The selling process: If, at first, you don't succeed, try, try, try again

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Abstract

About 40 percent of attempts to sell a house end with the seller not selling. This aspect of behavior has not been studied carefully and, by organizing the data in a way that reveals the behavior of sellers instead of listings, I consider some hypotheses related to the ability of a market process to efficiently allocate resources. First, a change in market conditions may cause the seller to change their decision between the time of listing and the end date. Second, the seller may enter the market as a test and find that the buyers' willingness-to-pay is less than their willingness-to-accept. Third, the seller may end a listing because they are dissatisfied with a broker and wish to switch to a new broker. There is some support for each hypothesis.

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This research uses historical data. Anybody using this research should consult a qualified professional since neither I nor the University of Windsor will accept any responsibility for costs or consequences associated with this research. Thanks are due to Dinghai Xu, Shi Fu and Yang Wang for their able research assistance. Robin Wiebe's assistance with data and insights has also been useful, though he does not bear any responsibility for errors and omissions. Comments would be appreciated and can be sent to panglin@uwindsor.ca or by mail to the Department of Economics, University of Windsor, Windsor, ON Canada N9B 3P4. The latest version of this paper can be found at http://www.uwindsor.ca/PaulAnglin

Economists like to argue that the price system rations the set of potential buyers and sellers so that the most willing sellers trade with the most willing buyers. In this model, it is difficult to understand why 40 percent of people who attempt to sell their house exit from the market before selling. Some people give up, which suggests that the market is sending the wrong signals and wasting scarce resources. Some people start trying to sell again, which suggests that some real estate agents are not doing a good enough job. These examples imply that traditional models of the selling process omit important margins of adjustment.

The textbook model of the selling process can be criticized for many reasons, especially in the context of a housing market. First, it is so costly to sell a house and the commonly available information is so poor that professionals are often paid to assist most attempts. Even with their assistance, the process takes many months. Second, theoretical models of the market process tend to focus on the equilibrium outcome. Given the time needed to sell a house, variations in this process are likely to have real effects even before a market attains an equilibrium. Third, many papers study the selling process but only a complementary study of failures could explain why a sale represents a successful outcome rather than being the only outcome.

A study of failed attempts reveals new dimensions of behavior such as trying again and waiting between attempts. The central question is what might cause an attempt to fail. The most obvious explanation is that market conditions may change but previous research has identified certain puzzles. Abundant evidence (e.g. Steele, 1996; Mayer and Genesove 1997; Mayer and Genesove, 2001) suggests that selling prices and list prices adjust surprisingly slowly to even large changes in the apparent market equilibrium. Other research (Clayton, 1996, 1997; Capozza, Hendershott and Mack, 2004) shows that housing markets are not informationally efficient over time. Thus, it may be true that an action that was rational may become irrational but the constraints that make a choice rational also need to be carefully considered.

Researchers have studied parts of this problem. For example, a poorly informed seller may also be learning about market conditions during the listing. Such sellers should start with a

high list price as part of an exercise in optimal learning or to allow for the possibility that market conditions may improve (Read, 1988; Krainer, 2001). Given the benefits associated with such activities, a few sellers may enter a market with the intention of speculating on future trends or on luck in the matching process rather than with the intention of selling with probability 1.

A second explanation is simply that a seller's problem is not stationary (Lambson, McQueen and Slade, 2003; Ben-Shahar, 2002, Salant, 1991). For example, the cost of selling may change when they commit to buy a different house. Or, it may be getting close to the start date for a new job in another city and their children may prefer to start at their new school on time. Or, the marginal return to remaining on the market may diminish if the house acquires a stigma (Taylor, 1999).

A third conjecture is related to a weakness of commonly-used data sets. A listing may end without a sale because the seller is unhappy with one agent and seeks a different agent. If the second agent is successful then, according to most data sets used to study the selling process, only the second attempt would be recorded even if the first attempt was also relevant to the seller. The final hypothesis is that a failure is the fault of the seller. The most obvious action is the seller's choice of list price although previous analyses have considered only the effect of the list price on the length of time it takes to sell a house. As this paper notes, the inference drawn from an increase in the average time-till-sale and the inference drawn from a decrease in the probability of expiry differ slightly: the first fact suggests that market conditions are worsening while the second fact may suggest that sellers see no better alternative. Commonly reported measures of the state of a market mix these two facts together.

The next section describes the data on failed attempts to sell since this phenomenon is not well-known. The fact that the data span three years enables me to distinguish first attempts and second attempts with a reasonable level of confidence. Amongst other facts, I note how the description of the house usually changes between attempts. The following section offers more details on the hypotheses concerning seller behavior. In general, I add to the approach outlined in Anglin, Rutherford and Springer (2003) and Anglin (2004). The third section describes the

data and how certain variables were constructed. Where previous papers have tended to organize the data in a way that focuses on the process of selling a *listing*, this paper focuses on the process of selling a house at a specific address. The fourth section discusses some econometric issues and the fifth section discusses the results. In general, the results support the hypotheses outlined above.

1/ Introduction to the Data

I use data provided by the Windsor and Essex County Real Estate Board. It represents 24,939 listings of residential[1] properties between 1997 and early 2000. Knowing the address and outcome of each attempt, it is possible to link a sequence of different attempts to sell by one seller and to distinguish that sequence from one sale followed by an attempt to sell by the different owner. In total, the data record attempts to sell by 20,002 different sellers.

Table 1: Sequence of Selling Activity

(each percentage refers to a percentage of the entire sample)

1st Attempt		100 %		
Outcome	Sold: 60%		Expired: 37 %	Active: 2%
2nd Attempt			19%	
Outcome		Sold: 10%	Expired: 9%	Active: 0.5%
3rd Attempt			5%	

Figure 1 summarizes the data using a decision tree. More than 60 percent of first

[1] Condominium properties, which are distinguished by suite numbers at a single street address, and listings, such as "LOT 23", were excluded from this study because the data cannot precisely identify an individual seller. Similarly, property that was "under construction" or "newly constructed" was omitted since the trade offs involved in selling such houses are likely to differ substantially from other types of property: very few sellers of these properties made a "second attempt". Properties with a list price above C$450,000 or below C$40,000 or with omitted data in other variables were also excluded.

attempts resulted in a sale. 37 percent of first attempts did not result in a sale and about half of these sellers, i.e. 19 percent of the entire sample, tried again. The average time-on-market for the first attempt was 12.6 weeks (9.1 weeks if successful) and 14 weeks on the second attempt (10.3 weeks if successful on this attempt). With a little more than 18 weeks on both attempts, the average time-on-market for houses which exited without selling was strikingly similar. About one-half of the second attempts were initiated within three weeks of the end of the first attempt while the average time lag was 99 days. The ratio of successes to failures on the second attempt was lower than that on the first attempt. A few sellers attempted, and failed, to sell six times within the data set. The analysis below considers only the behavior displayed by the first two attempts.

