Time on the Market and Selling Price

Norman G. Miller

This study is primarily an analysis of tradeoff between selling time and price, both on a nominal and real basis. Sellers are seen as desiring to maximize their discounted real selling price and trading off the nominal selling price with expected selling time. The time a property remains on the market is important, not only because of its reflection on price, but also because of its possible reflection on the issue of submarket equilibrium—an assumption in most urban price studies. The empirical results of this study shed light on how similar studies can easily misinterpret the implications of time on the market on price and how further work may be improved.

Introduction

There are several reasons for studying pricing and time on the market with respect to real estate. From the seller's point of view several questions are raised. Can he achieve a larger selling price over a longer period of time, or during an optimal selling period? And, if there is an optimal selling period, is the time-price tradeoff a linear or non-linear function? One must also consider the effects of inflation on the actual price received so that real price rather than nominal price is related to the selling period. From the buyer's point of view one might ask if it is best always to seek out properties which "just came on the market," or does time on the market really matter? Appraisers also have an interest in relating price to time, for in their definition of "market value" a "reasonable" time period is assumed.[1]

This study is primarily an analysis of the tradeoff between selling time and price, both on a nominal and real basis. This topic has only been touched upon in other studies, such as the work by Jacob Belkin, Donald J. Hempel and Dennis W. McLeavey, in efforts to better understand housing market operation and equilibrium.[2] The issues and hypotheses tested in this study are lineal descendants of the numerous static cross-

section house price studies, such as those by Kain and Quigley (1967), Ball (1973), and Straszheim (1975).

The first part of this paper deals with theoretical aspects of the sellers' behavior with respect to price and selling time. An hypothesis is set forth, and a multiple regression model is developed for the purpose of testing the expected results on a sample of 91 properties collected in Columbus, Ohio, which were sold during 1976. The empirical results shed light on how such studies can easily misinterpret the implications of time on the market on price and how further work may be improved.

The Relationship of Time and Selling Price

Given that supply and demand are held constant, the time required to sell a property must be a function of its attractiveness relative to other properties which are considered potential substitutes in the mind of the typical buyer for such property.[3] Relative attractiveness must then be primarily a function of the sellers' asking prices, and expectations regarding selling price, compared to the typical buyer's estimation of value for such property.

Selling a property can be viewed within an auction type framework.[4] Since the market does not clear instantaneously, sellers receiving bids over time must determine if the price expected to be realized is too high. Over time the gap between the list or initial asking price and selling price should increase, reflecting the seller's lower price aspirations. The empirical relationship expected is that the larger the list price/selling price gap, the longer the average time on the market. This relationship has been tested and verified by Belkin, Hempel and McLeavey[5] and Miller.[6]

If by some crystal ball divination, the seller knew in advance what the selling price of his property would be, his decision as to an optimal list or asking price would be based entirely on minimizing the expected selling time. The minimum selling period, however, is not expected. The seller, not being able to see the distribution of potential bids for his property, must "overprice" to some degree. This is necessary in order to preclude the possibility of missing a potential highest bidder. While optimal selling periods are not expected, they are an essential starting point for the analysis of time on the market and selling price.

Optimal Selling Periods and Seller Behavior

Information theory has often been applied to buyers in the form of optimal stopping models.[7] The general implication of such theory is that buyers who purchase goods in imperfect markets (those with price disper-

sion) should continue to search until the marginal benefit is equal to or less than the marginal cost of another search. The marginal benefit is measured in terms of the expected savings with an additional search. Marginal costs are determined subjectively by the searcher based on the costs of additional information. This same approach may be utilized by sellers, where the expected selling price increases as a greater number of potential buyers are located.

