# Housing Price Forecasting & Leading Indicators: A Literature Review

Scott Sambucci, VP Data Analytics
Scott.sambucci@altosresearch.com
888.819.7775

## Trouble with Transaction Prices

With the size of the housing, real estate, and mortgage-related industry, it is critical that traders, researchers, and modelers use the best possible information available for pricing and forecasting. Traditionally, housing market models have been based on transaction (a.k.a. "sold") prices, a practice that failed spectacularly when the housing bubble burst in 2007-2008. However, the traditional practice of forecasting the housing market with models based transaction prices faces everal significant challenges:

- **Lag Time**: Transaction prices are primarily available through public records or through local Multiple Listings Services. Due to heavy restrictions on MLS data access, municipal public records serve as the main channel to view transaction prices. However, the time delay from the moment a transaction occurs to public availability of these data ranges from one to many months. Given the volatility and seasonality of the housing market, integrating lagging transaction price data into forecasting models puts the researcher at an immediate disadvantage.
- **Omission of Market Conditions**: Transaction prices provide only a final data point about a property's journey on the active market. Transaction price measures omit other key drivers to forecasting models such as market supply (a.k.a. "inventory"), time to sale (a.k.a. "days-on-market"), price reductions taken by the seller prior to sale, demand indicators, and competing listing prices to name a few. Recent research regarding mortgage defaults illustrates strong correlations between default rates and housing market conditions. Transaction prices offer no visibility about current market conditions to portfolio and asset valuations, prepayment risk, and loss severity.
- **Sample Size Problems**: Today's modeling innovations enable forecasters to examine micro-market trends, such as zip codes and price levels. On a week-to-week basis, it is common in a zip code and price zones within a zip code for there to be very few (if any) transactions over a given week, depriving the forecaster of the necessary observations to discern useful data in their models. The researcher is left with anecdotal observations, not a sound data set to determine market trends.

The time has come for some new thinking, and fortunately, researchers the academic community began this process 30 years ago. Fortunately, a solution exists – the active real estate market.

While transactions are often few in number and provide no insights about current market conditions, the active real estate market moves and changes every day. More importantly, today's active listings provide a significant signal mechanism about market conditions and future transactions prices – exactly what the modelers seek. Over the past 30 years, dozens of research papers and journal articles have been published to provide specific applications for active market data, including listing prices, market supply, time on market, and price reductions. Additional active market measures provide a complete set of indicators to more know today's market conditions and tomorrow's transaction prices.

## Active Market Signals

This literature review examines the publications and research that emphasize the importance of active market property data such as list prices, price reductions, time on market and property characteristics in forecasting future prices. Implementing these research findings will enable investment community to more quickly and accurately determine future transaction prices, and subsequently, more accurately value residential real estate assets and residential real estate-based portfolios. The implications are significant to investors and their shareholders. With the recent housing crash casting a spotlight on financial market firms ("how did you miss the bubble!?"), an opportunity now exists to improve modeling practices and build on what we've learned as an industry.

While utilizing active market property analytics to housing market models may be a revolutionary thought process for some, the good news is that executing these modeling changes is more a matter of renovation than revolution. These model updates can often be implemented using existing models as a baseline then layering these new modeling innovations atop what already exists. For the housing market researcher modeling RMBS portfolios and whole loan assets, prepayment risk, default rates, and loss severity are major drivers to valuations. Better modeling through real-time market conditions provides the trader with better information and an exceptional advantage at time of trade.

# Literature Review

One the biggest challenges sellers face is the structure of the housing market. Sellers must set their price first based on available information. Lazear (1986) studies pricing from this perspective and provides a two-period model in which list price are important. In the first period, sellers who are uncertain about buyer valuations learn in the first period then adjust their pricing in the second period (if necessary). In slow or "thin" markets, fewer buyers in the initial period means that sellers accrue less information in a time period. In thin markets, a seller will set a lower price initially but decrease their prices less rapidly.

