MACRO-DETERMINANTS OF TIME ON THE MARKET

How financing costs, business conditions and housing inflation extend the time a property spends on the market.

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The authors wish to acknowledge the financial support of the Pennsylvania Association of Realtors' Education Foundation.

The first step in any real estate transaction is for the seller to estimate the listing price of the property being sold. Brokers, appraisers and counselors assist the seller in making this determination.[1] Errors in list pricing can lead to suboptimal sales prices. However, the counselors who advise sellers have few methods for determining the appropriateness of any past pricing decision because they do not have access to true market values.

One signal that is available to counselors is the length of time a property remains on the market. A result of supply and demand interactions, time on the market (TOM) is a measure of real estate market activity. Perhaps more importantly, TOM also sheds light on the pricing decisions made by sellers and their advisors.

Sellers tend to set high listing prices (Miceli, 1986 and Zorn and Larsen, 1989), reasoning that only by setting high listing prices can one be assured of receiving high bids. However, high listing prices may keep a property on the market for a lengthy period while the seller rejects supposedly below-market offers. Such pricing errors may be revealed in abnormally long selling periods (long TOM).

Of course, sellers may set listing prices too low; however, low listing prices preclude the possibility of obtaining high bids. Such a pricing error may be revealed in abnormally short selling periods (short TOM).

Empirical analyses of the determinants of TOM therefore add to the understanding of real estate markets and aid counselors in determining listing prices on behalf of sellers. Unfortunately, studies of TOM are few, and the results of these analyses are mixed and inconclusive. The lack of study of this topic is surprising, given the importance of TOM to the brokerage and counseling industries and to the efficient operation of real estate markets.

Of the prior work, the seminal and still most relevant study was conducted by Belkin, Hempel and McLeavey (1976). According to these authors, in the absence of mispricing, time on the market is equal for all properties in a similar market.[2] If abnormal TOM is the result of mispricing, then any statistically significant housing characteristic or neighborhood quality is evidence that the item has been mispriced. The authors concluded, however, that "in general,. . .housing features. . .do not provide a satisfactory basis for predicting TOM."[3]

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Cubbin (1974) found that large ratios of actual selling price to 'true quality price' result in increased turnover of lower TOM, i.e., "higher priced houses sold faster." The result, which was predicated upon the accuracy of 'true' market values as estimated by a hedonic pricing model, is somewhat suspect in that the ratios used in the study, may not have correctly measured the higher prices the author assumed.

Miller (1978) also examined the relationship between selling price and TOM and discovered a statistically significant positive relationship to TOM with both the real and the nominal selling price. Unfortunately, Miller used TOM as an independent variable and produced results that are not useful for TOM estimation.

Haurin (1988) examined the effect of atypical housing features on TOM. The author assumed that the greater the atypicality, the greater the variance of offers and therefore the longer TOM required. Haurin found that unusual houses do take longer to sell; however, the paucity of evidence on normal housing markets suggests that analyses of variables that affect all housing are preferable.

Housing attributes that are familiar to counselors, such as physical features and location advantages, may pose less of a pricing problem than more unpredictable macro-economic factors, such as changes in interest rates, inflation and business conditions. We add to the studies on TOM by including analysis of macro-economic variables that have been noted as important to real estate markets and TOM. We use a stratified sample which includes rural and suburban transactions as well as urban sales. We account for pricing decisions by including a listing price variable and the ratio of selling price to listing price.

The Importance Of Macro-Determinants Of TOM

As Miller noted, residential property values are a function of three primary sets of variables: housing services, informational and exchange factors (as influenced by brokers) and financial conditions. Unfortunately, in Miller's study, "financial conditions which may influence value have been assumed stable."[4] The traditional theory is that if markets are efficient, then variations in TOM for similar properties should either be random events or they should be explained by broker/seller mispricing. Macroeconomic activity will affect time on the market if broker/seller pricing decisions do not adjust in a timely fashion to changes in economic climate. Specifically, deteriorating business conditions should lengthen TOM as purchasers postpone making "move up" decisions and curtail spending. Brokers and sellers, unaware of potential or real income losses and possibly reduced expectations of potential buyers, fail to adjust asking prices during such periods. As a result, property remains on the market longer. Ultimately, sellers must take greater discounts from the listing price in order to sell their properties. The imbalance associated with falling demand may be countered when potential sellers pull housing from the market. Such supply adjustments may minimize the long-term impact of high unemployment rates. However, less active markets, even in equilibrium, may increase TOM as transaction costs increase to find suitable buyers.