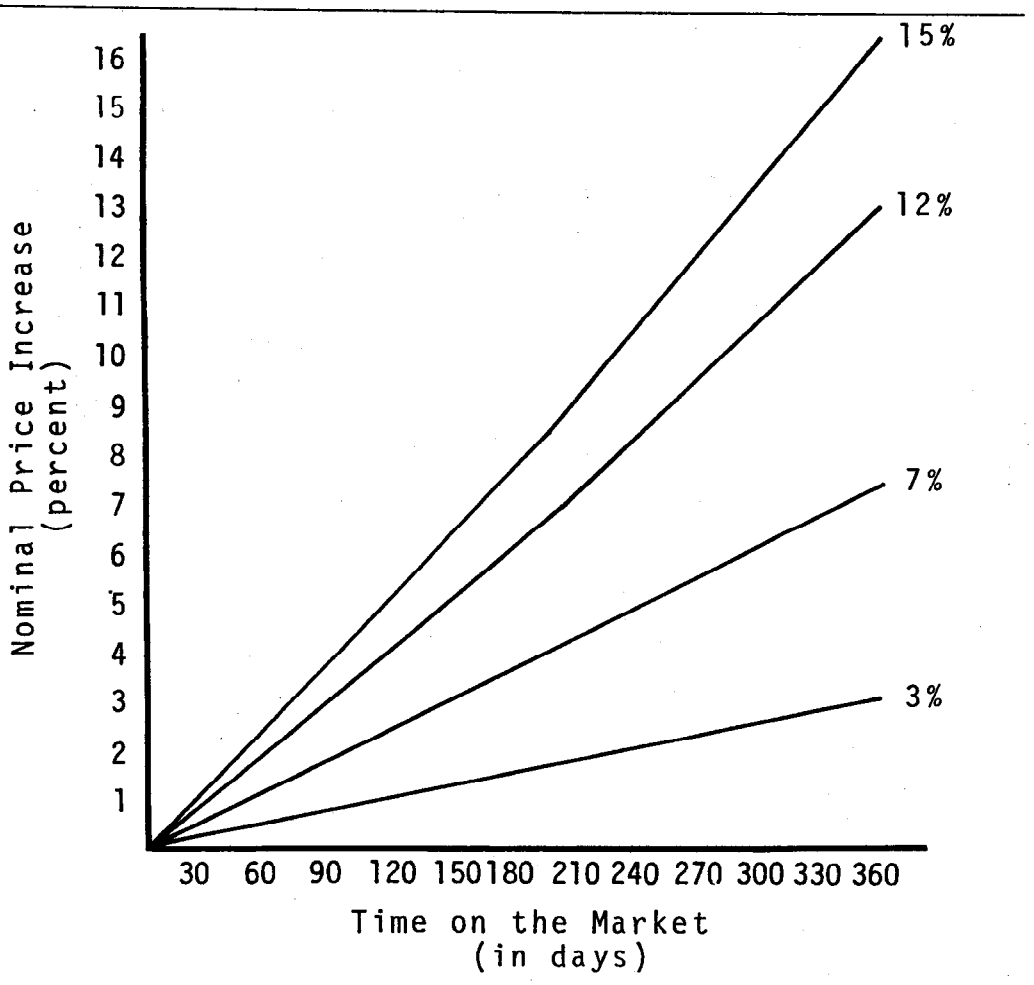
The problem from the seller's point of view is that he is uncertain as to the distribution of potential buyers at any point in time. If we assume that the distribution is normal and fairly stable, then the expected selling price should increase at a marginally decreasing rate as new potential buyers are located. The optimal selling period is determined by trading off the marginal selling cost associated with the location of each new potential buyer with the marginal increase in expected selling cost.

Sellers with very high selling costs (searching-for-buyer costs and time costs) must select a price which is immediately attractive to potential buyers. Their pricing behavior may preclude the highest potential bids; however, their opportunity costs could be so high that a lower price achieved quickly may be equal to or greater than a discounted higher price which requires a long marketing period. Sellers with no immediate urgency to sell (low discount rates or selling costs per unit of time) have the opportunity to select higher asking prices and wait until the highest potential bidders come along. With such behavior a positive relationship is expected between time on the market and selling price.

It is a simple task to define the relationship between time on the market and selling price at which the seller is no better or worse off, if their respective discount rates are known. An individual seller's discount rate should be a function of the costs incurred in his efforts to find potential buyers per unit of time. Exhibit 1 is a diagram of four iso-price lines which show equivalent real selling prices to each of four sellers, if their respective discount rates are known. Many selling costs (such as the hassles involved in showing property) are difficult to quantify. However, if we consider at least the inflationary effects on price, then rational sellers must expect higher nominal selling prices over time to maintain equivalent real selling prices.[8] For example, given a general inflation index of seven percent per year, a seller who could sell his property for $50,000, when first put on the market, must get at least $50,850 if the home is sold three months later to maintain an equivalent real dollar sale price. Allowing the property to be on the market for three months in such a case is only worthwhile if more than $50,850 is probable.

