 521: 31%). The modal category, property selling above list price, is a distinctive characteristic of this study. The price difference between sales and asking price is within the range from −£35,000 (greatest discount) to £41,050 (greatest premium). The most frequent price range is for properties selling from £71 to £100K (n = 674 or 40%) followed by those below £70K (n = 564 or 33%).

For those properties selling at 181 days or longer after listing, the mean percentage discount to list price of 5.39% (Exhibit 5) increases relative to those properties

Exhibit 5 | Sales, Discount, and Premium by Time-on-the-Market Days (listing to sales agreement)

	Days									
	0–7	8–14	15–30	31–60	61–90	91–120	121–180	181–365	>365	Totals
Number of sales	96	131	268	292	221	162	226	249	39	1684
Mean discount over list price (%)	−2.74	−3.18	−4.03	−3.89	−3.99	−3.48	−3.79	−5.39	−8.55	−4.12
Mean premium over list price (%)	3.36	4.27	3.71	3.16	4.08	4.14	3.96	3.73	1.73	3.16

sold more quickly. This suggests that TOM may only significantly affect the smaller percentage of properties taking in excess of half a year to sell. For those properties selling at a premium, little variation is apparent between the respective marketing periods. To illustrate this, the mean percentage premium for properties agreed for sale (*DAYS1*) within 8–14 days is 4.27%, whereas those agreed within 91–120 days have a mean percentage premium of 4.14%. However, on the basis of liquidity arguments (Forgey, Rutherford, and Springer, 1996), the former may be considered to have value and cost advantages over the latter. Mean TOM (*DAYS1*) is significantly higher (t = 8.277) for properties sold at a discount (132.81 days) compared to those properties sold at a premium (87.48 days), indicating that the premium subset has both price and liquidity advantages.

The literature suggests that age of property may impact on TOM. Results from this study support this inference with the longest period for *DAYS1* in both the discount (153.45 days) and premium (170.08 days) subsets being for the oldest age category (pre-1919 property).[4] For the discount subset, the variation in marketing period does not differ substantially by age category, but is lowest for post 1980 property (125.25 days), whereas properties selling at a premium display more variability in the marketing period by age category: lowest for properties in the 1960 through 1980 range (62.36 days).

Results: Development of Models

The literature, rather than reaching consensus, identifies from the various studies a range of factors that in specific examples are shown to influence TOM notably: property characteristics, location and season/period when listed. Hence, the initial models presented in this study seek to establish the relationship between TOM and the variables representing property characteristics, time listed, and location attributes. A two-stage least squares regression (2SLS) technique was employed with the dependent variable reflecting the three interpretations of TOM (*DAYS1*, *DAYS2*, and *DAYS3*, respectively). All three models generated are characterized by low adjusted R^2 values, although F ratios are significant (Exhibit 6) and produce levels of explanation not dissimilar to that reported by Anglin, Rutherford, and Springer (2003) for a comparable set of variables. The *DAYS1* model has the slightly better fit and higher degree of significance (adj. R^2 = .060, F = 5.695). Across the three models, a similar combination of variables is significant, although with fewer significant variables for *DAYS2* and *DAYS3*. In the case of the former, the negative coefficients for the time dummies are an indication of added noise with the *DAYS2* interpretation of TOM. For the *DAYS1* model, listing in the early quarters of the study period is significant but not for the final two quarters of 2003 (T7 and T8); there is evidence of spatial significance by market area and several property characteristics are also significant, notably age, size, central heating, and modernization requirements. These findings are in general agreement with earlier studies concerning the range of variables that influence TOM, although the models are characterized by small R^2 values. This phase of the analysis

Exhibit 6 | 2SLS Regression Results for Belfast Metropolitan Area
Dependent Variable = *TOM*

