A NOTE ON LEADING INDICATORS OF HOUSING MARKET PRICE TRENDS

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Abstract. **Most indicators of changing housing demand and supply provide signals for longer term trends. Many market participants such as mortgage lenders, speculators, real estate brokers, developers, and appraisers, would benefit if short term price trends could be better monitored and predicted. This research builds upon several simple and straightforward statistical indicators of housing market price movements to analyze either local, regional or national trends. It utilizes existing housing resale data as well as new housing market data.**

INTRODUCTION

Intermediate (two-five years) and long-term (beyond five years) housing market trends can be related to available data of demand and supply factors. On the demand side, the basic forces include demographic trends, income, employment, the cost and availability of credit, and others. On the supply side, the basic forces include the availability and cost of land, labor and capital, and the prospects for sufficient returns relative to anticipated demand and competition. Yet, such fundamental forces of demand or supply provide only intermediate and longer term information on the direction of housing price movements. Their usefulness for short-term predictions is limited.

Unlike housing markets, where little research has revolved around short-term trends, the stock market has been preoccupied with developing statistics that may shed further light on price trends. Toward this end there are monthly, weekly, daily and even hourly statistics provided to analysts on price movements, volume traded, and a plethora of market indices. Similar real estate market indicators could be developed with widely available Multiple Listing Service data.[1] Such indicators and their use in monitoring housing price movements will be explored in this research.[2]

Research in the sense of "summarized data" has been available for some time at most computerized multiple listing services, and at the National Association of Realtors, which can be related to housing market trends. Yet, there has been little academic interest in utilizing such data to the extent possible for short-term housing market analysis. Belkin, Hemphel, and McLeavey (1976), Cubin (1974), and Miller (1978) all examined time on the market and its relationship with price. Now, time on the market is a common variable in hedonic pricing models of single-family residential markets. Little has been done beyond this.[3]

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READILY AVAILABLE DATA AS INDICATORS

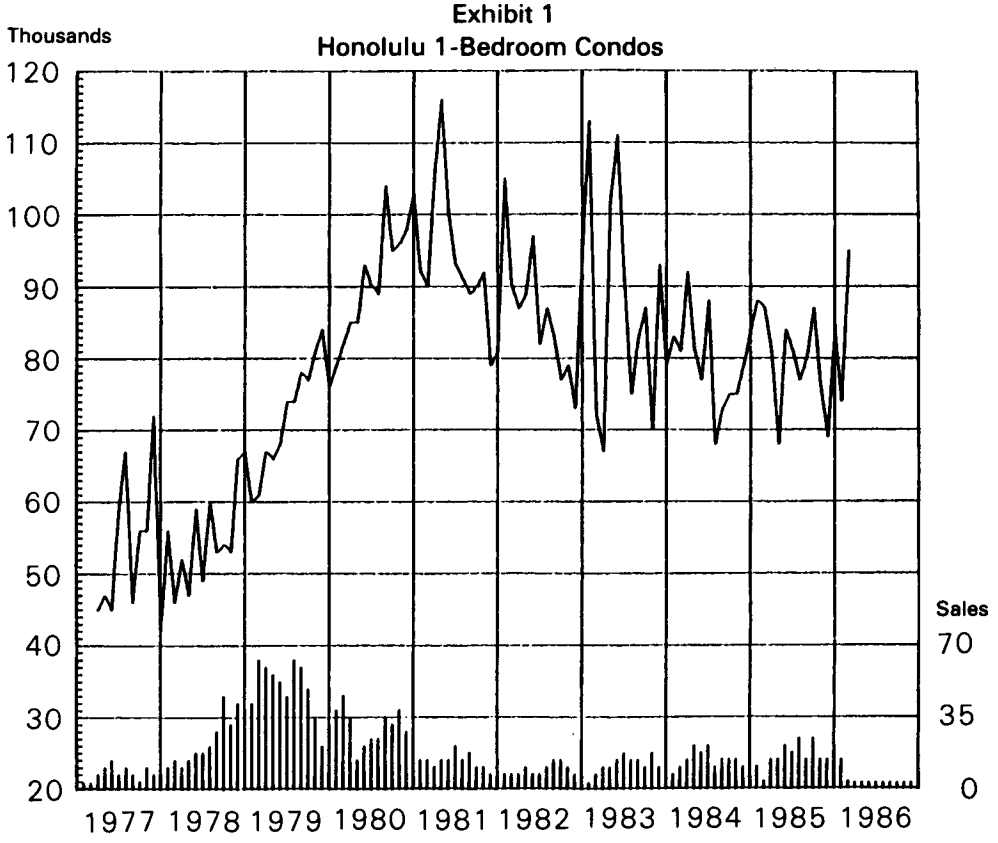
There are a number of short term, monthly and annual statistics available from computerized multiple listing services which can provide significant information on housing market price trends.