Sklarz (2010) suggests that access to key data elements including active market indicators such as listing prices (including the price of new listing entering the market each period), inventory, absorption rates, days on market, list-to-sale price ratios, and improved home price index methodologies considerably improve the researcher's ability to forecast the housing market. Listing prices for example, as shown in Hui, Wong, and Wong (2007) use the Granger causality test, significantly influence selling prices. Knight, Sirmans and Turnbull also use the Granger causality test (1998) across a panel data set that includes high- and low-priced homes and newer and older homes to find that "in spite of the dramatic differences in price trends across market segments, listing price appears to be useful in predicting subsequent selling price for almost all geographical and categorical subsets of [the] data."

Horowitz (1992) finds that including list prices in a regression model explains sales price more accurately than just the set of property characteristics. From the article:

"List prices are distinct from seller reservation prices…The estimated model predicts sale and reservation prices conditional on list prices…The model also explains why sellers may not be willing to reduce their list prices even after their houses have remained unsold for long periods of time."

Using this principle, list price provides a starting point in a market for current and future price levels. While there is expected variation (usually negative) when comparing the list price to the eventual transaction price, a seller's list price enables the market to begin narrowing in to future transaction prices. The gap between the listing price and transaction price is predictable, as shown using recent housing market data from San Jose, CA. Additionally, as the price of new listings entering the market each week approaches, and in the example below, exceeds the overall market list prices, sold prices accelerate towards market prices.


**Figure 1: List Price vs. Transaction Prices: San Jose, CA**

This gap between listing prices and sold prices is explained by the seller price-setting strategy - sellers strategically overprice their homes to account for expected bargaining between buyers and their reservation prices. Benítez-Silva, Eren, Heiland, and Jiménez-Martín (2008) showed that home owners typically over-value their homes by an average of 5-10%, further explaining the difference between listing and transaction prices. Most importantly, both articles illustrate that listing prices can be predictably discounted, enabling list prices to be used as a reliable indicator of current market prices.

Horowitz's model incorporates ten (10) variables that include price measures along with property attributes such as square footage, the number of bedrooms and bathrooms, lot size, and property type (attached or detached). Horowitz (1992) extends the work of Chinloy (1980) that develops a predictive model whether a home will sell or not based on observable house and household characteristics. Chinloy finds that the seller list price "is based on access to general market conditions, but prior to the receipt of any bids" indicating the sellers act rationally based on information available to them. Read (1988) finds that because homes are largely idiosyncratic, certain home qualities such as valuation per floor space and location are easily quantifiable while other qualities such as curb appeal or seller characteristics are difficult to observe. Because of this, sellers will adjust their list price in a sequence if buyers arrive at a

pace slower than expected. Sellers are constantly observing and revising their pricing strategy based on market interaction (or lack thereof). Anglin, Rutherford, and Springer (2003) conclude that "market conditions generate a locus which describes how the expected selling price and expected time on market vary jointly based on the choice of list price."

Additional factors govern systemic overpricing by sellers in a marketplace – the agents representing the market's buyers. Haurin, Haurin, Nadauld, and Taylor (2006) write:

*"If a potential buyer views an 'overpriced' property's characteristics either on-line or in-person, the buyer is likely to be disappointed with the property's quality. The housing market real estate agents are aware of this type of buyer reaction to overpriced properties and may be less likely to exert effort to show an "overpriced" property to potential buyers. Both agent and buyer behaviors tend to reduce the arrival rate of offers."*

Haurin, Haurin, Nadauld, and Taylor discuss the classic seller conundrum – a higher price will yield potentially higher buyer bids, but will reduce the number of the bids received. The laws of demand and supply coupled with the market interaction between sellers, buyers, and agents provides a policing mechanism that forces sellers to set their asking prices at realistic levels or risk inactivity among the buyer pool. A lack of buyer interest would, in turn, require a price reduction from the seller, which increases the hazard of sale, another result uncovered by de Witt and van der Klaaw (2010).

Merlo and Ortalo-Magn´e (2006) denote a "temporary equilibrium" to describe that housing markets frequently swing back and forth between being a "seller's market" and a "buyer's market." They describe real agents in the marketplace to have "approximately rational expectations" because of their position and perspective on the market "even though there may be a longer run continuing imbalance between the number of homes being sold and the number buyers looking to buy them in any particular housing market."