Variable	DAYS1 Model	*t*-Stat.	DAYS2 Model	*t*-Stat.	DAYS3 Model	*t*-Stat.
Constant	127.087*	5.905	90.925*	11.821	218.012*	9.945
T2	18.251***	1.766	−17.286*	−4.680	0.965	0.092
T3	18.978***	1.922	−11.371*	−3.221	7.607	0.756
T4	21.457***	1.827	−18.331*	−4.367	3.126	0.261
T5	51.966*	4.249	−14.439*	−3.303	37.527*	3.012
T6	34.777*	3.155	−21.317*	−5.411	13.460	1.199
T7	−1.668	−0.144	−1.273	−0.307	−2.941	−0.249
T8	−1.635	−0.150	0.290	0.074	−1.345	−0.121
T9	22.216***	1.917	−4.097	−0.989	18.119	1.535
Outer north	−36.772*	−5.110	0.563	0.219	−36.209*	−4.940
South	6.871	0.834	−5.370	−1.824	1.501	0.179
East	−15.474**	−2.078	−5.813	−2.184	−21.287*	−2.806
Semi-detached house	−2.282	−0.336	0.755	0.311	−1.527	−0.221
Detached house	21.615***	1.852	−0.921	−0.221	20.694***	1.741
Semi-detached bungalow	3.302	0.217	−0.915	−0.169	2.387	0.154
Detached bungalow	11.098	0.806	−5.332	−1.083	5.766	0.411
Apartment	19.414	1.389	−1.054	−0.211	18.360	1.290
Age	−7.339*	−2.783	1.866**	1.980	−5.472**	−2.037
Square feet	0.021***	1.789	0.008***	1.797	0.029**	2.387
Bedrooms	6.170	1.157	−6.759*	−3.546	−0.589	−0.108
Reception rooms	−3.388	−0.477	−1.981	−0.780	−5.369	−0.742
Garage	7.277	1.120	−1.358	−0.585	5.919	0.894
Central heating	−42.747*	−2.824	−0.828	−0.153	−43.576*	−2.826
Modernization needed	−20.478**	−1.952	−0.171	−0.046	−20.649**	−1.932
Adj. R^2	.060		.048		.040	
SE	102.72		36.713		104.632	
F	5.695*		4.674		4.018	

Notes: TOM is the dependent variable. The number of observations is 1,683.
*Significant at the 99% level of confidence.
**Significant at the 95% level of confidence.
***Significant at the 90% level of confidence.

indicates that *DAYS1* produces a wider range of significant variables and is likely to be the more robust measure of TOM.

The second models are sale price hedonics with the respective measurements of TOM as explanatory variables (*DAYS1*, *DAYS2*, and *DAYS3*) (Exhibit 7). The fit for the sale price hedonics are within the expected range from the literature, with adjusted R^2 values of .631, .644, and .646 respectively. The majority of the control variables are highly significant. For the *DAYS1* model, all of the property characteristics, except for central heating, are significant at 0.01. The arithmetic signs are as expected, being positive for most characteristics but negative for modernization, reflecting the lower price achieved for properties requiring modernization or a significant level of repair. Each of the dummy variables for property type entered with a positive coefficient (compared to the lower priced terraced/townhouse category, which was omitted).

The outcomes of these models support a priori expectations that *DAYS1*, the normal definition of the marketing period in the U.S., has an impact on the transaction price. The significant negative coefficient (-14.819, $t = -2.632$) for *DAYS1* is indicative of declining sale price after a period of listing. However, the greater complexity of this particular data set, reflecting the differing impact of the marketing period for properties selling both above and below list price is an important consideration.

In contrast, *DAYS2*, the period for survey and legal contracts, is not significant, indicating that this period has little or no impact on sale price (Exhibit 7), with the small negative correlation between *DAYS1* and *DAYS2* ($r = -.156$) symptomatic of the added noise. The *DAYS3* model, the combination of *DAYS1* and *DAYS 2*, is statistically significant and produces an outcome very similar to *DAYS1*, reflecting the high degree of correlation between *DAYS1* and *DAYS3* ($r = .937$) but does not bring any added value to the analysis. This suggests that transaction price is not unduly influenced by events following the marketing period (*DAYS1*), and although there is the potential to accept better offers, this does not seem to be unduly distorting market expectations.

A Cox regression, with *DAYS1* as the dependent variable, was used to test the likelihood of selling within 180 days from listing (Exhibit 8a). This threshold, identified from the descriptive analysis, suggested that time may only impact significantly on price for those properties taking longer than 180 days to sell. The Cox regression model was repeated without any time constraint (Exhibit 8b). From the time-limited model (Exhibit 8a), variables that increase the odds-ratio of selling include a number of property characteristics: central heating, the number of reception rooms, age of property and type (semi-detached house), and modernization. However, of these property characteristics, only age is both statistically significant and increases the odds-ratio of selling. Location effects appear stronger and statistically significant, raising the odds-ratio of selling properties in either the outer north or east of the city. Listing in time periods, T7 or T8, increased the likelihood of sale, although these are not statistically

Exhibit 7 | 2SLS Regression Results for Belfast Metropolitan Area
Dependent Variable = *Sale Price*