Other attempts were followed by a period where the activities were not recorded. For example, one attempt to sell a house using a real estate agent may be followed by the seller offering it for sale by owner (FSBO). Since the data records only activities which flow through the real estate board, this sequence would be interpreted as an unsuccessful attempt even if it ended with a sale. As a broad generalization for Windsor (Anglin, 1994; CREA), FSBO sales comprise only 10 percent of sales. About five percent of all *sales* start with the seller using FSBO and then turning to a real estate agent while another five percent selling their house using FSBO after using an agent unsuccessfully. No doubt, a few sellers tried to sell FSBO only and

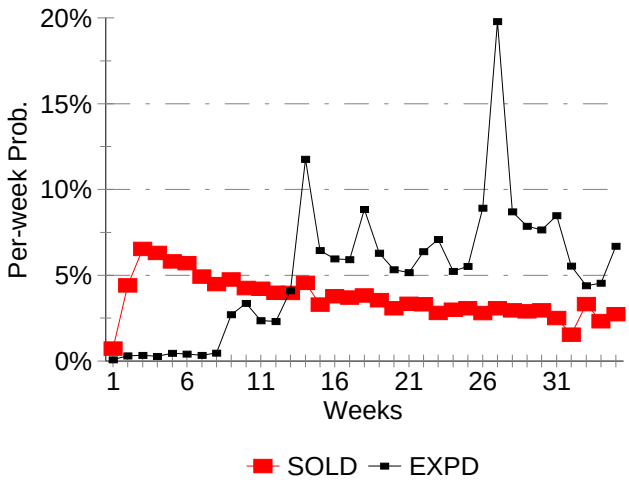

Figure 1: Per Week Probability of Sale and of Expiry (Kaplan-Meier estimates, all attempts)

then gave up. Based on this evidence, I conclude that most sellers who let one listing expire and who do not initiate another have given up the attempt.

Figure 1 shows what happens between the initial time of listing and the end of a listing. Few contracts expired during the first 60 days. The per-week probability of selling is much less jagged than the per-week probability that a listing expires. The spikes in Figure 1 represent about 15 percent of all attempts and they occur roughly at the end of three, four and six months. Anglin, Rutherford and Springer (2003) noticed this pattern in a different city and suggested that these spikes were *not* associated with the prescribed end of listing contract. Inspection of the data offers a related puzzle. Figure 2 shows that the distribution of days on which contracts expire is not uniform. (The distribution of days on which contracts begin is much more uniform.) The end of one month and beginning of the next month seems like a psychologically significant time to reevaluate the selling process.

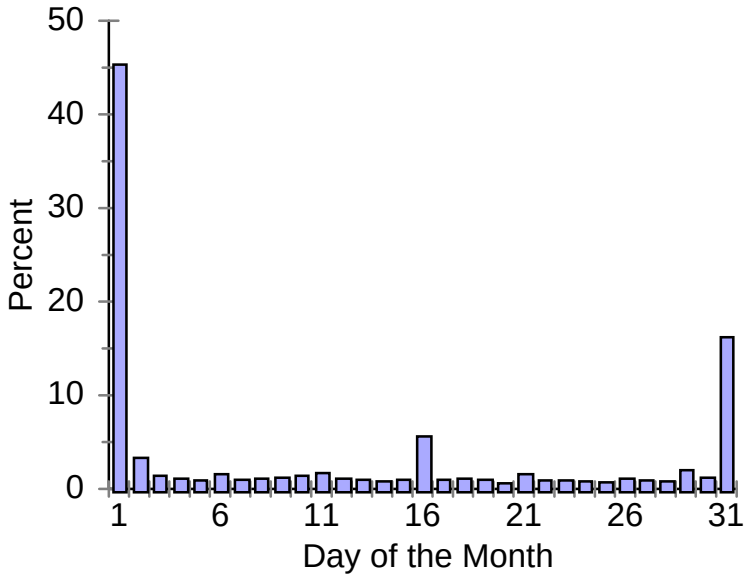

Figure 2: Distribution of Expiry Dates

Figure 3 compares the per-week probability of sale on the first attempt and on the second attempt, if the first attempt failed. After the first 10 weeks, the probabilities are roughly equal.

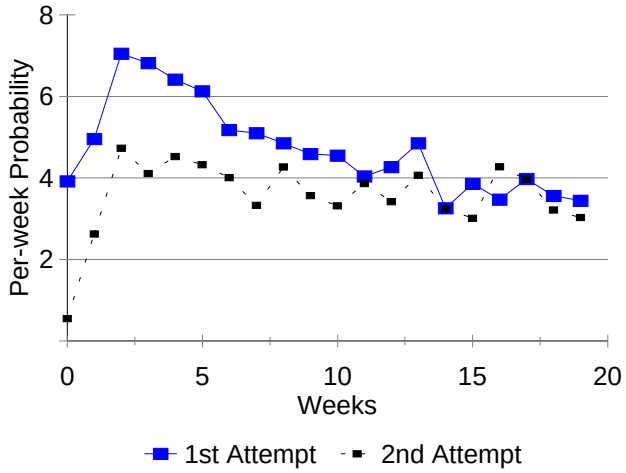

Figure 3: Probability of sale on first and second attempts

Many people view the choice of list price as critical in any attempt to sell a house. It is also well-known that the list price of a house can change during a listing. Knight (2002, 2003) and Merlo and Ortalo-Magne (2003) reached roughly the same conclusion: that about 25 to 35 percent of sellers lowered their list price at least once before selling and that the list price fell by about 5 to 8 percent if it fell. My data show that the list price changed between the first and second attempts. For those sellers who made a second attempt, the list price on the second attempt was averaged 3.3 percent less than that on the first attempt. This distribution is skewed since the median decrease was 2.7 percent. Slightly more than 20 percent of second attempts reported no change in the list price and over 10 percent of second attempts involved a higher list price.

The list price changed together with other aspects of the information presented to buyers. For example, in about five percent of cases, the reported number of bedrooms was higher on the second attempt and, in about four percent of cases, the reported number of bedrooms was lower on the second attempt. Similarly, the number of bathrooms was not stable: the reported number of bathrooms changed in over 10 percent of cases. These changes imply that the type of house is

less well-defined than is commonly assumed and they complicate the study of why it takes so long for a house to sell.

Ambiguity in the number of rooms in a house is matched by ambiguity in other aspects of the description of the house. As explained at greater length in Section 3, there is information on whether the house has a new roof, is "beautiful" or the seller "must sell". In 45.7 percent of second attempts, some descriptive aspect changed. Information on the urgency of a seller's motivation changed in 7.4 percent of cases.

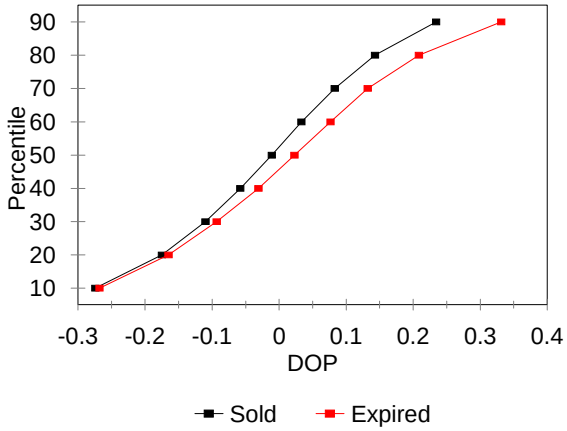

Figure 4: Distributions of DOP (first attempt)

Even if some people view the list price as a pivotal indicator, I do not use this information directly. Instead, because the type of house differs between sellers and may differ between attempts, I construct and use a measure called the "Degree of Over-Pricing" (DOP) that measures the difference between a seller's choice of list price and the typical list price for the reported type of house. Figure 4 shows the distributions of DOP for houses which sold on their first attempt and those which did not sell on their first attempt. As expected, the DOP on successful attempts was lower and had a smaller variance. This difference becomes more remarkable if you remember that the data record only the last list price, that expired listings were on the market for a longer duration and that previous research has shown that the list price tends to fall with the duration.