Knight (2002) writes that "mispricing the home in the initial listing is costly to the seller in both time and money. Homes with large percentage changes in list price take longer to sell and ultimately sell at lower prices." Knight also finds that the average list-to-sale markup was 12.2% before a price reduction and 3.2% after the price reduction. This provides an additional framework for the use of list price data to determine future sales prices. When the margin is predictable, the researcher can simply apply a discount to listing prices to arrive at future sales prices.

Using Boston condo data, Genesove and Mayer (2001) show that loss aversion determines seller behavior in the housing market. They tackle why housing prices and sales volume often accelerate in parallel, defying the generally accepted economic laws of demand and supply. In a housing boom or even within seasonal cycles, houses sell quickly and at times, above the stated asking prices. Genesove and Mayer find that at market troughs (thin markets), listing prices exceed sales prices by 35%, but in healthy markets, listing prices exceed sales price by only 12%. Genesove and Mayer also find that loss aversion drives those most sensitive to price out of the market, that is, sellers who are unable to find a seller to meet a rigid reservation price will likely withdraw their listings. This finding has applications for the distressed marketplace where short-sale sellers may have a rigid reservation price due to personal monetary constraints or the depth of a short-sale that a bank would be willing to approve. A market area's "days on market" (DOM) of its active listings is a critical component to understanding seller psychology. Longer DOMs indicate more rigid reservation prices of sellers.

This helps to explain that sellers, in aggregate, are rational. Over-pricing will occur on a single property in the market, but cannot logically occur in aggregate. If sellers where in fact serially over-pricing and rigid on their reservation prices, price reductions would be a negligible stat in housing markets. In cases where list prices are severely above buyer reservation prices, price reductions are high which research has shown as a signal of sellers to engage in a transaction.

Yavas and Yang (1995) research the question – "What is the optimal price to be asked for the property?" They find that sellers set their listing prices based on the following factors:

- Seller valuation of the property
- Bargaining power
- Commission rate
- Cost of search
- Signally function that maps the seller's listing price to valuation on the property

Because commission rate is generally fixed and cost of search in today's market in negligible with the advent of online advertising, these factors are less of an influence to sellers in today's market. As shown in Benítez-Silva, Eren, Heiland, and Jiménez-Martín (2008), sellers generally over-value their properties within a predictable 5-10% band. Today's sellers also have more access to more information than ever regarding their personal valuations. Active listings available are published publicly and updated quickly. It is a very simple process for sellers to search online to see the asking prices of all homes for sale in his neighborhood to define a self-determined price relatively close to eventual buyer acceptability.

To further their analysis, Yavas and Yang divide their data sample into price quartiles to calculate DOM based on price to see if there are differences. They found that overpricing increases DOM for mid-price houses but does not significantly impact on low- and high-price house. This suggests that mid-price homes fall in a highly competitive distribution curve and that markets are efficient. Anglin, Rutherford, and Springer (2003) found that increases in listings price affects DOM, and even more so in market segments with little price variability. In these highly competitive price segments, this factor coerces sellers to set their listing prices relative to other homes on the market, and thus leads to more efficient price setting by the sellers.

Yavas and Yang also found that DOM is more closely dependent on seasonal and brokerage-related variables than housing prices are. Seasonal and firm-related variables were not significant to explaining the selling price, and that the physical and locational attributes were significant to DOM. These findings indicate market efficiency – sellers, based on self-valuations, correctly take into account the physical and locational factors that will affect final selling prices. Sellers know when they live next to a polluting factory or back up to a nature reserve for example. Subsequently, they properly account for these factors when establishing self-valuations on their homes. Also, the fact that DOM is closely depending on seasonal and brokerage-related variables indicates that DOM may be dependent on the available pool of buyers. For example, here are fewer buyers in Fall and Winter, so homes on the market during this time face longer DOM simply because they are on the market during a thin market.

Genesove and Mayer (2001) also find that "(s)ince at the trough of the cycles, loss aversion and equity constraints lead many sellers to set relatively high reservation prices, buyers' valuations must actually be more volatile that the observed transaction prices!" In down markets (troughs), using observed transaction prices is even riskier for buyers of the rigidly of reservation prices. It is therefore vital for buyers to observe other characteristics about the sellers such as DOM and previous price reductions to estimate what prices will be accepted. "Loss aversion" and "equity

constraints" are particularly relevant in today's housing market environment because the equity constraints are so tangible and easily measured regardless if the seller is an individual or a bank disposing of the assets. However, if other cost factors are introduced such as holding costs, repair costs, and general demand weakness, then the likelihood of bids prices exceeding seller reservation prices will increase.