Variable	DAYS1 Model	*t*-Stat.	DAYS2 Model	*t*-Stat.	DAYS3 Model	*t*-Stat.
Constant	−5950.717	−0.764	−6396.409	−0.813	−4516.729	−0.577
T2	2284.058	0.963	1726.967	0.723	2028.583	0.857
T3	3327.777	1.468	2860.042	1.257	3169.141	1.400
T4	5608.547**	2.081	4974.752***	1.834	5346.304**	1.987
T5	8976.527*	3.187	7964.262*	2.828	8823.550*	3.142
T6	10884.750*	4.290	9975.973*	3.903	10587.218*	4.187
T7	7094.474*	2.661	7086.265*	2.653	7061.535*	2.650
T8	9729.356*	3.891	9744.934*	3.890	9728.058*	3.892
T9	12992.201*	4.888	12599.876*	4.736	12959.843*	4.880
Outer north	−5235.070*	−3.140	−4702.375*	−2.837	−5289.679*	−3.176
South	32442.969*	17.157	32267.416*	17.022	32369.124*	17.130
East	10241.025*	5.988	10358.575	6.045	10117.545*	5.913
Semi-detached house	6372.274*	3.811	6495.673*	3.879	6372.869*	3.814
Detached house	32980.809*	11.749	32774.878*	11.660	32998.935*	11.762
Semi-detached bungalow	5814.625	1.634	5855.303	1.643	5799.875	1.631
Detached bungalow	32214.452*	9.838	32082.133	9.778	32139.201*	9.820
Apartment	14026.964*	4.358	13753.932*	4.268	14054.695*	4.369
Age	−8367.112*	−2.444	−8021.214**	−2.336	−8194.665**	−2.395
Square feet	63.849*	10.674	62.927*	10.522	64.046*	10.710
Bedrooms	5315.340*	3.781	5209.039*	3.690	5211.324*	3.708
Reception rooms	5772.174*	3.400	5869.753*	3.453	5739.796*	3.383
Garage	10460.870*	6.976	10340.799*	6.885	10444.666*	6.970
Central heating	4017.771	1.156	4643.689	1.337	3935.816	1.133
Modernization needed	−7134.467*	−2.961	−6834.607*	−2.835	−7164.647*	−2.975
Age^2	1270.406*	2.582	1238.225*	2.510	1247.924*	2.538
Square feet^2	−0.008*	−7.571	−0.007*	−7.418	−0.008*	−7.579
DAYS1	−14.819*	−2.632	N/A		N/A	
DAYS2	N/A		−17.274	−1.095	N/A	
DAYS3	N/A		N/A		−16.399*	−2.969
Adj. R^2	.631		.644		.646	
SE	23530.02		23570.628		23516.667	
F	118.932*		118.303		119.140	

Note: The number of observations is 1,683.
N/A = Not applicable.
*Significant at the 99% level of confidence.
**Significant at the 95% level of confidence.
***Significant at the 90% level of confidence.

Exhibit 8a | Cox Regression Model Sales within 180 Days of Listing (all sample)

Variable	B	Wald	Sig.	Exp(B)
T2	−.219	4.008	.045	0.803
T3	−.091	0.791	.374	0.913
T4	−.161	1.732	.188	0.851
T5	−.507	14.782	.000	0.602
T6	−.186	2.545	.111	0.831
T7	.120	0.995	.319	1.127
T8	.166	2.230	.135	1.181
T9	−.053	0.183	.669	0.949
Outer north	.447	34.696	.000	1.564
South	−.081	0.805	.370	0.922
East	.147	3.448	.063	1.159
Semi-detached house	.046	0.384	.535	1.047
Detached house	−.288	4.566	.033	0.750
Semi-detached bungalow	−.079	0.225	.635	0.924
Detached bungalow	−.142	0.853	.356	0.868
Apartment	−.159	1.067	.302	0.853
Age	.069	5.608	.018	1.071
Square feet	.000	0.760	.383	1.000
Bedrooms	−.107	2.662	.103	0.898
Reception rooms	.023	0.079	.779	1.023
Garage	−.082	1.381	.240	0.921
Central heating	.165	0.941	.332	1.179
Modernization needed	.151	1.752	.186	1.163

Notes: The dependent variable is *DAYS1*.
2LL = 18843.093
chi-square = 139.297

significant, whereas listing in T2 or T5 reduced the likelihood of sale and is statistically significant. For the unconstrained time model (Exhibit 8b), a greater number of variables are significant. Those which are both significant and increase the odds-ratio of sale are a combination of property characteristics (age, square feet, and central heating) and location.

Analysis of subsets, those properties selling below list price (SP $<$ LP) and those selling at or above list price (SP $\geq$ LP) within 180 days produces different outcomes (Exhibit 9a and 9b). For those properties in the SP $<$ LP subset, the

Exhibit 8b | Cox Regression Model with No Time Limitation (all sample)

Variable	B	Wald	Sig.	Exp(B)
T2	−.157	2.417	.120	0.855
T3	−.192	3.902	.048	0.825
T4	−.223	3.781	.052	0.800
T5	−.489	16.776	.000	0.614
T6	−.316	8.480	.004	0.729
T7	.022	0.038	.845	1.022
T8	.061	0.330	.566	1.063
T9	−.220	3.549	.060	0.803
Outer north	.377	29.155	.000	1.458
South	−.055	0.462	.497	0.947
East	.135	3.518	.061	1.144
Semi-detached house	.017	0.064	.800	1.017
Detached house	−.184	2.414	.120	0.832
Semi-detached bungalow	−.023	0.022	.882	0.978
Detached bungalow	−.120	0.758	.384	0.887
Apartment	−.154	1.221	.269	0.857
Age	.060	5.085	.024	1.062
Square feet	.000	3.195	.074	1.000
Bedrooms	−.019	0.100	.752	0.981
Reception rooms	.057	0.607	.436	1.059
Garage	−.047	0.546	.460	0.954
Central heating	.295	3.741	.053	1.343
Modernization needed	.141	1.818	.178	1.152