The ability to obtain financing at suitable rates also may have a direct impact on TOM. High mortgage loan rates should increase TOM as buyers find it more difficult to obtain financing. TOM should increase as it becomes more difficult for buyers to qualify for loans and as marginal borrowers/buyers drop from the market.

Finally, inflationary pressures may play a role in the length of time required to find a buyer. Increasing inflation rates, specifically in housing, have two possible impacts. To the extent that housing is perceived to be a hedge against inflation, demand should increase, and TOM should fall as inflation increases. However, as inflation rates drive up prices and mortgage interest rates, buyers will find it more difficult to afford and finance new purchases. Thus, the ultimate effect of housing inflation may be to increase TOM once unaffordability levels have been breached.

The Data And Methodology

We examined the potential impacts on TOM from national unemployment rates, mortgage interest rate changes and housing inflation by using TOM as a dependent variable in a conventional linear regression analysis. Our study assumed that macroeconomic variables had a direct impact on the marketing time of residential real estate.

We used 337 residential sales over the time period December, 1986 to June, 1990, that had been obtained from three separate multiple listing services covering the Pennsylvania counties of Philadelphia, Montgomery and Chester. Separate MLS data sets were used to derive sales from three geographic markets: urban, suburban and rural. One-hundred-twenty-five sales occurred in the city of Philadelphia, 100 in outlying suburbs (Montgomery) and 112 in rural areas of Chester County. Additional information collected from the MLS included lot size (SQFT), number of bedrooms (BEDR) and baths (BATH), gross sales price (SALESP) and sales price per square foot (SALESSF), date of sale (CMONTH), listing price (LP) and days on the market (DAYS). Neighborhood conditions were proxied by data from the 1980 U.S. Census and applied by census tract location. The variables were: percent boarded up (BOARDED), median household income (HHINCOME) and average monthly rent (RENT). We also used a dummy variable to separate sales into two price categories, those less than or equal to $200,000 (SIZE = 0) and those above (SIZE = 1), to account for submarkets based on price. We accounted for possible effects of the time of sale by translating each date of sale into sequential months with December, 1986, as the base month.[5]

We used these variables for control only; coefficient interpretation was not critical for the purposes

of this study. Our primary interest was to determine the impact of macro-economic variables including financing terms, business conditions and inflation. We used monthly, seasonally adjusted unemployment rates compiled by the U.S. Department of Labor (UNEMPLOY), the housing component of the monthly Consumer Price Index as compiled by the U.S. Department of Commerce (HCPI) and the average monthly mortgage contract rate (RATE) as calculated by the Federal Reserve Board. We examined the potential effects of selected variables on TOM by using a standard hedonic pricing model, with days on the market (DAYS or TOM) as our dependent variable. Independent variables included the measures of housing attributes, neighborhood condition, geographic location and the economic variables mentioned previously. In order to detect for any partial effects, the following specifications were employed:

$$LogTOM = \beta_o + \sum_{i=1}^{n} \beta_i X_i + \sum_{j=n+1}^{k} \beta_j Z_j + e$$

where:

LogTOM = number of days on market (TOM)

X_i = conventional variables for housing attributes, neighborhood conditions and geographic location

Z_j = macro-variables in monthly form

β_o = constant term

e = random error

The functional form and log transformation allowed for the use of ordinary least squares to estimate parameters.

Estimation Results

The explanatory power of the estimated equations was rather low, ranging from 0.16 to 0.25. Such low values suggested that we did not capture all possible variables that may have had an impact on TOM. However, many additional variables worthy of consideration could be difficult, if not impossible, to measure, given the data currently available. We would have liked to include, for example, variables that would measure broker efficiency and productivity, but such data is not collected. The macro-economic variables of concern in this study nevertheless generated rather interesting results.

The descriptive statistics for all variables are presented in Table 1. This table shows the greatest variance among variables that measure housing size. Of 337 sales, 55 involved two bedrooms, 177 involved three bedrooms, 95 involved four bedrooms and the rest involved five bedrooms and up. To control for differential results associated with size, we performed separate regressions for three- and four-bedroom home sales.