These include, but are not limited to, the following:

- Sales volume
- Percentage of listings sold
- Mean time (days) on market
- Mean percentage of listing price received
- Months remaining inventory

Any of the above might be quarterly, monthly, or even weekly if sufficient data are available from national, regional, major metropolitan, city, neighborhood, or even more specific locations. Each of these will be discussed in turn, along with their significance.

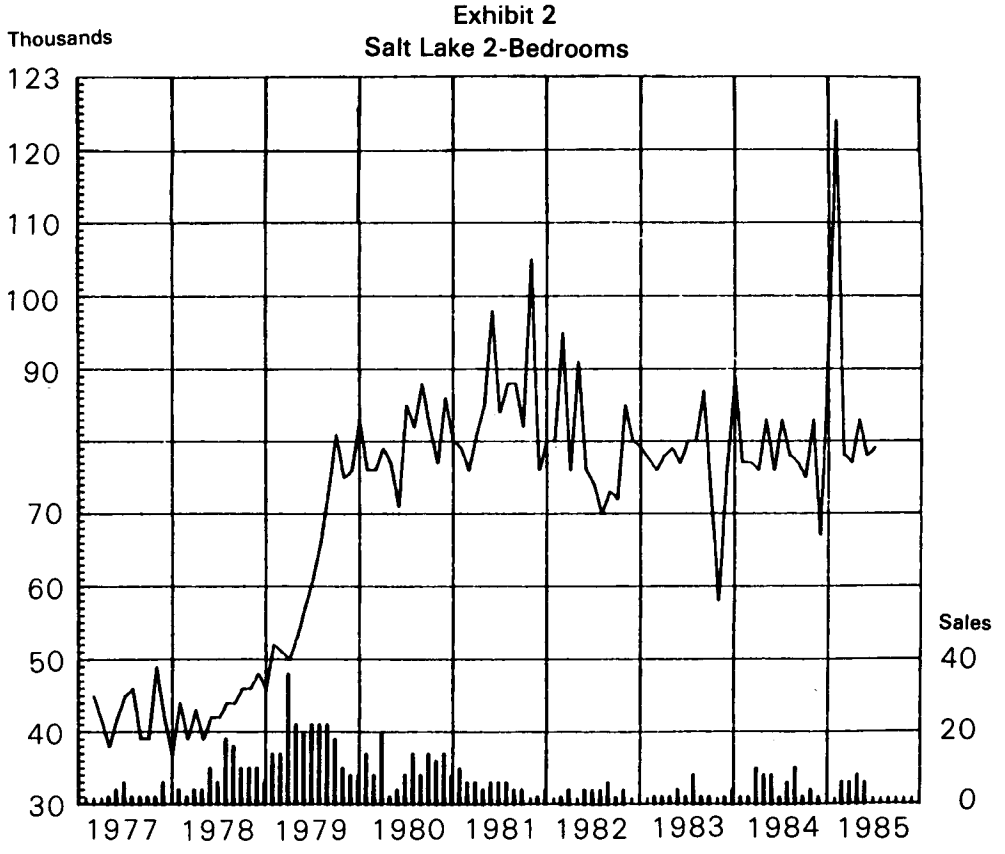
Exhibit 1
Honolulu 1-Bedroom Condos



Sales Volume

The number of sales within a given area per period shows whether demand is increasing or decreasing. In this respect, real estate is no different from other markets whereby sales volume precedes price movements. This is probably one of the most telling indicators of housing market price trends, and least utilized.