Notes: The dependent variable is *DAYS1*.
2LL = 21556.45
chi-square = 121.97

age and number of reception rooms increase the odds-ratio of a sale but are not statistically significant. Only location in the outer north of the city increases the odds-ratio of selling and is statistically significant. While several time dummies, listings in T4 or T7-T9, seemingly have improved the odds-ratio of sale, these, likewise, are not statistically significant. For properties in the SP $\geq$ LP subset, several variables increase the odds-ratio of sale but only central heating and location (*East*) are significant. In the SP $<$ LP model without a time constraint (Exhibit 9c), only one location variable is both significant and increases the odds-ratio, whereas for the SP $\geq$ LP model, two property characteristics (central heating

Exhibit 9a | Cox Regression Model Sales within 180 Days of Listing (SP<LP)

Variable	B	Wald	Sig.	Exp(B)
T2	−.119	0.334	.564	0.888
T3	−.029	0.024	.877	0.971
T4	.064	0.083	.774	1.066
T5	−.400	2.475	.116	0.671
T6	−.309	1.708	.191	0.734
T7	.191	0.600	.439	1.210
T8	.204	0.940	.332	1.226
T9	.035	0.025	.875	1.036
Outer north	.446	8.209	.004	1.562
South	−.193	1.262	.261	0.824
East	.175	1.553	.213	1.192
Semi-detached house	−.019	0.016	.898	0.981
Detached house	−.071	0.075	.784	0.932
Semi-detached bungalow	−.475	1.860	.173	0.622
Detached bungalow	−.377	1.579	.209	0.686
Apartment	−.328	1.379	.240	0.720
Age	.070	1.591	.207	1.073
Square feet	.000	1.654	.198	1.000
Bedrooms	−.065	0.270	.603	0.937
Reception rooms	.114	0.421	.517	1.120
Garage	−.112	0.656	.418	0.894
Central heating	−.237	0.538	.463	0.789
Modernization needed	−.012	0.003	.955	0.988

Notes: The dependent variable is *DAYS1*.
2LL = 4439.868
chi-square = 43.665

and modernization) and two location variables are significant and increase the odds-ratio.

The Cox models (Exhibit 10) indicate that no time dummy is both significant and has an odds-ratio greater than 1.00. Location effects are different and seemingly impact on each of the models, though to a more limited degree for the SP < LP models. This distinction is also apparent for property characteristics. For the SP < LP subset, none of these have the combination of an odds-ratio greater than 1.00

Exhibit 9b | Cox Regression Sale within 180 Days of Listing (SP ≥ LP)

Variable	B	Wald	Sig.	Exp(B)
T2	−.269	4.247	.039	0.764
T3	−.135	1.187	.276	0.873
T4	−.305	4.160	.041	0.737
T5	−.589	14.173	.000	0.555
T6	−.209	2.390	.122	0.811
T7	.027	0.037	.847	1.027
T8	.119	0.795	.373	1.127
T9	−.105	0.490	.484	0.900
Outer north	.383	18.538	.000	1.467
South	−.036	0.111	.739	0.965
East	.189	3.724	.054	1.208
Semi-detached house	.063	0.502	.478	1.065
Detached house	−.320	4.042	.044	0.726
Semi-detached bungalow	.122	0.409	.522	1.130
Detached bungalow	.030	0.028	.867	1.031
Apartment	−.045	0.058	.809	0.956
Age	.055	2.548	.110	1.057
Square feet	.000	0.241	.623	1.000
Bedrooms	−.119	2.300	.129	0.888
Reception rooms	−.029	0.104	.748	0.971
Garage	−.076	0.859	.354	0.927
Central heating	.357	3.102	.078	1.430
Modernization needed	.198	2.071	.150	1.219

Notes: The dependent variable is *DAYS1*.
2LL= 12718.786
chi-square = 93.170

and being statistically significant, whereas for the overall sample and the SP ≥ LP subset a number of property characteristics meet this threshold. These differences add further emphasis to the distinction between those properties selling at or above list price (SP ≥ LP) and those in the SP < LP category.

