"Lessons From a Lifetime of Running Housing Models"
by Norm Miller, PhD
Emeritus Professor, University of San Diego and University of Cincinnati, Hoyt Institute Faculty
Some background

- PhD at The Ohio State University (Finance and Economics)
- Professor at the University of Georgia, University of Cincinnati, and most recently University of San Diego, while always doing some work in the private sector.
- Head of Analytics at CoStar and significant work for NAA, NMHC, FDIC and with the Hoyt Institute, a think tank based in FL.
- Over 35 years of private sector consulting.
- Note: We stopped publishing our state-of-the-art research in academic journals on AVMs, such as specific influences and models, several years ago as they were being picked up by competitors.
- Personal interest in sustainability.
BTW: famous people who started out in economics...
Today: A Few Potential Owned Housing Research Questions (Prerequisite to a rental market analysis)

• A few quick discussions on leaving CA, affordability and property taxes

• Then the “art” of valuation and why is valuation uncertainty is important?

• More topics if we have time.
Is everyone really leaving California?
With the exception of Santa Barbara, the average SF homes are **$580,000** in this group.

The average home price in this group from San Diego to LA run **$1.3 million** with averages of $1.9 million in San Francisco, $2.1 million in Marin County, and $1.27 million in LA.
From the UT on June 18, 2024: Protesting Housing Investment Buyers

• Is housing a social good to be provided by government?
Yet it seems the media *never* says housing is affordable, even when it is...or was...
Affordability

A function of demand
• Households
• Income
• Employment
• Interest Rates
• Property Taxes
• Property Insurance

A function of supply
• land
• labor
• Regulation and speed to entitle
• NIMBYs
• Cost of capital
Housing Affordability in California
Supply and demand are local not national by Jared Rodio
This is Austin, Texas
Supply Matters for home prices and rents

Austin had 5000 more housing units added in 2021-2022 than indicated by household growth in the past year. MRI is now 5 months.
How have we historically measured affordability?

• We always discuss affordability based on a model that uses median home prices and median incomes and then asks what percentage can afford the median home, given current interest rates and prices. We usually ignore property taxes and property insurance. Maybe we should use “starter” homes?
“I’ll pause for a moment so you can let this information sink in.”
Exhibit 2: Los Angeles Metro
Maybe we should also include **property taxes** and property **insurance** in the cost to own? Property taxes vary around the country from .25% (Hawaii) to 2% in Chicago and 4%+ in parts of New Jersey. The US average is about 1.2%
More detail shows darkest areas paying the most
Add electric rates and we can generate a better home affordability index (using days of heat or AC use)

Source: EIA by State, December 2022
Note markets are/were less affordable, in part because of strong economies or desirability (2017)

Table 5: Combined Property Taxes and Home Prices

<table>
<thead>
<tr>
<th>CBSA NAME</th>
<th>Percent of Med Income Required to Buy the Med Priced Home with Property Taxes and a limit of 30% of Income</th>
<th>Percentage required for the 30% Lowest Tier</th>
<th>Percentage required for the 20% Lowest Tier</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco-Redwood City-South San Francisco, CA</td>
<td>299%</td>
<td>221%</td>
<td>191%</td>
</tr>
<tr>
<td>Santa Maria-Santa Barbara, CA</td>
<td>281%</td>
<td>172%</td>
<td>131%</td>
</tr>
<tr>
<td>Santa Cruz-Watsonville, CA</td>
<td>274%</td>
<td>227%</td>
<td>193%</td>
</tr>
<tr>
<td>San Rafael, CA</td>
<td>260%</td>
<td>203%</td>
<td>179%</td>
</tr>
<tr>
<td>San Jose-Sunnyvale-Santa Clara, CA</td>
<td>233%</td>
<td>174%</td>
<td>156%</td>
</tr>
<tr>
<td>Los Angeles-Long Beach- Glendale, CA</td>
<td>216%</td>
<td>171%</td>
<td>151%</td>
</tr>
<tr>
<td>San Francisco-Redwood City-South San Francisco, CA</td>
<td>214%</td>
<td>166%</td>
<td>148%</td>
</tr>
<tr>
<td>Anaheim-Santa Ana-Irvine, CA</td>
<td>203%</td>
<td>176%</td>
<td>160%</td>
</tr>
<tr>
<td>Santa Rosa, CA</td>
<td>197%</td>
<td>167%</td>
<td>156%</td>
</tr>
<tr>
<td>Salinas, CA</td>
<td>193%</td>
<td>153%</td>
<td>133%</td>
</tr>
<tr>
<td>Napa, CA</td>
<td>191%</td>
<td>160%</td>
<td>142%</td>
</tr>
<tr>
<td>Kohala-Maui-Lahaina, HI</td>
<td>169%</td>
<td>159%</td>
<td>144%</td>
</tr>
<tr>
<td>Urban Honolulu, HI</td>
<td>166%</td>
<td>159%</td>
<td>144%</td>
</tr>
<tr>
<td>San Luis Obispo-Paso Robles-Arroyo Grande, CA</td>
<td>186%</td>
<td>155%</td>
<td>139%</td>
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<tr>
<td>Oakland-Hayward-Berkeley, CA</td>
<td>182%</td>
<td>146%</td>
<td>130%</td>
</tr>
<tr>
<td>Santa Cruz-Watsonville, CA</td>
<td>181%</td>
<td>153%</td>
<td>137%</td>
</tr>
<tr>
<td>Santa Maria-Santa Barbara, CA</td>
<td>179%</td>
<td>126%</td>
<td>108%</td>
</tr>
<tr>
<td>San Diego-Carlsbad, CA</td>
<td>171%</td>
<td>146%</td>
<td>135%</td>
</tr>
</tbody>
</table>