A positive relationship is expected between time on the market and selling price, based on nominal and real values. The crucial assumption is

EXHIBIT 1
EQUIVALENT REAL SELLING PRICES OVER TIME



that sellers with high selling costs, per unit of time, must sell their homes more quickly, and to achieve a faster sale, they set and/or accept lower prices on their properties.

EMPIRICAL ANALYSIS

Residential property values can be stated as a function of three primary sets of variables: (1) the direct bundle of housing service, which is related to site, location and improvements; (2) financial conditions which may affect housing markets; and (3) market transaction factors. Market transaction factors include the methods and process by which information is communicated between potential buyers and sellers and by which exchange is facilitated. Most published studies have concentrated on the first set of variables. Data have generally been cross-sectional, or assumed

to be, and financial conditions which may influence value have been assumed stable.

THE MODELING PROCESS

The purpose of the model to be set forth herein is to test for systematic relations between time on the market—one of the market transaction related factors—and selling price. The dependent variable, selling price, SP, is estimated through a multiple regression model, with the inherent limitations and assumptions of all such models. However, it is important to point out that multicollinearity between independent variables used to control for the influence of site, location and improvement characteristics is not a major problem in this study. No interpretation is given to any of the regression coefficients on any of the non-market transaction influences on value. Their function is only to control, as a group, the variation in selling price which relates to locational, improvement, and site influences on value.

SAMPLE DATA

Ninety-one observations of single family property which sold in the latter half of 1976 within Columbus, Ohio, were collected through realtor files and direct survey. Their time on the market varied from one day to nearly a year. All were financed conventionally at an eight-and one-half percent interest rate and twenty or twenty-five percent down payments—typical terms for the sample market and time period. The properties were selected from a relatively small geographical area in order to avoid vast locational differences. Additionally, great care was taken to avoid properties on heavily traveled streets, properties near commercial areas, schools, parks, golf courses, rental housing or industry of any kind. These severe constraints in the sample collection process greatly reduced the need to collect locational related variables and financial related variables and enabled a model to be developed which controlled a large proportion of the variation in selling price with fewer independent variables. Data collected included nineteen variables which identified locational, site, and physical characteristics as well as the listing price and date, selling price and date (of contract-for-purchase signing).

EMPIRICAL RESULTS

The full sample of properties was analyzed both as a whole and by subgroups of low, mid and high price range. Exhibit 2 depicts the statistical characteristics of the groups with respect to time on the market, TOM.

EXHIBIT 2
TIME ON THE MARKET BY PRICE RANGE-
STATISTICAL CHARACTERISTICS

Group	N	Mean TOM	Standard Deviation	Correlation Coefficient of TOM with Actual Selling Price
Full Sample	91	65.0	56.1	.29
Low Price Range	37	52.4	44.4	-.24
Mid Price Range	28	61.6	55.0	.00
High Price Range	26	90.2	71.6	.145

Exhibit 3 shows the results obtained using actual selling price, time on the market and a control model. The control model symbolically depicted by !x . . . x_n1 is included along with the variables under observation.[9]

Only the full sample model resulted in a significant regression coefficient on time on the market. Interpreted literally, the coefficient indicates that the average property in the sample increased its expected selling price by $55 for each day on the market. Given the average selling price of $62,439 for the entire sample, this indicates an inflationary rate of thirty-two percent—much greater than the actual rate of inflation. This gives some support to the hypothesized result that there is a positive relationship between selling price and time on the market. But the lack of significance of TOM across price ranges precludes any substantial conclusions. A more direct test, however, would involve real selling price rather than nominal selling price.

DEALING WITH INFLATION

A common assumption in studies in which sample data are collected to develop models of residential property value is that the sample is cross-sectional. However, some elements of time series data are unavoidable in acquiring samples of sufficient size and in this study they are essential. The result is an inflationary price effect which may distort results.