Differences in the subsets are apparent in the morphology of the survival function and integrated hazard curves. In particular, the survival function for the subset SP ≥ LP (sale by 180 days) takes a curvi-linear form, with the steeper decay

Exhibit 9c | Cox Regression Model with No Time Constraint (SP<LP)

Variable	B	Wald	Sig.	Exp(B)
T2	−.108	0.357	.550	0.897
T3	−.244	2.038	.153	0.783
T4	−.084	0.172	.679	0.919
T5	−.558	6.176	.013	0.572
T6	−.401	3.743	.053	0.669
T7	.070	0.102	.750	1.073
T8	.013	0.005	.944	1.013
T9	−.203	0.936	.333	0.817
Outer north	.343	6.100	.014	1.409
South	−.116	0.656	.418	0.890
East	.126	1.029	.310	1.134
Semi-detached house	−.071	0.301	.583	0.932
Detached house	−.172	0.585	.444	0.842
Semi-detached bungalow	−.328	1.285	.257	0.721
Detached bungalow	−.308	1.506	.220	0.735
Apartment	−.400	2.607	.106	0.670
Age	.061	1.454	.228	1.063
Square feet	−.001	2.543	.111	0.999
Bedrooms	.041	0.161	.688	1.042
Reception rooms	.114	0.606	.436	1.121
Garage	.045	0.144	.704	1.046
Central heating	−.210	0.573	.449	0.811
Modernization needed	−.098	0.272	.602	0.906

Notes: The dependent variable is *DAYS1*.
2LL = 5453.029
chi-square = 35.212

gradient for the cumulative survival function (Exhibit 11a). Hence, for properties in this subset, the probability of sale occurrence by 50 days is close to 0.5, compared to a probability of 0.25 for the subset SP $<$ LP. The latter is characterized by a distinctly different survival function, one that is closer to a linear form (Exhibit 11b). In this respect, the varying morphologies of the curves lend support to behavioral differences depending on whether properties sell below list price and have a longer marketing period or sell at or above list price with a shorter marketing period. For the unconstrained time models (Exhibits 11c and 11d), the steeper decay function for the SP $\geq$ LP group is again apparent.

Exhibit 9d | Cox Regression with No Time Limit (SP ≥ LP)

Variable	B	Wald	Sig.	Exp(B)
T2	−.198	2.538	.111	0.821
T3	−.191	2.551	.110	0.826
T4	−.327	5.319	.021	0.721
T5	−.509	12.605	.000	0.601
T6	−.342	6.943	.008	0.710
T7	−.050	0.136	.712	0.951
T8	.048	0.134	.714	1.049
T9	−.244	2.861	.091	0.784
Outer north	.336	16.447	.000	1.399
South	−.021	0.045	.831	0.979
East	.186	4.249	.039	1.205
Semi-detached house	.055	0.447	.504	1.057
Detached house	−.150	1.129	.288	0.860
Semi-detached bungalow	.147	0.654	.419	1.159
Detached bungalow	.040	0.057	.811	1.041
Apartment	.005	0.001	.976	1.005
Age	.051	2.439	.118	1.052
Square feet	.000	1.277	.259	1.000
Bedrooms	−.055	0.531	.466	0.947
Reception rooms	.007	0.006	.939	1.007
Garage	−.094	1.501	.220	0.911
Central heating	.558	8.791	.003	1.747
Modernization needed	.264	4.093	.043	1.303

Notes: The dependent variable is *DAYS1*.
2LL = 14026.465
chi-square = 87.284

Exhibit 10 | Significant Variables with Odds Ratio Greater Than 1.00

	Property Characteristics	Location	Time
All sales (180 day model)	Age	Outer north, East	*
SP<LP (180 day model)	*	Outer north	*
SP≥LP (180 day model)	Central heating	Outer north, East	*
All sales (unconstrained model)	Age, Square feet, Central heating	Outer north, East	*
SP<LP (unconstrained model)	*	Outer north	*
SP≥LP (unconstrained model)	Central heating, modernization	Outer north, East	*