2/ Behavioral Hypotheses

Each attempt to sell reveals a seller who is willing to sell to a buyer willing to pay a "reasonable" price. Different sellers selling at different times may differ in their degree of willingness to sell and these differences should affect observed behavior. Each seller starts by offering their house for sale at date 0 with a list price seen by a flow of buyers. Some of them inspect the house and a few may want to buy it. Depending on luck, an attempt to sell may succeed quickly or it may not. If a house does not sell immediately, then the seller must decide whether to continue trying to sell, to stop or to do something else. This decision must be re-evaluated continually.

Baseline and luck

Figure 1 shows how luck affects when a house sells and that luck may vary with duration. Many theoretical models (e.g. Yavas, 1992) assume that there is a continuing flow of potential buyers who are randomly matched with houses for sale and these models show how this matching process produces a flow of transactions. Figure 1 cannot show whether it varies because the baseline process varies with duration or because the seller's position varies with duration. Coles and Smith (1998) proposed that baseline function for a seller could vary with duration even if a market is in a steady state, because the steady state is characterized by a group of buyers who have inspected all houses currently available on the market and who "pounce" on any newly listed house on the market. Figure 3 suggests that there may be some truth in this proposal.

Taylor (1999) suggested that a house which has been on the market for a long time may acquire a stigma in the sense that new potential buyers speculate that people who visited the house earlier did not buy it because they must have discovered something wrong.[2] If true then new buyers would be less likely to inspect and the likelihood that the house would sell would fall. A second attempt by the same seller may change the collective perception of buyers. Houses listed for a longer time are more likely to acquire a stigma but, given a limited memory

[2] Taylor also offered some interesting hypotheses concerning how a change in the list price might affect the accumulation of stigma but the complexity of his model makes it impractical to test any of his hypotheses directly.

of buyers, any effect of a stigma should decrease as the time between the first and second attempt increases.

Seller characteristics

At the time of initial listing, the choice of list price depends on its effect on the probability of sale, or on the expected time-till-sale, and on the selling price (Anglin, 2004). Later, the choice is whether to continue, to switch agents (or to go FSBO) or to stop and continue to live in their house. Independent of the type of house, an active seller's choice is summarized by a "Degree of Over-Pricing" (DOP, defined more precisely below) and it has been shown to be significant in related work (Anglin, Rutherford and Springer, 2003; Anglin and Wiebe, 2002; Anglin and Wiebe, 2004): An increase in DOP is expected to decrease the probability of sale at any given pint in time and to lengthen the expected time-till-sale. By construction, any effect of an increase in DOP differs from the effect of an increase in list price caused by a difference in the type of house. Variables which describe the house are important for a different reason; they are intended to attract buyers who are especially interested in buying that type of house.

This paper will also study when a seller decides to let a listing expire. The effect of an increase in DOP on the expiry process is not exactly the opposite of the effect on the selling process. If a listing expires, then the seller either intends to relist or to give up. If a seller gives up then a higher DOP would not affect or be affected by the value of that option. If a seller decides to relist, then DOP on the first listing should have little or no effect since the list price on the next listing can be chosen separately.

On the other hand, this argument may seem unconvincing if DOP is an indirect measure of a seller's reservation value. A seller with a higher reservation value expects a higher selling price and can be expected to set a higher DOP in attempt to achieve that outcome (Anglin, 2004). The flaw in this argument is that the value of an outside option should affect behavior only when it becomes the next best alternative. Thus, a seller who sets a higher value of DOP may have a higher reservation value which would make it more likely for the seller to leave the market sooner.

Because of bad luck, a listing by a serious seller may take a long time and a serious seller may end one listing. If high DOP indicates a seller with a very high reservation value or, equivalently, a seller who does not seriously want to sell then I expect that a seller with high DOP would be less likely to make a second attempt.

Market conditions

In a simple model, the ratio of buyers to sellers reveals excess demand and, if you believe this theory, an increase in excess demand should increase the probability of sale for any given seller. There are many other variables which might shift the supply or demand curve for housing and a few researchers have considered versions of this problem empirically (Asabere and Huffman, 1992; Kalra and Chan, 1994). Unfortunately, the simple model presumes that the market price adjusts fast enough and clearly enough that anybody who wants to sell can sell and anybody who does not sell is being rationed out of the market for a good reason. Figure 4 above shows how hard it is hard to divide the set of houses into over-priced and under-priced based on the outcome. Newer theories have started to recognize the transaction costs associated with selling but most of these models focus on a steady state where anybody who enters a market eventually sells.[3]

Since the selling price of a house depends in part on a buyer's willingness to pay, every attempt to sell represents a gamble on the match between buyer and seller. Therefore, it is not unreasonable that a subset of sellers may gamble on the uncertain state of the market in the future. Krainer (2001) showed that, when market conditions evolve according to a Markov process, the list price varies with the current state and that the list price and time-till-sale co-vary. Krainer's model presumes that all attempts to sell eventually succeed and has no implications for the decision to let a listing expire. Novy-Marx (2002) and Anglin (2004) offered other perspectives on this class of variables.

Dale-Johnson and Hamilton (1998) offered another reason why indicators of market

[3] A few papers consider dynamics explicitly (Mortensen, 1999; Anglin 2004).

conditions be statistically significant, given the source of the data. They argued that the FSBO share would change with market conditions because the relative advantage of using a multiple listing service (MLS), with its access to a more diverse set of buyers, is higher when market conditions are weak.

One problem with implementing any of these hypotheses is that the idea of market conditions is understood in general but not specifically. For a good like housing, where the same individual may act as both buyer and seller during a short span of time, the effect of a change in a particular variable is not entirely clear. Housing is also a heterogeneous good where aggregated summary statistics may be too crude to reveal what finer measures could. Thus, the analysis below should be seen as a kitchen sink approach rather than one justified by careful theory. This approach has the disadvantage that an insignificant coefficient is subject to interpretation and, even though some readers may have their own conjectures, no prediction is offered for any particular variable.

Agency issues

Even though the listing contract offers incentives to produce a sale quickly and at a high price, not all agents are equally capable. Many sellers interview one or two agents before signing a listing contract (FTC, 1983) and even sellers with serious intentions may become dissatisfied with the performance of their first agent.[4] With no direct information on the identity

[4] Less capable agents can benefit from letting a contract expire. Depending on how their performance is measured, it may be better to let a contract expire than to sell a house after the kinds of very long duration noted in the text below Table 1. Specifically, if their measured performance uses only data on successful sales then deliberately changing the selection would benefit the agent. Miceli (1989) and Geltner, Kluger and Miller (1991) have studied the incentive properties of limited term contracts. In the future, I plan to study whether their prediction concerning an end-of-term effect is distorted by the expiry option.