Equations 1 and 2, which were presented in reduced form (Table 2), demonstrated that the impact of the property-specific variables (BEDR, BATH and SQFT) was statistically insignificant. However, equations 3 and 4 indicated that the number of bathrooms was significant, suggesting that the presence of housing amenities, as proxied by bathrooms, reduced TOM. In the context of pricing error, these results also suggested that sellers were probably underpricing this item for three- and four-bedroom sales.

Neighborhood variables were statistically insignificant in all equations. Listing price and sales price divided by listing price, measures of broker pricing hypothesized to affect TOM, were insignificant and positive. However, variables that accounted for sales outside the city (SUBURB and RURAL) were significant and negative with the single exception of suburban sales of four-bedroom properties. Thus, residential real estate located outside the city sold quicker than property inside the city. Translating the coefficient for suburban sales in equation 1 into its antilog effect ($e^{-0.3956} - 1$), we discovered that a suburban location decreased TOM by nearly one-third (32.7%); property located in rural areas reduced TOM by 58%. These results may be peculiar to our study area (Philadelphia); they can be explained by city policies that have made the purchase of city properties less attractive (higher property taxes, wage taxes and higher property transfer taxes)[6] than the purchase of properties in suburban and rural areas. These advantages, in addition to the presence of other suburban and rural amenities such as better school districts, less traffic and reduced crime, may not have been fully capitalized into listing prices by suburban and rural sellers.

All macro-variables had the effects we hypothesized. Although the mortgage interest rate variable (RATE) was statistically insignificant at conventional levels in equation 1, it was significant and positive in the reduced-form equation 2 and for three- and four-bedroom sales, respectively. A one-point increase in mortgage rates increased TOM overall by over 42% in equation 2. Mortgage rates affected larger houses more severely than smaller houses, increasing TOM for four-bedroom homes by 119% but increasing TOM for three bedroom homes

TABLE 1

Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
DAYS	125.039	81.632	2	661
SQFT	45916.246	99766.960	632	1165230
BEDR	3.436	.974	2	9
BATH	2.051	.858	1	6
SALESP	181441.276	129437.261	19000	925000
LP	193562.047	140096.414	26500.00	1100000
BOARDED	.001	.005	0	.008
HHINCOME	21333.356	5648.517	6210	54016
RENT	234.733	67,391	70	454
UNEMPLOY	5.347	.250	5	7
RATE	9.617	.355	9	10
HCPI	123.376	3.575	112	128

TABLE 2

Estimation Results (Dependent Variable—LogTOM)

	Combined Data			Three Bedroom Homes		Four Bedroom Homes	
Variable	Equation 1		Equation 2		Equation 3		Equation 4
LP	7.018E-07 (1.256)	SPLP	-0.2390 (-0.412)	SPLP	0.251 (0.253)	SPLP	-1.816 (-1.461)
BEDR	0.0471 (0.860)	BEDR	0.0585 (1.071)	— —	— —	— —	— —
BATH	-.0483 (-0.664)	BATH	-0.0089 (-0.128)	BATH	-0.235 (-1.877)**	BATH	-0.259 (-1.873)**
SQFT	4.6349E-07 (0.854)	— —	— —	SQFT	7.024E-07 (0.883)	SQFT	7.109E-07 (1.156)
BOARDED	8.5339 (0.868)	— —	— —	— —	— —	— —	— —
HHINCOME	-1.2286 (-1.045)	— —	— —	HHINCOME	-1.699E-05 (-1.113)	HHINCOME	-6.695E-06 (-0.377)
RENT	0.0012 (1.037)	— —	— —	— —	— —	— —	— —
SIZE	0.2226 (1.509)	SIZE	0.3464 (3.232)***	SIZE	0.497 (2.786)**	SIZE	4.637 (0.065)
CMONTH	0.0022 (0.447)	CMONTH	0.0094 (2.262)**	CMONTH	0.007 (1.160)	CMONTH	0.0005 (0.065)
SUBURB	-0.3956 (-3.013)***	SUBURB	-0.3020 (-2.463)**	SUBURB	-0.519 (-2.527)**	SUBURB	-1.816 (-1.461)
RURAL	-0.8688 (-5.777)***	RURAL	-0.7804 (-6.734)***	RURAL	-1.057 (-5.536)***	RURAL	-0.644 (-2.437)**
RATE	0.2080 (1.244)	RATE	0.3561 (2.275)**	RATE	0.425 (1.990)**	RATE	0.785 (2.761)***
UNEMPLOY	0.6640 (2.833)***	UNEMPLOY	0.5661 (2.719)***	UNEMPLOY	0.736 (2.521)**	UNEMPLOY	0.250 (0.698)
HCPI	0.0619 (2.653)***	— —	— —	— —	— —	— —	— —
CONSTANT	-8.6829 (-2.698)***	CONSTANT	-2.1269 (-0.998)	CONSTANT	-3.059 (-1.071)	CONSTANT	-3.041 (-0.811)
r^2	0.22	r^2	0.22	r^2	0.25	r^2	0.16
Cases	337		337		177		95