Horowitz (1992) examined the role of active seller price reductions and their signaling effects, a concept explored in more detail by Glower, Haurin, and Hendershott (1995). They find that:

*"…sale prices are directly related to the estimated value of the property and to the amount of over-pricing, which is directly related to the seller's level of motivation. Further, a seller who has a planned date to move will over-price less (set lower list prices relative to market value) and sell more quickly than a seller with no definite move date. A seller who is willing to move later will over-price more and sell more slowly than a seller who wants to move sooner."*

Sellers have specific characteristics that affect their reservation prices, which are signaled by initial list price, time on market, and willingness to take a price reduction. More motivated sellers will have lower reservation prices and will accept earlier offers illustrating the rationality of sellers when price-setting in a first-mover environment. Albrecht, Gautier, and Vroman (2010) show that sellers self-identify based on their listings prices. Sellers with low reservation prices identify themselves by posting low asking prices, while sellers with high reservation price (relative to the home's value and transaction price) identify themselves by posting high asking prices. The authors do indicate that sellers with low reservation prices may be motivated in some other way such as contingency on another home they have purchased or distress. However in today's bifurcated market where the incidence of seller "move-ups" is low due to negative equity and thin markets, it could be argued that low price setting signals distress to the marketplace. DeWit and van der Klaaw (2010) show that the "thinness" of the market for a particular house affects both the list price and the probability of selling the house. Springer (1996) found "(f)actors such as relocation and financial distress motivate the seller of a single-family home to facilitate sale by posting a lower list price, communicating the motivations to the marketplace, or offering sales incentives to agents." Most importantly, Springer's results "further suggest that the list price is the seller's primary mechanism for selling the property."

Horowitz (1992) shows, because sellers are generally unwilling to reduce their asking prices, a seller that does indeed take this action is clearly signaling to the market her desire to sell and or a sign of market conditions strongly influencing seller actions. Not surprisingly, list price reductions significantly increase the probability of selling a house as is specifically examined by de Wit and van der Klaauw (2010) while also increasing the probability that the subject property will be withdrawn from the active market.

*"Our empirical results show that list-price reductions significantly increase the hazard of sale, but also increase the hazard at which the house is taken off the market. The effects are very substantial. A list-price reduction raises the selling rate by 83%, and the rate of withdrawing by 44%... Therefore, we interpret the substantial and significant effect of the list-price reductions as evidence in favor of the presence of asymmetric information in the housing market…*

*"In the sensitivity analyses, we have also shown that the timing and the magnitude of the list-price reduction matter. Furthermore, we have stressed the importance of allowing*

*for selectivity in list-price reductions and taking withdrawals from the market into account."*

Herrin, Knight, and Sirmans explore "price cutting" and find increased seller price rigidity in cases where the sellers have more information about buyer demand and increased seller flexibility with more motivated sellers. Knight, Sirmans and Turnbull (2006) specifically test the role of list prices in predicting eventual transaction prices, using quarterly data over an eight-year time series. They find that "the list price may lead the market when functioning as a signal of seller intent, but list price will probably lag a market driven by buyer willingness to purchase." Sellers have the best information about buyers in stronger market times – when there are more transactions occurring over shorter periods of time. However, this affects the signaling of list prices during inflection points in a market – at peaks and troughs - because prices are naturally "sticky." Caplin and Leahy (2008) address this in their discussion about a seller's perceived demand uncertainly which leads to price dispersion. They write:

*"Prices do not incorporate all contemporaneous information, causing prices changes to lag inventory dynamics. When demand is unexpectedly high, prices will rise, but this rise will be tempered by the fact that some homes sold at low prices. During the next period when inventory is known to be low, it is now possible for prices to rise further."*

Prices are sticky, even in the housing market both at peaks, such as Seattle in 2008 and troughs where prices might stabilize after falling, yet not increase even with falling inventory as is the case in Miami since January 2009.