Exhibits 1 and 2 are good illustrations of this relationship with the price line (left scale) charted above the monthly sales (right scale). Exhibit 1 is of all Honolulu one-bedroom condominium MLS sales. Notice how average prices stayed relatively flat until late 1978, while sales volume was increasing sharply. The volume peaked several months before prices. Volume dropped off sharply by 1981 which preceded a significant erosion in prices. A similar pattern is seen in Exhibit 2 for a smaller geographic area on Oahu called Salt Lake. Most of the time, prices are moving sideways within a price-dispersed range, but a small proportion of the time, significant price movements are seen generally lagging substantial changes in the volume of sales.

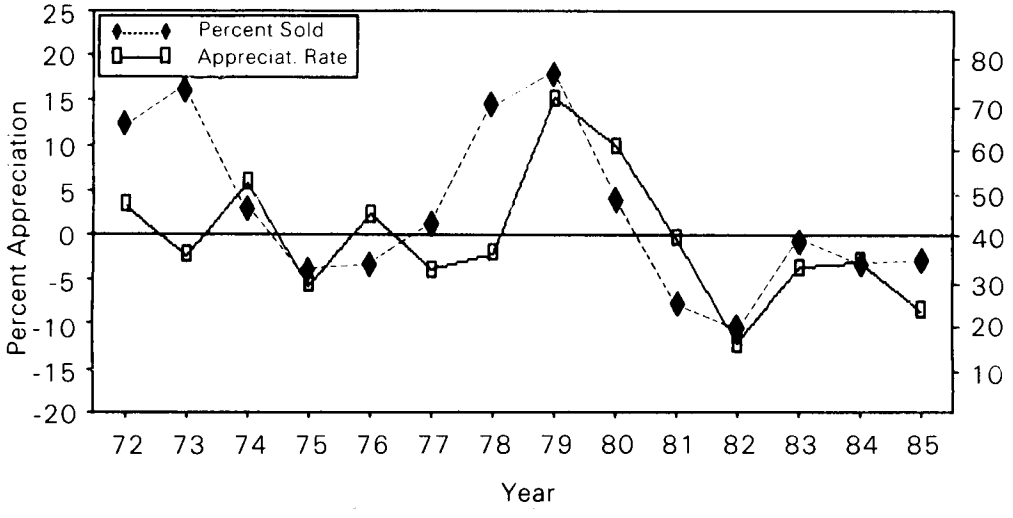


Percentage of Listings Sold

The number of homes that sell as a percentage of the total number put on the market in a given month, quarter, or year is another useful measure of market trends. In stronger markets, the percentage of listings sold increases, as should price. In soft markets, the percentage of listings sold declines.

Exhibit 3 depicts the Oahu condominiums percent sold via the MLS from 1972 through 1985. On Oahu the percent sold for condominiums generally varies from below 20% in weak markets to over 70% in strong markets. The appreciation rate is stated in real terms, adjusted by the change in the CPI, and shown by the solid line. The percent sold is graphed with diamond points and a dashed line. Note, not only the strong correlation, but that real appreciation only occurred when the percent sold exceeded 40% and was on an upswing. When fewer than 40% of the condominiums listed were selling, an "excess supply" was indicated in this market and real prices were falling.