t-ratios are shown in parenthesis

** significant at the 95% level of confidence

*** significant at the 99% level of confidence

by about 53% on average. The evidence suggested that larger houses were more difficult to sell during periods of high rates and that significant price discounts must be made to generate lower TOM.

The business conditions variable (UNEMPLOY) was highly significant in both equations 1 and 2 and significant in equation 3 for three-bedroom sales; however, it was insignificant for four-bedroom sales. The transformed coefficient associated with the business conditions variable in equation 1 suggested a rather high 94% increase in TOM associated with a one-percent increase in the unemployment rate. The interest rate variable may have suffered from the effects of colinearity with the housing component inflation index in equation 1; the housing inflation variable was dropped from equations 2, 3 and 4. However, the results seemed to suggest that, although deteriorating business conditions and financing costs affected housing markets overall, purchasers of larger homes were somewhat insulated from the effects of employment changes.

The housing inflation index variable (HCPI) also was positive and significant at the 99% level in equation 1. Here housing inflation increased TOM by

about 6% with each percentage increase in the housing inflation index. This positive relationship seemed to counter the conventional wisdom that inflationary pressures cause buyers to seek out real estate as a hedge. *Ceteris paribus*, an unexpected increase in demand would lower TOM; however, in our study area, prices had risen throughout the 1980s so significantly that sellers and brokers might have run into an unexpected wall of unaffordability. This conclusion was supported somewhat by evidence of more recent price declines in the Philadelphia area which many brokers maintained were reflective of a 1980s buildup and a resultant excess supply.

Listing price and the ratio of sales prices to listing price were not significant at conventional levels and had no consistent impact on TOM. Other forms of broker mispricing measurement also were significant. Therefore, we found no measurable relationship between listing price and TOM. However, these inconclusive results, in the face of the significance of other variables, illustrated the difficulty of measuring broker efficiency and productivity. The results might also point to the need for a refinement of the dependent variable, TOM (i.e., further study should be performed using a suitable measure of optimal TOM which would more effectively measure mispricing).

Still, if brokers are the major source of pricing information (as maintained by Belkin, Hempel and McLeavey), then these results could be interpreted to mean that brokers were able to efficiently price housing attributes and neighborhood conditions since TOM remained unaffected by these factors. The lower TOM generated by nonurban locations might mean that brokers overpriced these properties in the city of Philadelphia. In the same context, brokers did not correctly account for the effects of increasing interest rates, changes in business conditions and inflation rates. As a result, these con ditions extended TOM. Confirmation of this interpretation, however, might require a detailed analysis of sales prices relative to listing prices and a more accurate measure of the effect of mispricing.

Conclusions

Our analysis of the impact of macro-variables on TOM produced significant results. Financing costs, business conditions and housing inflation extended time on the market. Therefore, brokers, appraisers and counselors must pay closer attention to such conditions in the marketing of residential real estate, and sellers must be prepared to make necessary trade-offs. To the extent that sellers face substantial opportunity costs associated with lengthy selling periods, adjustments in listing prices and selling prices may be necessary.

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NOTES

1. For discussions of buyer and seller behavior, see Belkin, Hempel and McLeavey (1976), Miller (1978), Chinloy (1980) and Haurin (1988).
2. The authors reason that "if two houses are identical and equally priced within a submarket of comparable demand and supply conditions, then the houses should remain in the market for approximately the same duration. If houses are not identical but are made so by price, they should have the same time on the market" (p. 57).
3. Therefore, "brokers do a good job in negotiating list price" relative to housing and neighborhood features (p. 74).
4. Miller, (p. 167).
5. We first adjusted by aggregating sales into quarterly components of each year; next by season. We could discern no effects from these forms and therefore utilized the more detailed monthly variable.
6. Philadelphia has the highest real estate transfer tax in the nation (approximately 5%). City wage taxes average about 5% of income, but wage taxes also are collected at slightly lower rates (4.3%) from nonresidents who work in the city.