The possibility that a contract can end without a sale adds a new reason for why real estate brokerage commission rate are "too high": If an agent's total revenue must cover total cost and 40 percent of listings produce no revenue for an agent then the commissions earned on houses which sell must be that much higher. To reinforce this point, it should be noted that the longer time of unsuccessful attempts imply that the costs associated with them are higher than the costs associated with successful attempts. Any way to make the price signals more

of the agent or on the commission rate, it is not possible to test whether certain agents are more likely to suffer this fate than other agents. A crude alternative is to recognize that a seller who thinks that their agent is doing a good job may be willing to wait longer before choosing an alternative. But, since I do not impose any restrictions on the distributions of time-till-sale or time-till-exit, I cannot identify any such effect directly.[5] It might be possible to infer a seller's judgement from their subsequent behavior: whereas a seller who thinks that they have a good agent is more likely to give up than to switch agents, a seller who thinks that they have a bad agent is more likely to want to try again and to try again quickly.

To summarize, I offer several related hypotheses concerning the instantaneous probability of sale, also known as the hazard rate, and the decision to try again.

H1: The instantaneous probability of sale decreases with duration.

H1a: The probability of sale on a second attempt decreases with the duration of the first attempt and increases with the time between attempts.

H2: An increase in DOP decreases the probability of sale.

H2a: An increase in DOP may increase the probability of expiry.

H2b: An increase in DOP decreases the probability of a second attempt.

H3: Market conditions affect the probability of sale.

H4: A seller who ends an attempt early is more likely to make a quick second attempt.

The hypotheses focus on the instantaneous probability of sale at any point in time since the more common measure, time-till-sale, is observed imperfectly. In the simplest model, with a constant hazard rate equal to μ, the distribution of the time-till-sale can be described by an Exponential distribution with mean $1/\mu$. Some of the houses sell and the data are observed

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convincing should reduce commission rates to all sellers.

[5] An additional layer to this identification problem is that the Cox's Proportional Hazard Model used to estimate the expiry process does not allow for unobserved heterogeneity, such as is implied by differences in the skill of an agent. This fact creates the possibility of duration dependence. The facts that most exits are clustered onto certain dates, as shown in Figure 2 above, and that the data is reconstructed to account for this effect should limit the severity of this effect.

directly. But many other houses are offered for sale, would sell eventually, but are withdrawn from the market before sale. Thus the sample average of time-on-market is less than the expected time-till-sale. To avoid confusion, each process is described in terms of the probability of sale and probability of expiry during a short period of time.

3/ Definitions of Variables

This paper studies the sequence of states shown in Table 1 plus how long a seller remains in each state. Several types of dependent variables are considered. MT measures how long a house was on the market on a particular attempt. If a first attempt expired, TRY2= 1 if the seller makes a second attempt at any time after and equals 0 if no second attempt is recorded. If there was a second attempt, QUICK= 1 if the second attempt occurred within three weeks of the end of the first attempt and 0 otherwise.

Insert Table 2

To explain variation in these dependent variables, I consider many types of independent variables, some[6] of which are reported in Table 2. The first class of variables describe the house, including the reported number of bedrooms and bathrooms (measured using dummy variables to maximize the flexibility in estimation). Information on the location of each house was constructed with the help of the GIS Lab at the University of Windsor and is based on 24 postal code divisions. Some descriptors are coded automatically, such as the presence of a pool, landscaping or the style of building, but several variables were constructed by scanning the "Remarks" section of the published listing for key words, such as "Beautiful" or "Good Buy". Some key words revealed the intended market segment, such as "Handyman Special," "Starter" or "Rent". The presence of such key words in the Remarks section is measured with dummy

[6] This section describes the more than 60 variables used in the regressions and, if I reported tables of coefficients with so many numbers, the result would probably intimidate the reader. Table 2 reports the variables relevant to the hypotheses listed above plus some other commonly used variables. As much as possible, the regression equations use a common set of explanatory variables. Please contact the author for more information.

variables. In total, 29 descriptive variables were used.

The next class of variables describe the seller, including the Degree of Over-Pricing (DOP). The method of estimating the Degree of Over-Pricing (DOP) is outlined in Anglin, Rutherford and Springer (2003). Essentially, a buyer perceives a house as being over-priced if its list price is high relative to the list prices of comparable houses. To implement this comparison, I regress ln(list price) on various descriptors of a house using ordinary least squares; the residual is DOP.[7] The fact that one seller may make multiple attempts implies that the set of houses seen by a buyer differs subtly from the set of sellers. Since DOP is intended to represent buyers' perception of a listing and since I assume that buyers are not fully informed about previous attempts, I use the full data set in this regression: i.e. if a seller makes two attempts then the house enters *this* regression twice. After DOP has been computed for each attempt using the contemporaneously reported description, the entire data set is reorganized into a record of the attempts by 20002 different sellers.

The Remarks section of the listing can reveal some information on a seller's intentions, such as whether the seller "Must Sell" or is moving to a new job or the house is "Vacant." The presence of such phrases is indicated with dummy variables. I constructed three such variables.

The next class of variables concerns market conditions. In the past, many indicators of market conditions have been proposed in informal and formal studies. I use the following indicators, which are available on a monthly basis.[8]

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[7] The regression included over 60 variables and produced R^2= 0.623. Individually, each coefficient on a variable representing an indicator of market conditions was insignificant. A table of coefficients is available from the author.

[8] Some researchers (Asabere and Huffman, 1992; Ong and Koh, 2000) have proposed using the rate of house price inflation as an indicator. This proposal is based on the idea that potential capital gains could affect the decision to hold the asset. The work on informational efficiency of a real estate market suggests that the actual rate of change probably differs from the anticipated rate. I prefer to use variables which are likely to cause prices to change. As a practical matter, this measure may vary little within the sample since the data in this study are from a period of fairly stable prices.

Real mortgage interest rate (five year, using the inflation rate over the 12 months prior)

Volatility of real interest rate (measured as the sample standard deviation on preceding six months)

Local unemployment rate (seasonally-adjusted)

Number of sales (seasonally-adjusted)

US/Canada exchange rate[9]

Balance: number of new listings/number of sales

plus seasonal variables (Winter includes the first quarter; Spring includes second quarter of each year and so on.) Professional analysts at Canada Mortgage and Housing Corp. (CMHC) find these measures useful but they are imperfect.

Since both market conditions and the thing being studied vary over time, I use different measures of the same indicator in different regressions. DOP is estimated using market conditions as they exist at the listing date. For the technical reasons described more fully below, the selling process is estimated using the average value of each indicator over the duration of the listing. The determinants of TRY2 and QUICK are estimated using market conditions as they exist at the end of the first attempt.

I noted how some listings might expire before their natural end because a seller becomes dissatisfied with the performance of their agent. But an early end may also be caused by other forces, such as disappointment with the state of the market. The relative importance of these two explanation should vary with the time before expiry and this fact suggests how to measure this effect. Because of a policy imposed by the local real estate board, essentially no listings expire during the first 60 days. Any listing which expires after exactly 61 days suggests that the seller is most dissatisfied with the agent's performance. For contrast, any listing which could have expired on day 61 but actually expired after 182 days or the normal term of an agreement, suggests that dissatisfaction with market conditions or the tastes of the seller is the dominant

[9] Since Windsor is a border town, a change in the exchange rate could affect the local economy in ways that are not measured by the unemployment rate.

factor. To measure any effect of changing balance between these factors as the duration increases, I let

EARLYEND= max(0, (182- MT)/(182- 60)).