Exhibit 3
Oahu Condo Apprec. Rate & % of List Sold

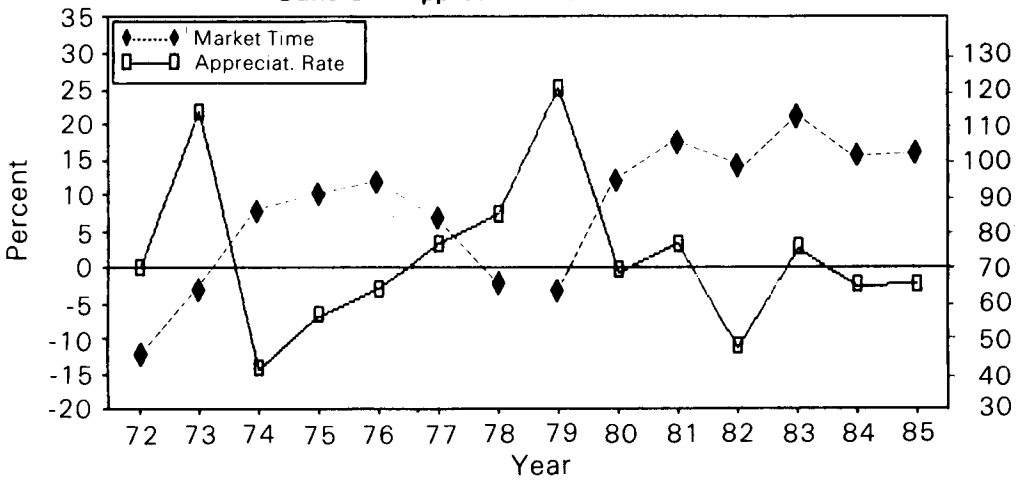


Mean Time on Market

The mean number of days-on-market of properties actually sold measured monthly, quarterly, or annually within an area is a strong inverse indicator of housing market price trends. As the mean number of days-on-market of sold properties declines, prices tend to increase.

These general relationships over fourteen years for the Oahu single-family resale housing market are shown in Exhibit 4.

Exhibit 4
Oahu S.F. Apprec. Rate & Sold Mkt Time



Mean Percentage of Listing Price Received

The mean selling price over listing price statistic tends to lead market price trends. In very strong markets, such as in 1979, it was not uncommon to see properties selling for more than the list (asking) prices as buyers outbid each other. (The same thing seems to be happening during the second quarter of 1986, as this is written.) For single-family homes on Oahu, this percentage tends to oscillate between approximately 90% on the low end and 96% on the high end. When the ratio is at the high end or above, it is a reliable sign that prices are close to peaking out, while at the low end or below, they are bottoming.

Exhibit 5 depicts this relationship from 1973 through 1985 for Oahu single-family homes. Similar to time on the market, this tends to lead the appreciation rate. Leads are discussed in the third section of this study

Months Remaining of Inventory

The ratio of available inventory to the current sales rate is known in finance as the inventory remaining ratio. This type of statistic can be developed by dividing the existing number of listings in an area by the most recent monthly sales rate, resulting in the number of months of currently available inventory. Months remaining is an excellent real estate market indicator, because it combines both supply (inventory for sales) and demand (sales rate) in one statistic. As the months-of-remaining-inventory declines, the prices tend to increase, and vice-versa.

This indicator tends to work very well in local markets or national markets. To show how such indicators apply even at the national level, Exhibit 6 was developed. It shows that quarterly values of months-remaining inventory (seasonally adjusted) from 1970 through 1985 have been strongly negatively correlated with real U.S. new single-family price changes measured quarterly.