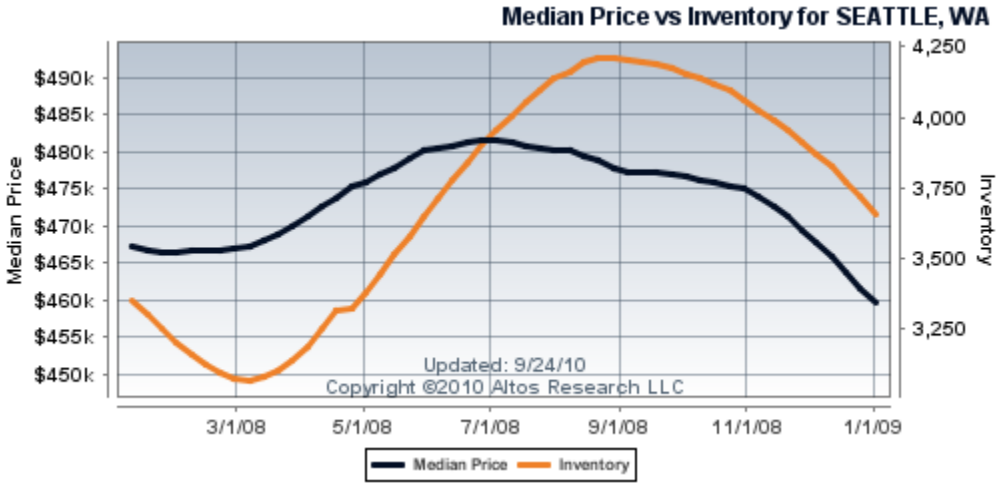


**Figure 2: Price & Inventory since 01/01/2008 - Seattle, WA**

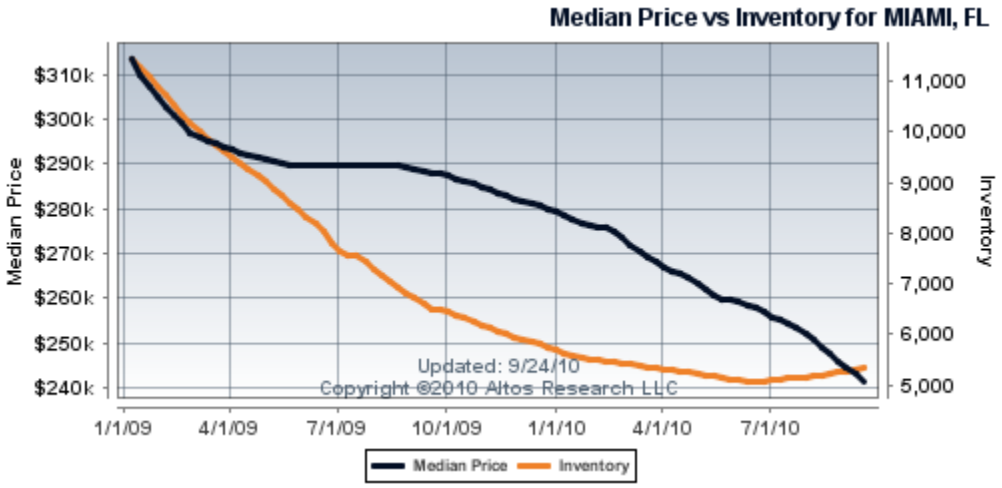


**Figure 3: Price & Inventory since 01/01/2009 - Miami, FL**

This means sellers may be misdirected when using only transaction prices to set listing prices without considering time on market, price reductions, or other transaction factors that led to these transaction prices. Most importantly, market supply (inventory) matters when it comes to future prices. If prices are indeed sticky and do not adjust quickly to changes in housing supply, knowing inventory in real-time becomes even more important to forecasters. The use of inventory enables modelers to forecast future price changes and trends, whether that predictive ability is one week or several months.

Bental and Eden (1993) show the stationary relationship between inventory and prices. They find:

1. Larger beginning-of-period inventories tend to depress prices.
2. Inventories are positively serially correlated.
3. A unit increase in inventories leads to an increase in the price spread.
4. Output tends to vary more than sales.