Finally, TIMELAG measures the fraction of a year between the end of a first attempt and the beginning of a second attempt.

4/ Econometric Methods and Miscellaneous Hypotheses

Practitioners and academics sense that a relationship between time and price should exist but its magnitude, and sometimes even its sign, have been debated. The earliest papers in refereed journals (e.g. Cubbin, 1974; Belkin, Hempel and McLeavey, 1976; Miller, 1978) used small data sets and ordinary least squares (OLS). More recent work used two-stage least squares (e.g. Yavas and Yang, 1995) to overcome simultaneity bias and used the discount (i.e. 1- selling price/list price) to measure "over-pricing". The most recent work (e.g. Glower, Haurin and Hendershott, 1999; Anglin, Rutherford and Springer, 2003) tended to use a duration model to study one part of the trade off more precisely and focused on the list price as a key indicator.

Given a set of explanatory variables, X, the statistical algebra uses the same principles as a decision tree:

Probability($t \leq t^S$| first attempt, SOLD, X)= 1- $S(t^S; X)$

where t represents the passage of time and S(.) is called the survivor function for selling. $F(t^S)$= 1- $S(t^S)$ is the cumulative distribution function of time-till-sale. Similarly,

Probability($t \leq t^E$| first attempt, Expired, X)= 1- $E(t^E; X)$

where E(.) is the survivor function for expiry. The distribution of time-on-the-market during the first attempt is

MT= min(t^S, t^E).

As a practical matter, these two processes form a competing risk model where I estimate each one separately as a censored process. At the end of an expired first attempt, the probability of a second attempt is

Probability(TRY2= 1| Expired, X)= g(X)

and is estimated using a logit model. These probability functions suffice to predict the average

probabilities shown in Table 1. I also estimate

Probability(QUICK= 1| TRY2= 1, X)= h(X)

using a logit model. The duration model proposed for the second attempt is similar to that shown above for the first attempt.

All such studies have focused on the selling process which, according to Figure 1, is smooth enough that the hazard function can be estimated parametrically with confidence. The Weibull model is commonly used, in part because the Exponential distribution is a theoretically interesting special case. In contrast, Figure 1 shows that the expiry process is not a smooth function of duration. Instead of using a traditional parametric model, I use Cox's proportional hazard model (summarized by Lancaster, 1990) to estimate it.

Cox's model starts with a baseline hazard function, $h_0(t)$, and assumes that the probability of sale during a short period of time for a seller described by X is:

Prob(sale during (t, t+ dt); X)= $h_0(t) \exp(X\beta)$.

Both $h_0(t)$ and β are to be estimated. This model is a semi-parametric model in the sense that the baseline hazard uses a step function where the size of each step is based on the data:

$h_0(t)= \sum_t \alpha_T I(t= T)$

where I(t= T)= 1 if the equality is true and 0 otherwise. By construction, the probability of sale before t is

$1- S(t)= 1- \exp(-\int^t h_0(T)\, dT \;\; \exp(X\beta))$.

When a data point is censored, these formulas are modified to account for the limited information embodied in the observation.

This model is proportional in the sense that the ratio of the probabilities of sale for different types of sellers at a given point in time is independent of t: given any set of houses offered at t, G(t), the probability that seller i's house would sell in the next short period of time is

$h_0(t) \exp(X_i\beta) / (\sum_{j\epsilon\, G(t)} h_0(t) \exp(X_j\beta))= \exp(X_i\beta) / (\sum_{j\epsilon\, G(t)} \exp(X_j\beta))$.

Since the right hand side of this expression is independent of the baseline hazard function, β can be estimated more easily. Cox's model is also known as a "partial likelihood" method because it

does not propose a full joint likelihood function. More specifically, it cannot differentiate spells of time when nothing in the data happens. A more serious limitation is that Cox's model cannot identify, and therefore ignores, unobserved heterogeneity.[10] By itself, this ignorance causes negative duration dependence where a changing selection of sellers causes the hazard rate to appear to fall.

In practice, Figure 2 shows that the date of expiry is closely tied to dates on a calendar. Therefore the time scale is changed to recognize the clustering of events on critical days. Instead of using MT directly, I divide time into 24 categories. Except for a phase-in period, each month has two periods: a period between the 3rd and 16th of each month and the period between the 17th of a month and the 2nd day of the next month. Organizing the data in this way creates a small problem because the length of a period can varies. To reduce this effect, there is a phase-in period, of at least one month and no more than two months long, until the beginning of the categories described above. Because Cox's model is a partial likelihood model, because Figure 2 shows that few listings expire between the clusters, and because Figure 1 shows that few listings expire during the phase-in period, the qualitative effect of stretching time in this way is small.[11]

5/ Results

These tables focus on the hypotheses noted above. More specifically, the regressions include many other variables, such as the number of bedrooms or the location, that are not reported in these tables. For the reader's information, a large number of the individual

[10] Unobserved heterogeneity is a common problem but recent research (van den Berg, 2000; Frijters, 2002) in a labor market has indicated how multiple observations of single seller, e.g. repeated attempts to sell, offer the possibility of spotting effects common to a seller across the different attempts. It may be possible to detect correlations among generalized residuals (Lancaster and Chesher, 1985) that would reveal non-independent processes. This analysis is left as future research.

[11] Several explanatory variables change over time and it is theoretically possible to treat them as "time-varying covariates." Unfortunately, the size of the data set and technical restrictions in the statistical package (LIMDEP) limit my treatment of time-varying covariates. I focus on other questions.

coefficients describing the house were statistically significant in explaining the selling process during the first attempt; fewer of these coefficients were statistically significant in explaining the process during the second attempt, the expiry process discussed with Table 4 or the decision to try again discussed in Table 5. In Tables 3 and 4, except for σ and θ which have particular interpretations, a positive coefficient implies that an increase in that variable *increased* the instantaneous probability of sale (*decreased* the expected time for that process if that process were allowed to continue to its natural conclusion). Table 5 reports on the estimates of two logit model and the signs of the coefficients have their usual interpretation.

Insert Table 3

As expected, the left hand pair of columns on Table 3 show that an increase in the Degree of Over-Pricing decreased the probability of sale at any point in time during the first attempt. The marginal effect became more severe as DOP rose. Some of the coefficients on variables representing market conditions and seasons were statistically significant with the probability of sale being highest in the Winter and Spring. An increase in the unemployment rate was nearly significant at the 5 percent level where an increase in the rate decreased the probability of sale.[12] The variables measuring the seller's motivation were significant, except for the variable showing whether a seller intended to move in the near future, but not always with the expected sign.

σ is the parameter estimated for the Weibull distribution and is significantly different from 0 or 1; σ= 0.54 implies that the baseline hazard function decreases with duration. There is evidence of unobserved heterogeneity that can be captured by a Gamma correction. The estimate of θ indicates that there was significant unobserved heterogeneity amongst sellers.