Exhibit 5
Oahu Single-Family Apprec. & List/Sold $ Ratio

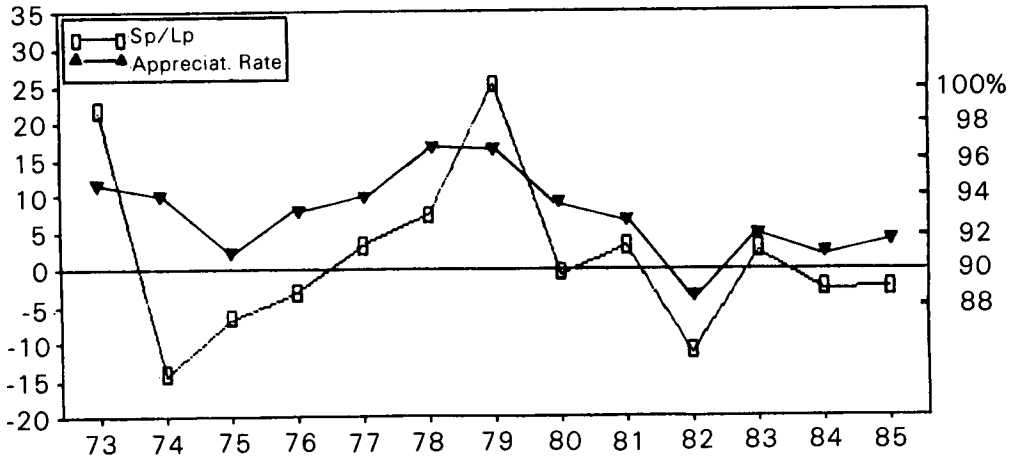


Exhibit 6
U.S. New S. F. Real Apprec. Rate & Inv. Remaining
Quarterly Values

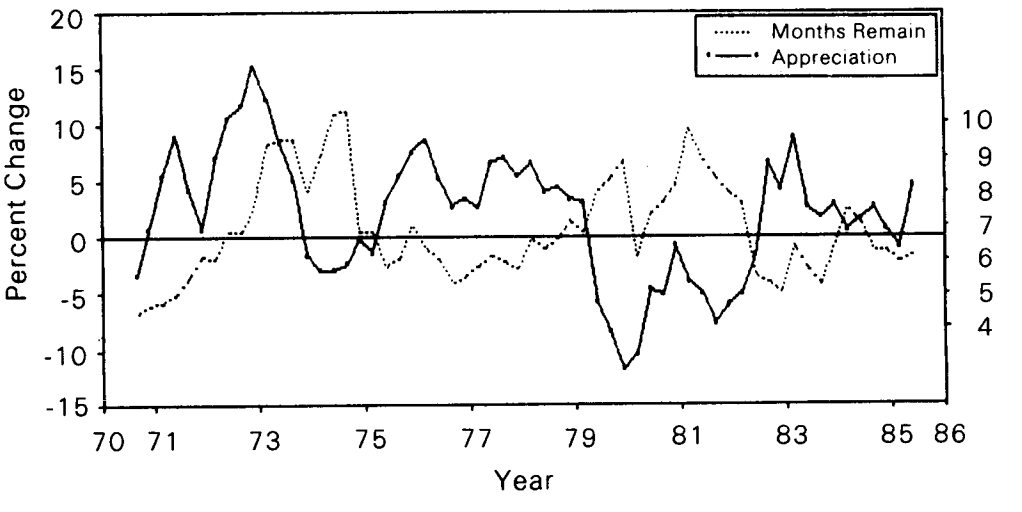
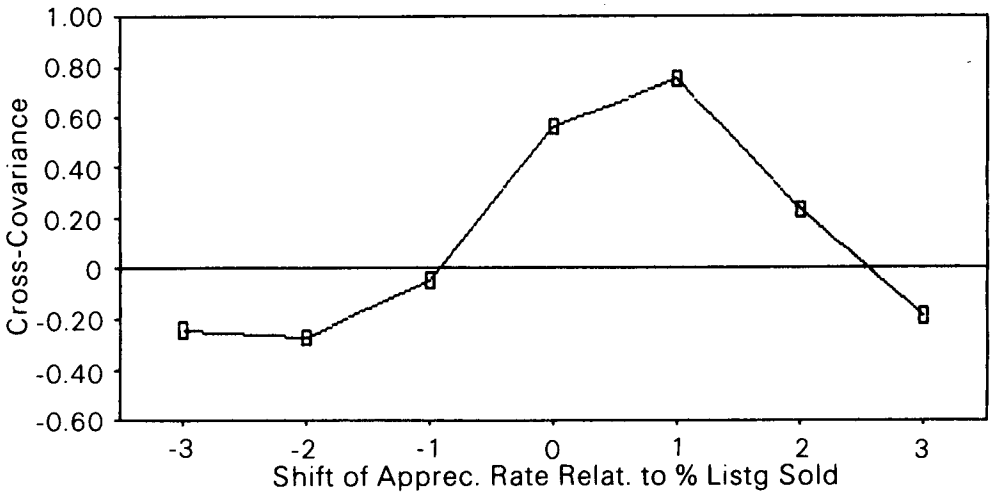


Exhibit 7
Oahu Condo Apprec. Rate & % of Listings Sold
Cross-Covariance Function
Annual Data 1972-1985