Exhibit 11a | Survival Function for Properties SP≥LP: Sale by 180 Days

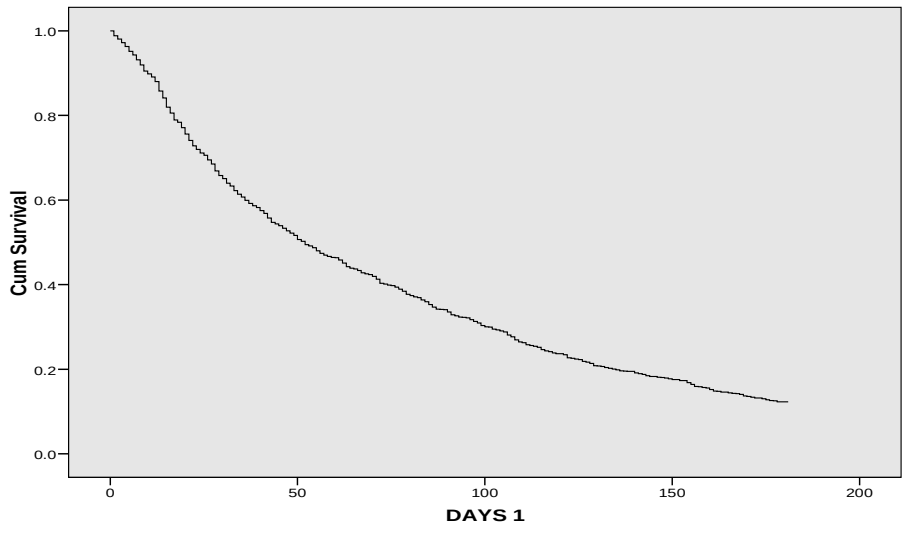


Exhibit 11b | Survival Function for Properties SP<LP: Sale by 180 Days

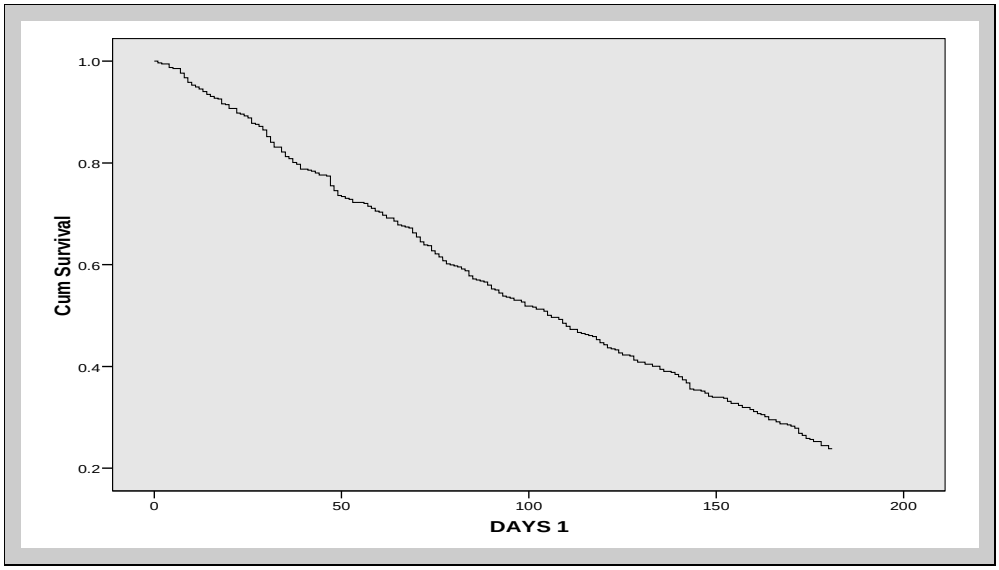


Exhibit 11c | Survival Function for Properties SP≥LP Without Time Constraint

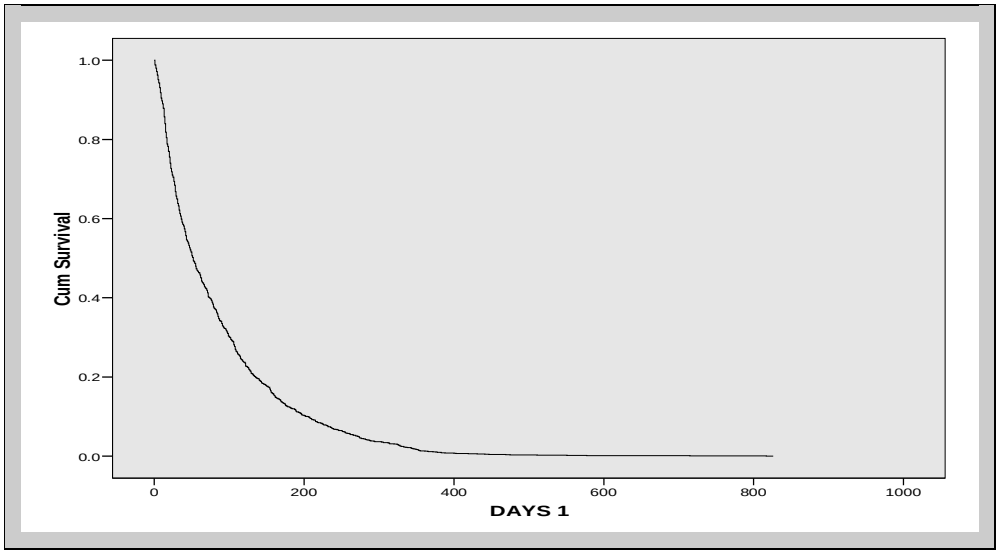
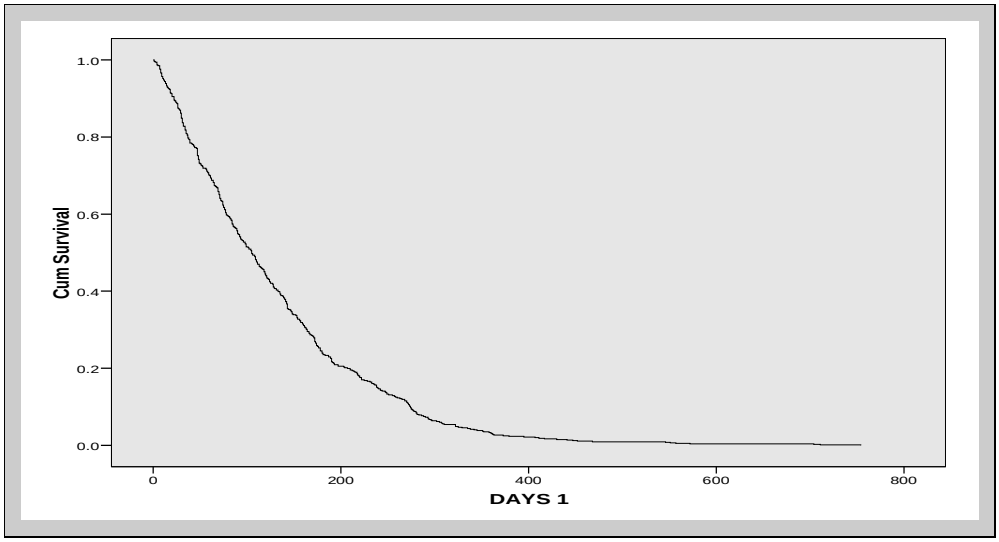