[12] The method of estimating DOP implies that DOP is independent of market conditions but, even so, none of the published indicators of market conditions were significant in explaining variation in the list price. This finding limits the validity of models which seek to explain the choice of list price as a signal that is consistent with some equilibrium inference by buyers since it may be difficult to extract the signal that the seller is trying to send from the noise created by changing external conditions.

The coefficients relating to the second attempt, shown in the right hand pair of columns, follow the same general pattern as for the first attempt except that the levels of t-statistics on the second attempt are usually lower. The right hand columns also include two measures of the duration before the start of the second attempt. A longer duration on an unsuccessful first attempt decreased the instantaneous probability of sale at any point during the second attempt and a longer time lag between attempts also decreased the probability of sale on the second attempt. The effect of a lengthy first attempt dominated the effect of a time lag between attempts by a factor of about 7.

Insert Table 4

The left hand pair of columns on Table 4 report selected coefficients for the expiry process on the first attempt using Cox's model. For most of the range of DOP, an increase in DOP increased the instantaneous probability that a listing would expire. For very high values of DOP, the coefficient on DOP^2 shows that this effect reaches a peak before falling. Mortgage interest rates and unemployment rates were important determinants of the expiry process: an decrease in the interest rate or an increase in the unemployment rate increased the probability of expiry.

The right hand pair of columns on Table 4 report coefficients concerning the second attempt. The seasonal pattern changed significantly but the coefficients on indicators of market conditions were similar to those reported for the first attempt with the exception of the ratio of new listings to sales. On the first attempt an increase in this ratio decreased the probability of expiry whereas, on the second attempt, the coefficient was positive though insignificant.

An increase in either the duration of the first attempt decreased the probability of expiry or an increase in the time lag between attempts decreased the probability of expiry. Again, the effect of a prior listing dominates the effect of the intervening time by a large factor. This finding suggests that such sellers had serious intentions during their first attempt to sell and that the intervening time lag represents a failed attempt to sell by FSBO. This suggestion is

consistent with the previous finding that a longer time lag decreased the probability of sale: a time lag is not able to remove any stigma because buyers do not view the house as having been removed from the market.

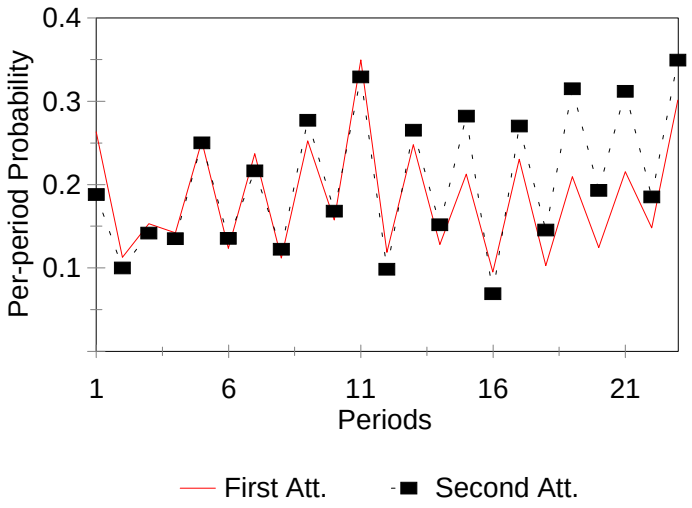

Figure 5: Baseline Hazard Function of Expiry (per-period probability)

Figure 5 illustrates the baseline function derived from the Cox Proportional Hazard Model on both the first and second attempts. Both functions display the same general pattern of oscillation suggested by Figure 2. The probability of expiry per (two-week) period seems to vary little with duration. The highest spike, at about period 11, represents a duration of about 6 months.

However, actions on a first attempt seem to be related to a second attempt in more ways than was suggested above. When developing the hypothesis linking the Degree of Over-Pricing and the decision to expire on the first attempt, I claimed that there might be no relationship because the Degree of Over-Pricing seen by buyers on a second attempt can be chosen independently of the first attempt. It is possible to test this claim. Since the covariance between DOP on the first attempt and the second attempt is very high (0.87), using the measure directly could create a multi-collinearity problem. Therefore, I re-estimate the sales and expiry processes with a variable called the "Change in DOP", which is DOP on the first attempt less DOP on the second attempt. Introducing this variable has little effect on the coefficients for DOP, DOP^2,

MT/365 or Time Lag but is negative and significant in both regressions. To be more specifically, if I compare two second attempts having equal DOP, the attempt with the higher DOP on the first attempt would have a lower the probability of sale and a lower probability of expiry at any given point in time.

Insert Table 5

Table 5 reports selected coefficients on the decision to try again after a first attempt failed. At the micro-level, an increase in DOP decreased the probability of a second attempt and a seller with the highest DOP was less likely to try quickly. Sellers whose listing ended early were more likely to try again. For those sellers who decided to make a second attempt, sellers with a very high values of DOP on the first attempt were less likely to try again quickly and sellers who ended another listing early were more likely to try again quickly. At the macro-level, the mortgage interest rate and the unemployment rate had a significant effect on the decision to try again. Surprisingly, an increase in the ratio of new sellers to sales (my proxy for excess supply) had no significant effect on the probability or timing of a second attempt. While some of the coefficients are statistically significant, adding the variables does little to improve the goodness of fit.

6/ Implications

These results are mostly consistent with the hypotheses presented at the end of Section 2. The first set of hypotheses focused on the general selling process. I found that the hazard rate, i.e. the instantaneous probability, of sale decreased with duration and that an increase in the first duration decreased the hazard rate for the second duration. Waiting between attempts had a much smaller effect but with an unanticipated sign. This evidence, together with Figure 3 mostly confirms Hypothesis 1. In part, this evidence explains why a rational seller would want to give up an attempt rather than waiting indefinitely.

The second set of hypotheses focused on the Degree of Over-Pricing (DOP). As earlier studies found, an increase in DOP decreased the probability of sale. I also found that an increase

in DOP tended to increase the probability of expiry on the first attempt and to decrease the probability of making a second attempt. Thus, Hypothesis 2 is confirmed. DOP should be seen as a credible indicator of a seller's bargaining position. Figure 4 suggests that the market process tends to select the more willing sellers, i.e. those with lower values of DOP, but the randomness inherent in the matching process removes the assurance that only the lowest priced sellers will sell.

The fourth hypothesis focused on the role of an agent. I found some effects due to dissatisfaction with an agent: sellers who ended a listing early were more likely to try again and were more likely to try again quickly.

The third hypothesis focused on market conditions. I find that there are effects worthy of future study but, since the effect of a change in market conditions is not based on any specific theoretical model, I hesitate to attach an interpretation to any given coefficient. In an important sense, the coefficients of the selling process and of the expiry process should be combined because there is more than one dimension to a seller's behavior: letting a listing expire is not exactly the same thing as not selling. It is true that, ultimately, a house either sells or it does not but this truth ignores the time margin. Combining results from the selling and expiry processes, an increase in the unemployment rate decreased the probability of sale *and* increased the probability that a seller would let a listing expire at any given point in time. Thomas (1996) noted that one of the problems with using a competing risk model to explain behavior is that the individual coefficients do not directly reveal the magnitude or sign of an effect on a selected fraction of listings. With the coefficients estimated here and without more computations, for example, the effect of an increase in the unemployment rate on the average time-till-sale of houses which sell is ambiguous.