CROSS–COVARIANCE ANALYSIS OF HOUSING MARKET PRICE MOVEMENTS WITH INDICATORS OVER TIME

Most of the market indicators presented here lead the housing market price movements. One may intuitively guess at the expected lag in housing price movements based on the change in an indicator statistic by visually examining the graphs in Exhibits 1 through 6. This crude process unfortunately does not provide nearly the precise information available from cross-covariance analysis of housing price movements shifted in time relative to the respective indicators. Such a process also helps to validate which variables are leading which. Cross-covariance analysis was performed over a range of ten period leads and with three of the indicators previously discussed.

Exhibit 7 uses the data presented in Exhibit 3 with the percent of listings sold versus Oahu condominium real appreciation rates, and shows the lead/lag relationship for plus/minus three years. Above the 0 on the horizontal axis is the simultaneous data correlation statistic .56. To the right of the 0 is listing sold data shifted one, two, and three years in advance. To the left of the 0 is listing sold data shifted after the appreciation rate. Note that the percent sold leads the real appreciation rates by over one year, where the maximum correlation (in absolute value) occurs. The correlation statistic of .76 for the one-year lead compares to a .56 with zero lead. This is a remarkably high correlation statistic when one considers that "percent changes" in prices, not the absolute price movements, are being used in this analysis.

Exhibit 8 provides the cross-covariance statistics for Oahu single-family real appreciation rates and time on the market. Again it confirms the fact that average market time moves inversely with real price appreciation and leads by between zero lag and one year. Quarterly or monthly data, if available, could be used to refine the precise timing of the shift.