To help control for such bias an inflationary index is developed based on construction cost indexes reported by the U.S. Department of Commerce modified by local factors for the Columbus, Ohio area.[10] Monthly average cost indexes were developed from such data. Then, for each

EXHIBIT 3
SELLING PRICE MODELS BY PRICE RANGE

Group		Regression Coefficient	T-statistic	Adjusted R^2	F-ratio
Full Sample	$SP=[x \ldots x_n]$	+ 55.2 (TOM)	(2.95)*	.91	111.1
Low Price Range	$SP=[x \ldots x_n]$	+ 6.6 (TOM)	(.35)	.63	9.7
Mid Price Range	$SP=[x \ldots x_n]$	+ 9.5 (TOM)	(.73)	.70	8.7
High Price Range	$SP=[x \ldots x_n]$	+ 23.5 (TOM)	(.60)	.83	21.7

*Significant at .05 level.

property, by taking the index for the month of the initial listing date as the base, and dividing by the index for the month of the selling date, a general deflation index is developed which applies only to the period for which the property was on the market. The appropriate deflation index is applied to the selling price of each respective property to develop a deflated selling price. The deflation index applied to the entire sample averaged nearly eight percent on an annual basis. Admittedly, this procedure and the appropriate index for deflation is somewhat arbitrary and will always be a debatable issue. However, given the fact that there is no possible way of knowing the actual discount rates appropriate to apply to each property, this seemed a reasonable approach. The use of deflated selling price on the full sample resulted in the following model:

$$\text{Deflated SP} = [x \ldots x_n] + \underset{(2.68)^*}{34.9\ (\text{TOM})}$$

*t-statistic significant at .05 level.

Adjusted $R^2 = .90$ F - ratio = 119.6

The decline in the regression coefficient on TOM from 55.2 to 34.9 demonstrated a positive inflation bias of approximately thirty-seven percent.

MULTIPLE REGRESSION, MULTICOLLINEARITY AND TESTS BETWEEN TIME ON THE MARKET AND SELLING PRICE

Before the preceding empirical results are taken as satisfactory evidence that sellers can achieve greater real prices if they allow their properties to

be on the market a longer period, one further problem must be overcome.

In examining the average time on the market of three price range groups (under $40,000, $40,000 to $69,999, and $70,000 plus) of the sample collected, it became obvious that the higher priced properties generally required more time on the market. This was further evidenced by examining the Realtor Multiple Listing Service Data for 1976 for the Columbus Metropolitan area. Over four quarters, the average percentage of total residential properties which were for sale at $70,000 and over equaled thirty seven percent. However, the average percentage of total residential properties which were sold at over $70,000 equaled only twenty one percent. This indicates the equilibrium average time on the market for higher priced properties may be longer than for lower priced properties (in the sampled market). If this is true, then one would need a multiple regression model which accounted for nearly one hundred percent of the variation in selling price to make a test which relates time on the market to selling price, because as the site, locational and physical attributes (such as size) increase, average time on the market may increase. Some of the site, locational and physical attributes may show their effects on value through the time on the market variable, because of their high correlation. Thus, one cannot easily conclude that having more time on the market will result in a higher selling price from tests with a model developed over several price ranges. A valid investigation of time on the market and selling price may require a test sample covering a very limited price range, where site, location and improvement characteristics are very similar.

In an attempt to follow such a procedure, two price ranges with the largest concentration of similar properties were analyzed for a relationship between deflated selling price, DSP, and time on the market (TOM). The following results occurred.

Price Range	N	Model	Regression Coefficient	T-statistic	Adj.R^2	F-ratio
$40-50,000	22	DSP =[x...x_n]	-2.8 (TOM)	1.3	.42	6.0
50-70,000	24	DSP =[x...x_n]	-9.8 (TOM)	.7	.41	5.1

Neither of the above models represent valid tests since the overall regression models were not significant. However, the negative regression coefficient on TOM is interesting and in direct contradiction to the hypothesized result.