Exhibit 11d | Survival Function for Properties SP<LP Without Time Constraint



Conclusion

This study has highlighted a greater complexity in the U.K. residential market, relative to that of the U.S., in terms of departure from the list price for used residential properties. In the U.K., discounts and premiums are both likely to occur as expected events, in contrast to the U.S. market for which a discount from list price is the most likely outcome. Although behavioral differences are apparent between the U.K. and U.S. markets, the analysis suggests that several of the factors considered in the literature, largely drawn from the U.S., are of relevance to the U.K. For properties selling at a discount, the main impact on price only appears after 181 days. For properties selling at a premium, little difference is apparent between the respective marketing periods, although those selling earlier possess liquidity advantages. The analysis highlights how properties selling at a premium have both price and liquidity advantages over those at a discount.

The findings of this study indicate that the relationship between sales price and marketing period is complex and although sale price is influenced by TOM, the effects are uneven, with properties selling at or above list price likely to have shorter marketing periods compared to those selling below list price. The price-TOM spectrum is a distinctive characteristic of the study, with different shaped hazard functions for sales above and below list price. Of wider significance is the seemingly different role of list price in the U.K. market compared to the U.S. In the former, list price is a statement of expected value but in reality prices can

oscillate appreciably around this value, in contrast to the U.S., where list price is normally viewed as the upper bound. Previous studies have indicated the possibility of an optimum selling period. This study indicates that properties selling within a shorter time period (90 days) are frequently either at or above list price.

Finally, reflecting the characteristics of the U.K. market, a uniqueness of this study is the consideration of three different interpretations and measurements of TOM. The results indicate that *DAYS1*, which effectively captures the marketing period for the property and is the normal interpretation of TOM, is the more important variable and while the subsequent period between initial sales agreement and final completion has less impact on the sale price, it nevertheless introduces noise into the house-buying process.

Endnotes

[1] The Belfast metropolitan area is the largest market within Northern Ireland. The number of houses in the owner-occupied sector in 2004 was 176,800.

[2] The company made 31% of the sales monitored in 2002, 37% in 2003, and 39% in 2004.

[3] At time of the study, £1.00 = $1.80 USD approximately.

[4] The small number of sales for pre-1919 property, 20 in the discount sub-group, and 24 in the premium sub-group means that a few outlying properties with a long marketing period may skew these statistics.

References

Anglin, P.M. Determinants of Buyer Search in a Housing Market. *Real Estate Economics*, 1997, 25, 567–89.

Anglin, P.M., R. Rutherford, and T.M. Springer. 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*, 2003, 26:1, 95–111.

Arnold, M.A. Search, Bargaining and Optimal Asking Prices. *Real Estate Economics*, 1999, 27, 453–82.

Arnott, R. Housing Vacancies, Thin Markets and Idiosyncratic Tastes. *Journal of Real Estate Finance and Economics*, 1989, 2:1, 5–30.

Asabere P.K., F.E. Huffman, and S. Mehdian. Mispricing and Optimal Time on the Market. *Journal of Real Estate Research*, 1993, 8:1, 149–56.

Asabere P.K., F.E. Huffman, and R. Johnson. Contract Expiration and Sales Price. *Journal of Real Estate Finance and Economics*, 1996, 13:3, 255–62.