They study a model of inventory behavior when firms face uncertain demand, with the uncertainly stemming from unknown demand levels and the structure of the demand. The model also looks at the scenario of buyers arriving in "separate batches, with the arrival of any event being a random event." When it comes to prices setting in the housing market, this is the experience of the seller – buyers pools are random and may be infrequent. Bental and Eden assume "production decisions are made before realization of demand." This is also the case in today's housing market. The seller entering the marketplace is generally doing so because of endogenous reasons (as opposed to sellers who entered the market during the housing bubble to earn a profit). Today's sellers are likely motivated by a personal factor such as labor mobility or wealth changes.

Relating inventory and its effect on prices, a key result from Bental and Eden is that "A unit increase in inventories leads to an increase in the price spread". A market with increasing inventory would be characterized as "thin" by sellers – a "buyer's market" - characterized as fewer buyers per available home for sale. In this type of market, Genesove and Mayer found that at market troughs (thin markets), listing prices exceed sales prices by 35%, but in healthy markets, listing prices exceed sales price by only 12% which supports this finding by Bental and

Eden in the housing market. Anglin, Rutherford, and Springer (2003) found that an increase in market inventory lengthens DOM for an individual seller.

DeWit and van der Klaaw (2010) show that changes in the list price are not exogenous, meaning that the reason for a price reduction stems from the seller and her characteristics, and that market thinness may also affect list price changes. They also show the relationship between price, price reductions, and time on market:

*"List-price reductions reduce the expected transaction price, which is the direct effect. However, also the time on the market before selling the house has a negative effect on the transaction price. The indirect effect of a list-price reduction is thus that it reduced the time on the market which again increases the expected transaction price."*

The rate of buyer offers is examined by Arnold (1999) in his "search-and-bargaining" model discussing how the initial listing price directly affects the rate at which potential buyers display interest in the seller's property. Additionally, Arnold shows that a seller's initial asking price relative to the property's intrinsic value provides information about the seller's discount rate. The seller knows that an initial asking price well above the property's value with result in fewer buyers and interest in the property. However, this may be purposeful for a patient seller that is willing to extend the time on market to receive a higher bid price from a smaller pool of buyers. For property analysis, this implies that a single properties with similar physical characteristics as other on-market properties may have not have a less motivated seller, but a seller is a less distressed situation. However, as Arnold points out, the higher-pricing seller may also offset these longer time on market costs during the bargaining process with a prospective buyer by reaching a higher transaction price.

De Wit and van der Klaauw (2010) also comment on house quality relative pricing showing a seller's willingness to a take a price reduction signals unobservable characteristics about the property or the seller. Sellers with specific characteristics will set their initial asking prices different. For example, Genovese and Mayer (1997) find that sellers with high loan-to-value ratio tend to set a higher initial listing price, have a lower probability of sale but, if and when they sell, obtain a higher price.

Merlo and Ortalo-Magné (2004) examines price changes from the time of initial listing to sale. Listing prices influences the arrival of buyer offers, revealing the ability to assess market demand based on seller behavior related to time on market and listing price revisions. They write:

*"The variables included in our regression jointly account for 80 percent of the observed variability in the initial listing price. Initial listing prices depend to a large extent on the observable characteristics of the properties."*

This is important because this enables buyers to compare listing prices based on comparable on-market listings to determine relative pricing and probabilities related to time on market and sale price.

*"Before a first price change, they wait 11 weeks on average. Recall from Table 1 above that the average time to sale is also 11 weeks. This observation suggests that sellers who change their listing price wait a significant amount of time before doing it. In more active markets price changes are less frequent. In the vast majority of cases, sellers who decrease their listing price*

*have no prior response from prospective buyers: in 86 percent of the cases, price changes occur before an offer was ever received."*

By watching individual listings, it is possible to determine likelihood of future price reductions based on DOM. If DOM is reaching the 11 week benchmark, it would be acceptable to expect a list price reduction, and subsequently a lower forecasted transaction price. This also provides additional evidence as to the negative correlation between price reductions and demand levels. The authors explicitly state that the probability of price reductions decreases with the number of potential buyers who have made a bid on the property:

*"It is equal to 5.3 percent on average, which is greater than the average sale price discount relative to initial listing price (4.1 percent). In more active markets listing price reductions are smaller on average… Also, the more a property is overpriced, the smaller the listing price revision in percentage terms…*

*"Our main findings can be summarized as follows. First, listing price reductions are fairly infrequent; when they occur they are typically large. Listing price revisions appear to be triggered by a lack of offers. The size of the reduction in the listing price is larger the longer a property has been on the market.*

*"Second, the level of a first offer relative to the listing price at the time the offer is made is lower the longer the property has been on the market, the more the property is currently overpriced, and if there has been no revision of the listing price."*

Belkin, Hempel, McLeavy (1976), Jansen and Jobson (1980) and Kang and Gardner (1989) examined the influence that time on market plays on selling price. Their findings show the time on market is a decreasing function of selling price over listing price – as the gap between the transaction price and the listing price widens, so does time on market. However in reference to these papers, to Yavas and Yang (1995) point out that all three of these papers "fail to recognize the simultaneity problem between TOM and price; TOM can affect selling price as selling price can affect TOM." Because of this simultaneity problem, using time on market as a single indicator for future transaction prices will lead to forecasting errors. Kalra, Chan, and Lai (1997) review this simultaneity problem and find that TOM and sale prices are positively related to one another.

Tsai (2010) explores the relationship between the initial asking price, sale price, and time on the market as they are simultaneously influenced by the intrinsic value of the house, developing a model that estimates average rates of listing price concessions using these three inputs.

Miller and Sklarz (1987) propose two listing price strategies that a seller could employ – price considerably above market value in an attempt to receive the highest possible bid or price very close to market value. The first strategy results in an extended time on market as the buyer pool willing and able to pay a higher price would be smaller. The second strategy would lead to a very quick trade. Given the distribution of DOM for individual properties, one can conclude that neither strategy is used in aggregate by sellers in the market – that sellers rationally set their listing prices in general accordance with expected market prices.

The relationship between DOM and selling price is a topic of debate in the research community. Johnson, Benefield, and Wiley (2007) summarize the results of eighteen published articles, finding that 72% of the estimations of property price and marketing time do not exhibit the positive relationship between DOM and selling price. They suggest that the estimation

differences arise from unobservable characteristics of both buyers and sellers. Johnson, Benefield, and Wiley (2007) also refer to Anglin (2006) which shows that estimating time on market becomes more difficult with changing market conditions. These mixed results in the published research indicate that other factors should be considered when estimating transaction price in the housing market.

## Conclusion

The research shows that listing price matters. Market supply matters. Price reductions signal demand weakness. Residential mortgage-backed securities, whole loan portfolios, REOs, foreclosures, and related real estate investments are a multi-trillion dollar industry. Active market indicators provide immediate visibility about today's market conditions and tomorrow's transaction prices.

## Articles Reviewed


ALBRECHT, JAMES, P.A. GAUTIER, AND S. VROMAN (2010), "Directed Search in the Housing Market," *Tinbergen Institute Discussion Paper*.

ANGLIN, PAUL M., R. RUTHERFORD, AND T.M. SPRINGER (2003), "The Trade-Off Between the Selling Price of Residential Properties and Time-on-the-Market: The Impact of Price Setting," *Journal of Real Estate Finance and Economics*, 26:1, 95-111.

ARNOLD, MICHAEL (1999). "Search, Bargaining and Optimal Asking Prices," *Real Estate Economics*, 27, 453-481.

BELKIN, JACOB, D.J. HEMPEL, AND D.W. MCLEAVEY (1976), "An Empirical Study of Time on Market Using Multidimensional Segmentation of Housing Markets," *Real Estate Economics*, 4:2, 57-75.

BENÍTEZ-SILVA, HUGO, S. EREN, F. HEILAND, AND S. JIMÉNEZ-MARTÍN (2008), "How Well do Individuals Predict the Selling Prices of their Homes?" *Foundation for Applied Economic Studies (FEDEA).*

BENTAL, BENJAMIN AND B. EDEN (1993), "Inventories in a Competitive Environment," *Journal of Political Economy*, 101, 863-886.