CONCLUSIONS

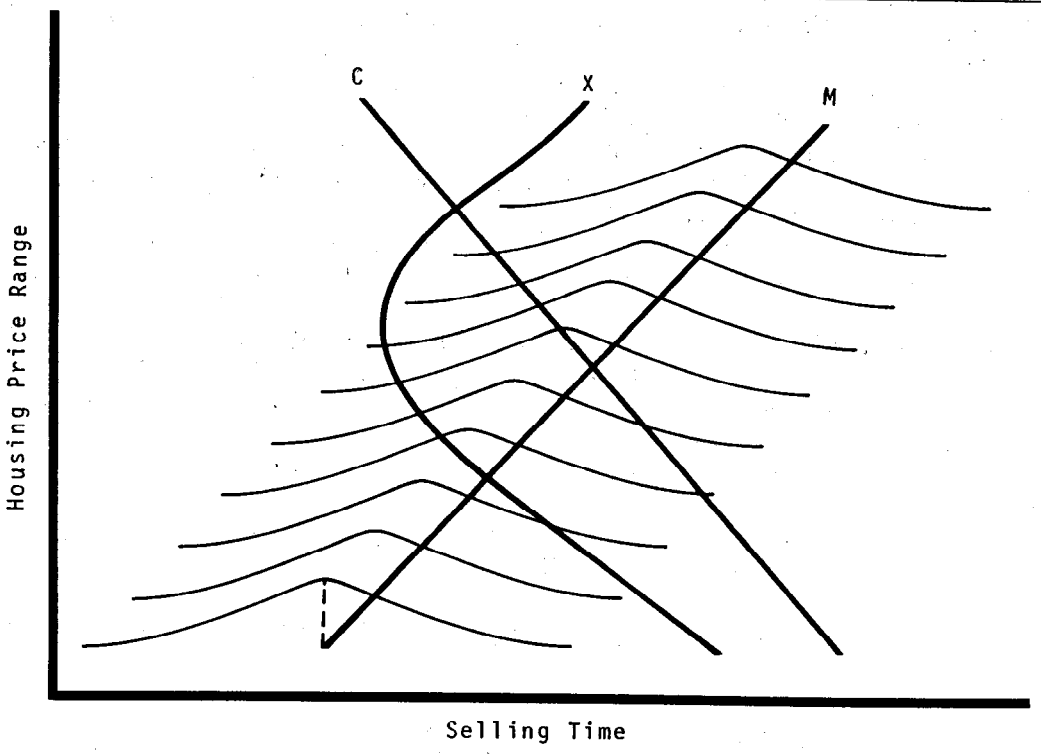
The seller has two somewhat conflicting objectives: to maximize selling price and to minimize selling time. Both variables, selling time and price, are influenced by the characteristics of the property (size, location, quality). The simultaneous influence makes the study of the relationship between time on the market and selling price difficult. Unless a market can be located where the equilibrium or average time on the market is stable and equal across all price ranges, locations, and sizes within the sample, traditional statistical approaches and empirical tests will be of questionable validity.[11]

Serious misinterpretation of housing market behavior can result unless one is cognizant of the effects of different demand/supply relationships on the potential outcomes. It may not be overly bold to assume the housing market is in equilibrium or close to it. But it is far too much to assume that the demand and supply for each major housing attribute (size, area, etc.) and price range as reflected by time on the market will have similar equilibrium values. In Exhibit 4 below, the general mean time on the market trend line M is a good approximation of the Columbus, Ohio, housing market in 1976. At each price level there may be a normally distributed variation for selling time. Grouping any substantial portion of the M line sample can result in a conclusion of longer time/higher price. But such a conclusion in no way proves there is an optimal selling period, even though theoretically sound reasoning supports the concept of an optimal selling period. Also, there is no reason to believe that the trend between price and selling time as shown in M is to be typical or expected in other housing markets.

In a study by John S. Cubbins using a sample from Coventry, England, he concluded "that a given house could be sold faster the higher the price put on it."[12] The 83 sampled sales may have been from a market as shown by C in Exhibit 4, where there is simply greater demand relative to supply as one moves up the price ranges, possibly because of greater demand for larger or better quality houses. There is no acceptable reasoning why simply putting a higher price on any given property will result in a quicker sale. However, it is acceptable to say that demand relative to supply is greater for larger, higher quality, more expensive properties.