Exhibit 8
Oahu S.F. Apprec. Rate & Market Time

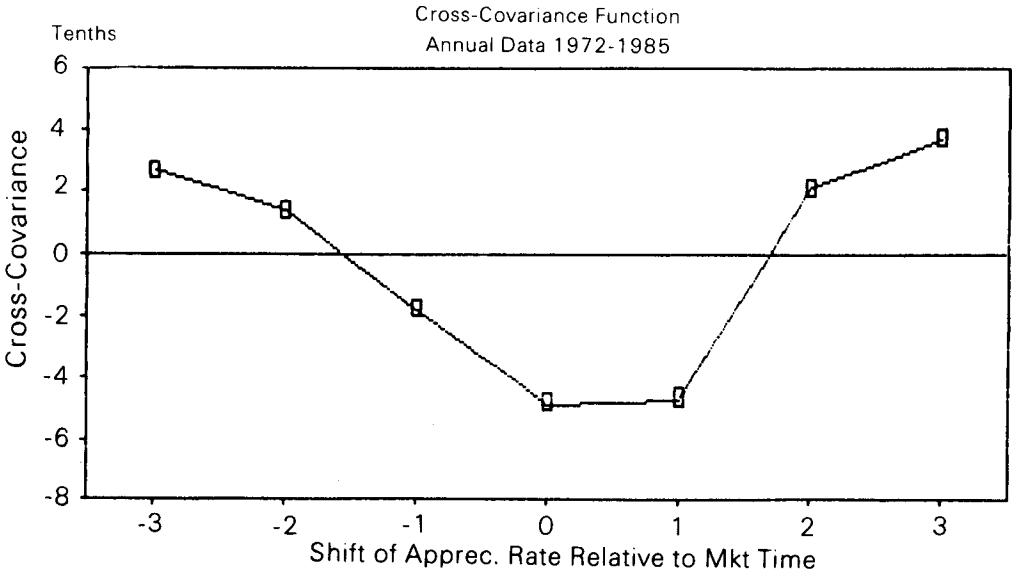


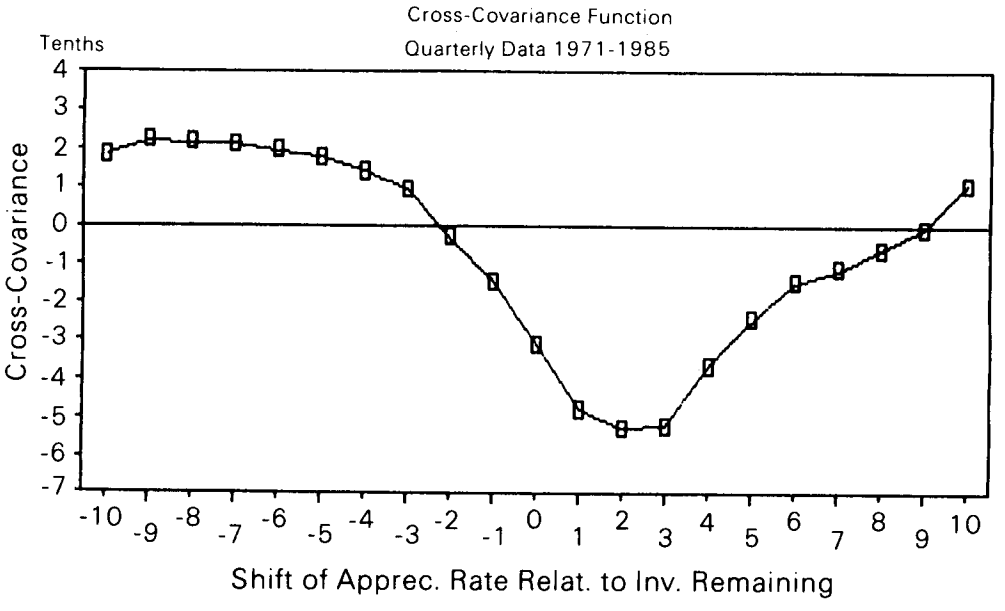
Exhibit 9 (following page) is the cross-covariance function for plus or minus ten quarterly shifts of Remaining Inventory (seasonally adjusted) with U.S. New Home Appreciation Rates. A negative correlation is shown, suggesting that the lower the months remaining of inventory, the higher the percentage gain in new home prices. The peak negative correlation occurs when the inventory remaining is shifted forward two quarters relative to the price appreciation change.

Cross-covariance analysis as shown here in Exhibits 7, 8 and 9 reveals the structure and strengths of leads or lags between variables. This type of analysis is necessary to develop price movement regression models with such indicators as independent variables. This holds true whether they are part of a larger hedonic pricing multivariate model or analyzed independently. For example, if one is developing a hedonic pricing model for single-family homes, including time on the market as an independent variable, then an earlier period statistic of time on the market may improve the significance of the regression coefficient and overall fit of the model.

REGRESSION ANALYSIS: A FEW EXAMPLES

The magnitude of expected market price changes relative to the indicators discussed here can be developed through simple least squares estimation of a regression coefficient. Below are the estimates for Oahu Condominium Real Annual Appreciation Rates with percent of listings sold as the independent variable.

Exhibit 9
U.S. New Home Appreciation & Inv. Remaining



No Shift

Condo Real Price Change$_n$ = .21774 (Percent Sold)$_n$ -10.30
(2.342)
t-value

Correlation Coefficient = .560
Standard Error of Estimate = 6.239

One Period Shift

Condo Real Price Change$_n$ = .28796 (Percent Sold)$_{n-1}$ -14.20
(4.153)
t-value

Correlation Coefficient = .768
Standard Error of Estimate = 4.824

Note that not only did the correlation coefficient increase with a one-year shift, as expected from the covariance matrix, but the t-value increased for the regression coefficient and the standard error of estimate declined.

For U.S. New Home Appreciation Rates and Months Remaining Inventory (seasonally adjusted), the best fit model at two-quarters shift was:

U.S. New Home Apprec.$_n$ = -1.83933 (Months Remaining)$_{n-2}$ -14.48
(-4.292)
t-value

Correlation Coefficient = .491
Standard Error of Estimate = 5.054

If one indicator is good, are more indicators together better? The answer is, not necessarily. All of the indicators discussed here are highly correlated with one another. Thus, multiple regression models may suffer from significant multicollinearity, generally without any improvement in overall fit. However, from market to market the "best" indicator may change, based on whether one wants to seek out the best correlation overall or the greatest lead time indicator at some minimum level of correlation. For example, the percent of listings sold worked extremely well with the Oahu condominium market, providing both a strong correlation and significant lead time, yet worked only modestly with single-family price trends.