CHINLOY, PETER T (1980), "An empirical model of the market for resale homes," *Journal of Urban Economics*, 7, 279-292.

DE WIT, ERIK R. AND B. VAN DER KLAAW (2010), "Asymmetric Information and List Price Reductions in the Housing Market," *Tinbergen Institute Discussion Paper*

HAURIN, DONALD R., J.L. HAURIN, T. NADAULD, AND A.B. SANDERS (2006), "List Prices, Sale Prices, and Marketing Time: An Application to U.S. Housing Markets,"

Hui, Eddie C.M., J.T.Y. Wong, and K.T. Wong (2007), "The Role of the List Price: Evidence from the Hong Kong Housing Market" Presented at the AREUEA International Conference; Macau, China.

GENESOVE, DAVID AND C.J. MAYER, "Equity and time to sale in the real estate market," American Economic Review 87 (1997)

GENESOVE, DAVID AND C.J. MAYER (2001). "Loss Aversion and Seller Behavior: Evidence from the Housing Market," *The Quarterly Journal of Economics*, 116:4, 1233-1260.

GLOWER, MICHEL, D.R. HAURTIN AND P.H. HENDERSHOTT (1995), "Selling Price and Selling Time: The Impact of Seller Motivation," *NBER Working Paper No. 5071*

HERRIN, WILLIAM, J.R. KNIGHT, AND C.F. SIRMANS (2004), "Price Cutting Behavior in Residential Markets," *Journal of Housing Economics*, 3, 195-207.

KALRA, RAJIV, K.C. CHAN AND P. LAI (1997), "Time on market and sales price of residential housing: A Note," Journal of Economics and Finance, 21:2, 63-66

KANG, HAN BIN AND M.J. GARDNER (1989), "Selling Price and Marketing Time in the Residential Real Estate Market," *Journal of Real Estate Research*, 4:1, 21-35.

Knight, J R., C.F. Sirmans and G.K. Turnbull (1998), "List Price Information in Residential Appraisal and Underwriting," *Journal of Real Estate Research*, 15:1, 59-76

KNIGHT, J R., C.F. SIRMANS AND G.K. TURNBULL (2005). "List price signaling and buyer behavior in the housing market," *The Journal of Real Estate Finance and Economics*, 9:3, 177-192

KNIGHT, J. R. (2002), "Listing Price, Time on Market, and Ultimate Selling Price: Causes and Effects of Listing Price Changes," *Real Estate Economics*, 2, 213-237.

JANSSEN C. T. L. AND J. D. JOBSON (1980), "On the Choice of Realtor," *Decision Sciences*, 11:2, 299–311.

MERLO, ANTONIO, F. ORTALO-MAGN´E, AND J. RUST (2006), "Models of Bargaining and Price Determination of Residential Real Estate, with and without Real Estate Agents."

MERLO, ANTONIO AND F. ORTALO-MAGN´E (2004), "Bargaining over Residential Real Estate: Evidence from England,' *Journal of Urban Economics*, 56:2, 192-216.

MILLER, NORMAN AND M.A. SKLARZ (1987), "Pricing Strategies and Residential Property Selling Strategies," *The Journal of Real Estate Research*, 2:1, 31-40.

READ, COLIN (1988), "Price Strategies for Idiosyncratic Goods - The Case of Housing," *Real Estate Economics*, 16:4, 379-195.

SKLARZ, MICHAEL (2010), "New Predictive Methods for Residential Real Estate and Mortgage Analytics," *Presented at the 2010 Predictive Methods Conference; Laguna Nigel, CA (organized by Veros*).

SPRINGER, THOMAS, M. (1996), "Single-family housing transactions: Seller motivations, price, and marketing time," *Journal of Real Estate Finance & Economics*, 13:3, 237-54.

TSAI, I-CHUN, (2010), "The Average Rate of Selling Price Concessions: Selling Price and Time in the Housing Market," International Research Journal of Finance and Economics, 38, 116-121.

YAVAS, ABDULLAH AND S. YANG (1995), "The Strategic Role of Listing Price in Marketing Real Estate: Theory and Evidence," *Real Estate Economics*, 3, 347-368.