Baryla, E.A. and L.V. Zumpano. Buyer Search Duration in the Residential Real Estate Market: The Role of the Real Estate Agent. *Journal of Real Estate Research*, 1995, 10, 1–13.

Baryla, E.A., L.V. Zumpano, and H.W. Elder. An Investigation of Buyer Search in the Residential/Real Estate Market Under Different Market Conditions. *Journal of Real Estate Research*, 2000, 20:1/2, 75–91.

Benjamin, J.D. and P.T. Chinloy. Pricing, Exposure and Residential Listing Strategies. *Journal of Real Estate Research*, 2000, 20:1/2, 61–74.

Bjorklund, K., J. Dadzie, and M. Wilhelmsson. Offer Price, Transaction Price and Time-on-Market. Paper presented at the Conference of the European Real Estate Society, Helsinki, 2003.

Forgey, F.A., R.C. Rutherford, and T.M. Springer. Search and Liquidity in Single-family Housing. *Real Estate Economics*, 1996, 24:3, 273–92.

Genesov, D. and C. Mayer. Equity and Time to Sale in the Real Estate Market. *The American Economic Review*, 1997, 87:3, 255–69.

Glower, M., D.R. Haurin, and P.H. Hendershott. Selling Time and Selling Price: The Influence of Seller Motivation. *Real Estate Economics*, 1998, 26, 719–40.

Gwin, C.R., S.E. Ong, and C.F. Gwin. Seller versus Broker: Timing of Promotion. *Journal of Real Estate Research*, 2002, 24:1, 27–45.

Haurin, D. The Duration of Marketing Time of Residential Housing. *Journal of the American Real Estate and Urban Economic Association*, 1988, 19:4, 396–410.

Horowitz, J.L. The Role of List Price in Housing Markets: Theory and an Econometric Model. *Journal of Applied Econometrics*, 1992, 7:2, 115–29.

Jud, G.D., D. Winkler, and G. Kissling. Price Spreads and Residential Housing Market Liquidity. *Journal of Real Estate Finance and Economics*, 1995, 11:3, 251–60.

Jud, G.D., T.G. Seaks, and D.T. Winkler. Time on the Market: The Impact of Residential Brokerage. *Journal of Real Estate Research*, 1996, 12:3, 447–58.

Kalra, R. and K.C. Chan. Censored Sample Bias, Macroeconomic Factors, and Time on Market of Residential Housing. *Journal of Real Estate Research*, 1994, 9:2, 253–62.

Kang, H.B. and M.J. Gardner. Selling Price and Marketing Time in the Residential Real Estate Market. *Journal of Real Estate Research*, 1989, 4:1, 21–35.

Knight, J.R., C.F. Sirmans, and G.K. Turnbull. List Price Information in Residential Appraisal and Underwriting. *Journal of Real Estate Research*, 1998, 15:1–2, 59–6.

Merlo, A. and F. Ortalo-Magne. Bargaining over Residential Real Estate: Evidence from England. *Journal of Urban Economics*, 2004, 56,192–216.

Miller, N.G and M.A. Sklarz. Pricing Strategies and Residential Property Selling Prices. *Journal of Real Estate Research*, 1987, 2:1, 31–40.

Pryce, G. and K. Gibb. Modelling Time to sale of Second Hand Owner Occupied Residential Properties in Glasgow,. Paper presented at the Conference of the European Real Estate Society, Helsinki, 2003.

Pryce, G. and K. Gibb. Submarket Dynamics of Time to Sale. *Real Estate Economics*, 2006, 34:3, 377–415.

Sirmans, C.F., G.K. Turnbull, and J.D. Benjamin. The Markets for Housing and Real Estate Broker Services. *Journal of Housing Economics*, 1991, 1, 207–17.

Springer, T.M. Single-Family Housing Transactions: Seller Motivations, Price and Marketing Time. *Journal of Real Estate Finance and Economics*, 1996, 13, 237–54.

Yang, S.X. and A. Yavas. Bigger is Not Better: Brokerage and Time on the Market. *Journal of Real Estate Research*, 1995, 10:1, 23–33.

Yavas, A, and S.X. Yang. The Strategic Role of Listing Price in Marketing Real Estate: Theory and Evidence. *Real Estate Economics*, 1995, 23:3, 347–68.

Stanley McGreal, University of Ulster, Newtownabbey, Co. Antrim BT37 0QB, Northern Ireland, UK or ws.mcgreal@ulster.ac.uk.

Alastair Adair, University of Ulster, Newtownabbey, Co. Antrim BT37 0QB, Northern Ireland, UK or as.adair@ulster.ac.uk.

Louise Brown, University of Ulster at Jordanstown, Newtownabbey, Co. Antrim BT37 0QB, Northern Ireland, UK or l.brown@ulster.ac.uk.

James R. Webb, Cleveland State University, Cleveland, OH 44115.