But note that even in expensive metros, if we used lowest 10% or 20% tier of home prices, we get a slightly less gloomy result.

PS We need some low quality housing because it is more affordable.
And the **majority** of the US was **VERY affordable** in 2017 especially for less than median priced homes.

<table>
<thead>
<tr>
<th>CBSA</th>
<th>Ratio of Med Income to Income Req for Med Price</th>
<th>Ratio for 30% Decile</th>
<th>Ratio for 20% Decile</th>
<th>Ratio for 10% Decile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bloomsburg-Berwick, PA</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Alexandria, LA</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Bay City, MI</td>
<td>20%</td>
<td>12%</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td>Danville, IL</td>
<td>25%</td>
<td>19%</td>
<td>18%</td>
<td>10%</td>
</tr>
<tr>
<td>Altoona, PA</td>
<td>27%</td>
<td>26%</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>Midland, MI</td>
<td>31%</td>
<td>20%</td>
<td>16%</td>
<td>9%</td>
</tr>
<tr>
<td>Lima, OH</td>
<td>31%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>East Stroudsburg, PA</td>
<td>32%</td>
<td>26%</td>
<td>21%</td>
<td>17%</td>
</tr>
<tr>
<td>Jackson, TN</td>
<td>32%</td>
<td>25%</td>
<td>21%</td>
<td>17%</td>
</tr>
<tr>
<td>Youngstown-Warren-Boardman, OH-PA</td>
<td>32%</td>
<td>21%</td>
<td>14%</td>
<td>9%</td>
</tr>
<tr>
<td>Decatur, IL</td>
<td>32%</td>
<td>22%</td>
<td>16%</td>
<td>9%</td>
</tr>
<tr>
<td>Weirton-Steubenville, WV-OH</td>
<td>32%</td>
<td>23%</td>
<td>18%</td>
<td>11%</td>
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<tr>
<td>Gary, IN</td>
<td>33%</td>
<td>24%</td>
<td>19%</td>
<td>13%</td>
</tr>
<tr>
<td>Michigan City-La Porte, IN</td>
<td>33%</td>
<td>25%</td>
<td>18%</td>
<td>12%</td>
</tr>
<tr>
<td>Kokomo, IN</td>
<td>34%</td>
<td>23%</td>
<td>18%</td>
<td>12%</td>
</tr>
<tr>
<td>Ithaca, NY</td>
<td>35%</td>
<td>34%</td>
<td>34%</td>
<td>33%</td>
</tr>
<tr>
<td>Saginaw, MI</td>
<td>35%</td>
<td>23%</td>
<td>16%</td>
<td>10%</td>
</tr>
<tr>
<td>Peoria, IL</td>
<td>35%</td>
<td>25%</td>
<td>20%</td>
<td>13%</td>
</tr>
<tr>
<td>Muncie, IN</td>
<td>36%</td>
<td>26%</td>
<td>18%</td>
<td>12%</td>
</tr>
<tr>
<td>Scranton--Wilkes-Barre--Hazleton, PA</td>
<td>37%</td>
<td>24%</td>
<td>18%</td>
<td>10%</td>
</tr>
<tr>
<td>Springfield, IL</td>
<td>37%</td>
<td>25%</td>
<td>20%</td>
<td>12%</td>
</tr>
<tr>
<td>Fayetteville-Springdale-Rogers, AR-MO</td>
<td>38%</td>
<td>26%</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>Lawton, OK</td>
<td>38%</td>
<td>20%</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td>Fond du Lac, WI</td>
<td>38%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
</tr>
<tr>
<td>Rockford, IL</td>
<td>38%</td>
<td>26%</td>
<td>20%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Some markets remain cheap, but who wants to live in Gary, IN or Bay City, MI or Youngstown, OH?
Drilling down more on Property Tax Impacts on Affordability and Home Prices
Do property taxes hold down home prices? Back in 2018 we noticed a pattern of home prices vs property tax rates.