Whether equilibrium time on the market values appear typically as in M, X or C in various housing markets is at this time an unknown. What this study and others are inching towards is a more definitive work on housing submarket equilibrium, along with the issue of an optimal selling period.

EXHIBIT 4
HYPOTHETICAL EQUILIBRIUM TIME ON THE MARKET
VALUE BY PRICE RANGE IN THREE MARKETS



It is not apparent that sellers benefit from longer marketing periods in terms of achieving greater real selling prices. Unrealistic price aspirations of different degrees may be a fundamental factor in determining selling time. Over time, sellers' price aspirations and expectations may change or lower at different rates. Other factors such as the intensity of promotion, advertising and broker skill may enter into the determination of both selling price and time on the market.

As a final caveat, the temptation to see the expected hypothesized results demonstrated must be avoided in studying the complex area of housing market operation. There are as yet too many unknowns and too much guess work. The housing market transaction process touches upon human behavior and the field of psychology, and the economic interpretations must be resolved only after meticulously thorough research.

NOTES

1. See Byrl N. Boyce, *Real Estate Appraisal Terminology* (Cambridge, Mass.: Ballinger Publishing Co., 1975).

2. Jacob Belkin, Donald J. Hempel, and Dennis W. McLeavey, "An Empirical Study of Time on the Market Using Multidimensional Segmentation of Housing

Markets," *American Real Estate and Urban Economics Association Journal* (Fall, 1976) pp. 57-75. Robert R. Trippi, "Estimating the Relationship Between Price and Time to Sale for Investment Property." *Management Science* 23, no. 8 (April 1977) pp. 838-842. See also, Robert H. Zerbst and William B. Brueggeman, "FHA and VA Mortgage Discount Points and Housing Prices." *Journal of Finance.*

3. Potential substitutes implies that no property has greater or lesser attractiveness with respect to taste preferences.

4. This viewpoint and concept was suggested by Professor William B. Brueggeman of Ohio State University in discussions with the author in July, 1977.

5. Belkin, *et. al., op. cit.*

6. Norman G. Miller, "The Influence of Market Transaction Phenomena on Residential Property Values." Ph.D. Dissertation: The Ohio State University, 1977.

7. For examples see George J. Stigler, "The Economics of Information," *The Journal of Political Economy* (June, 1961) pp. 213-225, and John McCall, "The Economics of Information and Optimal Stopping Rules," *The Journal of Business* 38 (July, 1965) pp. 300-316.

8. The appropriate inflationary index to use is discussed further in the following empirical analysis.

9. [$x \ldots x_n$] includes the most significant variables of the locational, improvement, and site data. For the full sample this includes:

Intercept	Regression coefficient (variable)	t-statistic
2422		(.55)
	.54 [lot size in sq. ft.] .	(9.99)**
	26.8 [living area in sq. ft.]	(12.32)**
	-189.5 [age in years]	(2.47)*
	2924.4 [construction quality]	(1.17)
	4305.2 [number of fireplaces]	(2.52)*
	7122.5 [located index]	(1.64)
	5172.8 [swimming pool]	(1.10)
	3429 [neighborhood quality]	(1.60)

**Indicates significance at .01 level, *indicates significance at .05 level.

10. *U.S. Department of Commerce,* Bureau of Economic Analysis, "Survey of Current Business," 57, No. 5 (U.S. Government Printing Office, May, 1977).

11. Canonical regression, where selling price and time are both used as a joint dependent variable, is an approach suggested by Robert R. Trippi in "Estimating the Relationship Between Price and Time to Sale for Investment Property," *Management Science*, 23, no. 8 (April, 1977). However, the problem with such an approach is that the appropriate functional form of the relationship between the dependent variables in not known and must be assumed in order to develop a working model. Until valid, theoretically acceptable functions can be assumed for the two-variable dependent variable, the canonical approach will be of questionable additional benefit.

12. John S. Cubbins, "Price, Quality and Selling Time in the Housing Market," *Applied Economics*, 6 (1974) pp. 171-187.