This paper ignores some practical problems with using market conditions as explanatory variables. First, I do not distinguish between anticipated and unanticipated changes in market conditions. Anticipated conditions, of the kind that Krainer (2001) considered, affect a seller's decision to enter a market and all subsequent events. Unanticipated changes may not even be

recognized until after the seller completes the transaction with an "unanticipated" buyer. The way that the explanatory variables are constructed has the effect of assuming that sellers are myopic. Second, though not reported here, indicators of market conditions had little effect on the list price. Using an independent data set covering some of the same time period as the data used here, Anglin and Wiebe (2004) noted that the variation in DOP has a more significant effect on the selling price than indicators of market conditions. Thus, the link between measures of "market conditions" and the actions of individual sellers in the middle of a market is only imperfectly understood.

It may be that the measures are too crude to be useful for the kinds of detailed calculations that an individual seller needs to make. Or, it may be that the average price of a house varies according to a different mechanism. Read (1988), Salant (1991), Ben-Shahar (2003) and others have proposed models where the selling price is a function of duration. With given conditions, this price function combines with the realized time-till-sale to produce a realized selling price; for a given price function, a change in market conditions which changes duration would be enough to change the average realized price. In this kind of model, it would be vital to recognize the fact that some sellers prefer to let their listing expire rather than continue forever.

It may be that market conditions change the selection of sellers types active in a market but this data set cannot study this question directly because it does not include data on people who *think about* selling their house. The evidence from the behavior of sellers who make a second attempt may provide some insight, because such sellers are near the margin, but these sellers are also selected by a process that is not fully understood.

Bibliography

Anglin, P. 1994. "A summary of some data on buying and selling houses," working paper, University of Windsor.

Anglin, P., 2004. "The value and liquidity effects of a change in market conditions", working paper, University of Windsor.

Anglin, P., R. Rutherford and T. Springer, 2003. "The trade off between the selling price and time-on-the-market: The impact of price setting," *Journal of Real Estate Finance and Economics*, 26 (1), 95- 111.

Anglin, P. and R. Wiebe, 2002. "House prices and time-till-sale in Windsor," report submitted to the Windsor and Essex County Real Estate Board (with supplements).

Anglin, P., and R. Wiebe, 2004. "Pricing in an illiquid real estate market", working paper, University of Windsor.

Asabere, P. and F. Huffman, 1992. "Macroeconomic determinants of time on the market," *Real Estate Issues*, 39- 43.

Ben-Shahar, D., 2002. "Theoretical and empirical analysis of the multiperiod pricing pattern in the real estate market," *Journal of Housing Economics*, 11, 95- 107.

Canadian Real Estate Association (CREA) 2003. "Who we are" available at http://www.crea.ca/public/about/about.htm

Capozza, D., P. Hendershott and C. Mack, 2004. "An anatomy of price dynamics in illiquid markets: Analysis and Evidence from local housing markets", *Real Estate Economics*, 32 (1), 1-32.

Clayton, J., 1996. "Rational expectations, market fundamentals and housing price volatility," *Real Estate Economics*, 24(4), 441-470.

Clayton, J., 1997. "Are housing price cycles driven by irrational expectations?," *Journal of Real Estate Finance and Economics*, 14, 341-63.

Coles, M.G., and E. Smith, 1998. "Marketplaces and matching", *International Economic Review*, 39 (1), 239-54.

Dale-Johnson, D. and S. Hamilton, 1998. "Housing market conditions, listing choice and MLS market share," *Real Estate Economics*, 26 (2), 275- 307.

Federal Trade Commission, 1983. *The residential real estate brokerage industry*, staff report, Los Angeles.

Frijters, P., 2002. "The non-parametric identification of lagged duration dependence," *Economics Letters*, 73 (3), 289- 292.

Forgey, F.A., R.C. Rutherford and T.M. Springer. 1996. "Search and liquidity in single-family housing," *Real Estate Economics*, 24:3, 273-292.

Geltner, D.M., B.D. Kluger, and N. Miller, 1991. "Optimal price and selling effort from the perspectives of the broker and seller", *American Real Estate and Urban Economics Association Journal*, 19 (1), 1- 24.

Genesove, D. and C.J. Mayer, 1997. "Equity and time to sale in the real estate market," *American Economic Review*, 87:3, 255-270.

Genesove, D., and C.J. Mayer. 2001. "Loss aversion and seller behavior: Evidence from the housing market," *Quarterly Journal of Economics*

Glower, M., D.R. Haurin and P.H. Hendershott. 1998. "Selling time and selling price: The influence of seller motivation," *Real Estate Economics*, 26:4, 719-740.

Kalra R., and K.C. Chan, 1994. "Censored sample bias, macroeconomic factors and time on market of residential housing," *Journal of Real Estate Research*, 9:2, 253- 262.

Keifer, N., 1988. "Economic duration data and hazard functions", *Journal of Economic Literature*, 26, 646- 679.

Knight, J., 2002. "Listing price, time on market and ultimate selling price: Causes and effects of hidden listing price changes," *Real Estate Economics*,

Krainer, J. 2001. "A theory of liquidity in residential real estate markets," *Journal of Urban Economics* 49, 32- 53.

Lambson, V., G. McQueen and B. Slade, 2003. "Do out-of-state buyers pay more? An examination of anchoring induced bias and search costs", *Real Estate Economics*, 32 (1), 85-126.

Lancaster, T., 1990. *The econometric analysis of transition data*, Cambridge University Press, New York.

Lancaster, T. and A. Chesher, 1985. "Residual analysis for censored duration data," *Economics Letters*, 18, 35- 38.

Lin, Z. and K. Vandell, 2001. "Illiquidity and real estate risk," working paper, University of Wisconsin- Madison School of Business.

Miceli, T., 1989. "The optimal duration of real estate listing contracts", *American Real Estate*

and Urban Economics Association Journal, 17(3), 267-77.
Mortensen, *International Economic Review*

Novy- Marx, R., 2002. "The fine line between hot and cold markets", working paper, Haas School of Business, University of California, Berkeley.

Ong, S.E., and Y.C. Koh, 2000. "Time-on-market and price trade-offs in high-rise housing sub-markets", *Urban Studies*, 37 (11), 2057-71.

Ortalo-Magne, F., and A. Merlo, 2002. "Bargaining over real estate: Evidence from England, working paper," University of Wisconsin.

Pissarides, C., 2000. *Equilibrium unemployment theory*, MIT Press, Cambridge, MA.

Read, C., 1988. "Price strategies for idiosyncratic goods- The case of housing," *American Real Estate and Urban Economics Association Journal*, 16(4), 379- 395.

Rosen, S., 1974. "Hedonic prices and implicit markets," *Journal of Political Economy*, 82 (1), 34- 55.

Salant, S., 1991. "For sale by owner: When to use a broker and how to price the house," *Journal of Real Estate Finance and Economics*, 4 (2), 157- 173.

Stein, J.C., 1995. "Prices and trading volume in the housing market: a model with down-payment effects," *Quarterly Journal of Economics*, 110:2, 379-406.