<table>
<thead>
<tr>
<th>Property Tax Rate (%)</th>
<th>Average Price</th>
</tr>
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<tbody>
<tr>
<td>ptr&lt;0.5</td>
<td>$438,483</td>
</tr>
<tr>
<td>0.7&gt; ptr &gt;=0.5</td>
<td>$455,149</td>
</tr>
<tr>
<td>0.9&gt; ptr &gt;=0.7</td>
<td>$404,460</td>
</tr>
<tr>
<td>1.1&gt; ptr &gt;=0.9</td>
<td>$380,774</td>
</tr>
<tr>
<td>1.3&gt; ptr &gt;=1.1</td>
<td>$298,776</td>
</tr>
<tr>
<td>1.5&gt; ptr &gt;=1.3</td>
<td>$268,981</td>
</tr>
<tr>
<td>1.7&gt; ptr &gt;=1.5</td>
<td>$270,651</td>
</tr>
<tr>
<td>1.9&gt; ptr &gt;=1.7</td>
<td>$288,044</td>
</tr>
<tr>
<td>2.1&gt; ptr &gt;=1.9</td>
<td>$294,508</td>
</tr>
<tr>
<td>2.3&gt; ptr &gt;=2.1</td>
<td>$289,393</td>
</tr>
<tr>
<td>2.5&gt; ptr &gt;=2.3</td>
<td>$254,783</td>
</tr>
<tr>
<td>2.7&gt; ptr &gt;=2.5</td>
<td>$259,093</td>
</tr>
<tr>
<td>ptr &gt;=2.7</td>
<td>$242,520</td>
</tr>
</tbody>
</table>
Does Prop 13 reduce supply and turnover?

Average tax rates for 1635 defined neighborhoods in San Diego
10 Year Turnover Rate 2005 to 2015 Versus Effective Property Tax Rate for San Diego Neighborhoods
San Diego County Neighborhoods
Median 'Tax/AVM' Versus Ave. Age of Home

The scatter plot shows the relationship between the median effective tax rate and the average age of homes in San Diego County Neighborhoods. The data points are distributed across a range of tax rates and average ages, with a trend line indicating a general decrease in tax rate as the average age of homes increases.
When Prop 19 passed around 2020 that allowed those 55+ to move and keep their basis intact for property tax purposes, some expected this to free up inventory. It didn’t. Why?

Cap gains taxes
Do Housing Indices like Core-Logic Case-Shiller Tell Us Anything Useful? (2 months lag in reporting)

The media reports this as if it is the same for all of us no matter where we live. Note also they exclude new housing and ST distress sales.

Shaded areas indicate U.S. recessions. Source: S&P Dow Jones Indices LLC.
Case-Shiller for San Diego was down 35% for the metro during this time period.

Geographical Price Dispersion - There is significant variation in home price performance among neighborhoods – so don’t use metro indices to update values!
Background for the state of the art on valuation uncertainty and why it is important

• Risk Based Pricing and Capital Reserve Proposals like Basel II or III

• Price and Value Theory
Back in 2004-2005 the we almost passed Basel 2, that may have curtailed subprime mortgage lending...

It required banks to measure risk by bringing in uncertainty around things like value and then the hold reserves as a function of that risk.
The results of Basel 2 would have been something like this

• We develop different risk weights for different mortgage loans.
• A risk weight of 100% requires 8% capital reserves.
• The average mortgage risk weight is 50% so it requires 4% reserve capital, but lower or higher risk weights are a result of credit score and LTV.

• Simple Examples:
  • FICO 740, LTV 70% = risk weight of 3% therefore .03*.08 = .0024 capital reserve
  • FICO 620, LTV 95% = risk weight of 62% therefore .62*.08= .0496 capital reserve
Then Dodd Frank came along and suggested skin in the game...in 2010 to help prevent the next meltdown..