CONCLUSIONS

The real estate purchase and investment decision process involves many complex, dynamic, and uncertain elements. Because of the uniqueness of many properties and localized markets, real estate market prices and trends have been more difficult to monitor than stocks, bonds and other financial assets. Information in real estate markets has been extremely costly. However, the proliferation of computerized real estate databases, especially Multiple Listing Services, has made available a great deal of information about market transactions. Even though most local housing markets are made up of heterogeneous properties, general price trends show a number of consistent and systematic relationships with various market transaction statistics. These include, but are not limited to: sales volume, time on market, percent of list price received, percent of listings sold, and remaining months of inventory.

Utilizing several of these "indicators" described here, one can generally forecast both the direction and magnitude of housing price percentage changes up to one year in the future. The typical lead time between these indicators and price reactions ranged from zero to twelve months. The suggested method, used here with three different indicators, is to develop a cross-covariance matrix of the relative price movement with the indicator statistic over a range of monthly, quarterly, or annual lags. Peak correlations then indicate by how much the leading indicator preceded price movements.

Technical approaches to the analysis of housing market price trends should be used in conjunction with, and not independent of, fundamental analysis which considers the effects of interest rates, employment and demographic trends, and other such economic driving forces.

To many market participants, such as homebuyers, investors, mortgage insurance companies, and mortgage lenders, price trends are probably as important as current "value," yet databases are apparently being underutilized in the real estate market.[4] For example, lenders monitoring the housing market may notice a transaction volume surge in a neighborhood, or a decrease in average time on the market, both signals of future price movements. This would add to their comfort level for making mortgage loans at higher-than-average loan-to-value ratios. Alternatively, when negative price leading indicators are observed in an area, lenders may tighten the loan-to-value ratio for mortgages well ahead of the expected price declines. We have found MLS-developed "indicator" statistics to work very reliably at both macro and micro levels. Although our work has focused on the Hawaii and nationwide market, these techniques should be equally applicable to any specific real estate market.

Future research will concentrate on the applications of similar methods to commercial markets.

NOTES

[1] The use of MLS data from a Realtor Association or Board may require a research license or membership in the Realtor Association. Many other computerized real estate data services are growing around the U.S.A. and it would seem highly desirable for them to provide their data to researchers who show the informational value of such data.

[2] For several years, Locations, Inc., a real estate firm in Honolulu, Hawaii, has used such indicators as will be presented here to help monitor housing market price trends, under the direction of Dr. Michael A. Sklarz.

[3] Seasonal variations have been examined by a number of authors. For example, see Rosen in the references. Also inventory-related statistics have been used in past research, primarily for new housing market analysis, as contrasted with existing housing resales. See Grebler and Mittelbach in the references.

[4] We are unaware of any submarket level housing market forecasting of real estate price trends using the type of data discussed here.

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[1] J. Belkin, D. Hemphel and D. McLeavey. An Empirical Study of Time on Market Using Multidimensional Segmentation on Housing Markets. *AREUEA Journal* (Fall 1978), pp.57-75.

[2] J. Cubin. Price, Quality, and Selling Time in the Housing Market. *Applied Economics* 6 (1974), pp.171-187.

[3] Leo Grebler and Frank G. Mittelbach. *The Inflation of House Prices*. Lexington, Mass.: D.C. Heath and Co., 1979.

[4] Norman G. Miller. Time on the Market and Selling Price. *AREUEA Journal* (Summer 1978), pp.64-73.

[5] Norman G. Miller and Michael A. Sklarz. Pricing Strategies and Residential Property Selling Prices. Working Paper, University of Hawaii, Real Estate Center, 1986.

[6] Kenneth T. Rosen. *Seasonal Cycles in the Housing Market*. Cambridge, Mass.: The MIT Press, 1979.

[7] Michael A. Sklarz. How a Technician Analyzes the Real Estate Market. *Barron's* (August 12, 1985), pp.85-86.