Taylor, C., 1999. "Time-on-the-market as a sign of quality," *Review of Economic Studies*, 66 (3), 555-78.

Thomas, J. 1996. "On the interpretation of covariate estimates in independent competing risks models," *Bulletin of Economic Research*, 48 (1), 27- 39.

Yavas, A. 1992. "A simple search and bargaining model of real estate markets," *Journal of the American Real Estate and Urban Economics Association* (now *Real Estate Economics*), 20:4, 533-548.

Yavas, A. and S. Yang, 1995. "The strategic role of listing price in marketing real estate: Theory and evidence," *Real Estate Economics*, 23 (3), 347- 368.

van den Berg, G., 2000. "Duration models: Specification, Identification and Multiple Durations," working paper, Free University Amsterdam; forthcoming chapter in *Handbook of Econometrics*, Vol. V ed. by J. Heckman and E. Leamer.

Zorn, T., and W.H. Sackley, 1991. "Buyers' and sellers' markets: A simple rational expectations search model of the housing market," *Journal of Real Estate Finance and Economics*, 4 (3).

Table 2: Selected Descriptive Statistics

	Mean	Std.Dev.	Number of Observations
Dependent Variables			
MT (time on market, in days, first attempt)	88.50	70.42	20002
TRY2= 1 if second attempt	0.51	0.50	7467
QUICK= 1 if second attempt within 3 weeks	96.75	7.20	3817
Independent Variables			
List Price	140838	59012	20002
Selling Price	130361	51531	12081
Discount	0.04	0.12	12081
DOP (Degree of Over-Pricing)	0.00	0.23	20002
# Bedrooms	3.12	0.89	20002
# Bathrooms	1.65	0.72	20002
Listing Date (of first attempt)	1.47	0.95	20002
#Sales (Seasonally adjusted, /100)	4.21	0.23	20002
Unemployment Rate	8.01	1.34	20002
Mortgage Rate (5 year, minus CPI inflation during preceding 12 months)	5.75	0.31	20002
Volatility of Mort. Rate	0.35	0.12	20002
FXR (US/Cdn Exchange Rate)	1.45	0.05	20002
#New Listings/ #Sales	1.92	0.25	20002
Urgent	0.01	0.11	20002
Moving	0.01	0.08	20002
Vacant	0.02	0.13	20002
Early End (see text)	0.44	0.34	7467
Time Lag (between attempts)	0.27	0.48	3817

Table 3: Determinants of the Selling Process
Weibull Model
Selected Coefficients

	First Attempt		Second Attempt	
	Coefficient	t-stat.	Coefficient	t-stat.
Spring	-0.04	-0.97	-0.17	-1.58
Summer	-0.30	-6.86 •	0.05	0.43
Fall	-0.41	-9.47 •	-0.24	-2.17 •
#Sales	0.55	12.05 •	0.54	4.20 •
Mortgage Rate	-0.07	-1.77	0.14	1.48
Unemployment Rate	-0.01	-1.95	-0.02	-0.85
Volatility of Mortgage Rate	0.34	2.34 •	1.03	2.07 •
FXR	-0.11	-0.34	-0.03	-0.04
#New/#Sales	0.04	0.85	0.42	3.00 •
MOVING	0.17	1.43	-0.22	-0.69
URGENT	-0.23	-2.84 •	-0.26	-1.94
VACANT	0.14	2.19 •	0.09	0.70
DOP	-0.40	-10.99 •	-0.44	-5.23 •
DOP^2	-0.62	-7.64 •	-0.46	-2.42 •
MT/365 (during first attempt)	--	--	-0.67	-5.94 •
Time Lag (between attempts)	--	--	-0.10	-2.23 •
θ	1.88	21.98 •	1.41	7.12 •
σ	0.54	51.07 •	0.60	22.21 •
N.Obs	20002		3817	
Log-Like.	-23967.37		-4111.66	
Log-Like. (β= 0)	-25012.14		-4283.61	

* Note: Though the variable names do not change between columns, the relevant data changes, i.e. I use the data recorded for the attempt being studied.
• indicates that the coefficient differs from 0 at a 5 percent level of significance.

Table 4: Determinants of the Expiry Process
Cox Proportional Hazard Model
Selected Coefficients

	First Attempt		Second Attempt	
	Coefficient	t-stat.	Coefficient	t-stat.
Spring	-0.18	-1.19	1.26	4.12 •
Summer	-0.52	-3.26 •	0.56	1.58
Fall	-0.12	-0.79	1.32	4.13 •
#Sales	0.40	2.83 •	0.57	1.91
Mortgage Rate	-0.66	-4.60 •	-0.64	-2.32 •
Unemployment Rate	0.16	10.28 •	0.13	2.37 •
Volatility of Mortgage Rate	-0.48	-1.08	0.46	0.44
FXR	0.20	0.32	-1.16	-0.76
#New/#Sales	-0.88	-4.46 •	0.57	1.37
MOVING	-0.11	-0.62	-0.34	-0.94
URGENT	0.05	0.50	-0.01	-0.06
VACANT	0.16	1.87	0.06	0.43
DOP	0.22	4.53 •	0.19	2.00 •
DOP^2	-0.32	-3.15 •	-0.44	-2.01 •
MT/365 (during first attempt)	--	--	-0.75	-5.03 •
Time Lag (between attempts)	--	--	0.05	0.85
N.Obs	20002		3817	
Log-Like.	-63020.54		-12365.05	
Log-Like. (β= 0)	-63264.85		-12510.7	

* Note: Though the variable names do not change between columns, the relevant data changes, i.e. I use the data recorded for the attempt being studied.
• indicates that the coefficient differs from 0 at a 5 percent level of significance.

Table 5: Concerning the Second Attempt
Selected Coefficients
Logit

	TRY2		QUICK	
	Coefficient	t-stat.	Coefficient	t-stat.
Spring	-0.07	-0.87	-0.12	-1.05
Summer	-0.16	-2.08 •	0.13	1.21
Fall	-0.01	-0.21	-0.14	-1.47
#Sales	0.01	0.08	0.03	0.26
Mortgage Rate	-0.33	-3.90 •	0.17	1.42
Unemployment Rate	0.33	14.85 •	-0.26	-8.03 •
Volatility of Mortgage Rate	-0.17	-0.46	0.72	1.36
FXR	-1.98	-2.89 •	0.77	0.82
#New/#Sales	0.03	0.47	-0.16	-1.53
MOVING	0.33	0.93	0.53	1.07
URGENT	0.19	0.95	0.26	0.97
VACANT	0.19	1.11	0.18	0.80
DOP	-0.09	-0.93	0.21	1.45
DOP^2	-0.43	-2.06 •	-1.01	-3.12 •
EARLYEND	0.38	4.19 •	0.44	3.27 •
MT/365 (first attempt)	0.37	2.27 •	0.40	1.56
N.Obs	7467		3817	
Log-Like.	-4914.65		-2545.86	
Log-Like. (β= 0)	-5173.86		-2643.06	

*Note: Though this table uses the same variable names as in the previous tables, I use the relevant data, i.e. recorded at the end of the first attempt.
• indicates that the coefficient differs from 0 at a 5 percent level of significance.