Barney Frank was most proud of skin in the game...later eliminated by congress for “qm” “qualified mortgages”
Now we have a simpler Basel III proposal

What a concept?
Risk based pricing!
Price dispersion as an equilibrium condition =‘s uncertainty

Exhibit 1-1: Theoretical Distribution of Buyers and Sellers Reservation Prices for a Similar Home
Distribution of actual transaction prices for a similar property

Research in 1977: Out of town buyer premium = 8%
Research in 2005: Out of town buyer premium = 5.72%
Research in 2015: Out of town buyer premium = 4.54%

See Leveling the playing field: out-of-town buyer premiums in US housing markets over time
Katrin Kandlbinder, Norman G. Miller, Michael Sklarz, International Journal of Housing Markets and Analysis
ISSN: 1753-8270, Publication date: 3 June 2019  Note: We also found anchoring bias based on how expensive the home sold in a prior market. Other factors: Credits, Points.

What kinds of sellers are here?

What kinds of buyers are here?

Does this decline suggest improved informational market efficiency?
And who gets excited about efficiency?
How good are AVMs (Automated Valuation Models) and what is the state of the art?

• **Statistically what explains prices?**
  • 80% of the variation in **most** home prices, within a **pre-defined neighborhood**, can be explained with 3 variables:
    • Location (must first define submarkets or neighborhoods)
    • Size (Space matters)
  • Age or a property condition indicator
Heterogeneity matters
Older property with high maintenance and repair variance as well as high-end custom homes are harder to value for both AVMs and appraisers.
Going beyond size, age and location

• We can add in lots of other variables bedrooms, bathrooms, landscaping, roof quality, construction type, fireplaces, AC, various features, finishes via photo data mining, and text mining. This might get us to **88% or so R^2**.

• We can also test for non-linearity and we will find it with age, bedrooms, lot size and more. This might get us to being able to explain **91%+ of the sale price** on average in a typical neighborhood.
A typical hedonic model using 2 years of past sales back in 2013.
What else should be added to explain price?
What fundamental locational data is harder to get but matters?

• School quality by school level
• Noise: Highway, flight paths
• Views: Water, mountains, parks, industrial, slope and heights of adjacent buildings
• Flood risks? Insurance rates?
• Note: The models matter as well. We ran 11 different models. Neural network models might work, but are risky especially if disparate impact (Racial bias) is a concern.
How nuanced can you get? One example
Another nuance: Noise

Exhibit 1: Noise and Home Prices
Water views matter: Ocean, lake, rivers?

![Bar chart showing U.S. Waterfront Home Premium By Waterfront Type]

- Ocean/Bay: 45%
- Lake: 25%
- River: 20%
Premiums need to be localized: water view vs waterfront

Newport Beach CA Zip 92663 Single Family Sold Price Per Living Area for Oceanfront and Off-Water Sales

- Off-Water
- Waterfront

Dollars Per Square Foot

In today’s world why not throw every possible variable into unstructured models and see what happens?

Data series of Japan Karaoke Sales and San Francisco Home Prices (m)
Obviously, Karaoke Sales from the prior 3 months in Japan provide a leading indicator of home prices in San Francisco.
What about flood risks?
CLIMATE CHANGE MAY BE REAL, BUT IT'S TOO EXPENSIVE TO TRY TO STOP IT.
CLIMATE CHANGE MAY BE REAL, BUT IT'S TOO EXPENSIVE TO TRY TO STOP IT.

AAA AHH

INSURANCE INCREASES
Key West: Memories are short

![Graph showing price trends in Key West, with a note indicating "Irma hit here".](image-url)
New Orleans

Market Amnesia Always Seems to Follow

Katrina hit here

Median price

Price per sq ft
New disclosures on climate risks may start to affect market prices... but when

Guess what the flood risk is according to Risk factor data?
“Yes, the planet got destroyed. But for a beautiful moment in time we created a lot of value for shareholders.”
• Why should I care about future generations? What have they ever done for me? -- Groucho Marx
Running AVMs: What explains price variation beyond the fundamentals?

- Seasonality (holidays and weather)
- Distress sales: REOs, short sales
- Out-of-town vs. in-town buyer and the typical price in their prior market?
- How many credits or concessions were paid by the seller at closing?
- Who paid the points for financing?
- Tastes and preferences that are unobservable (for now).
- Market conditions beyond seasonality like changing credit access
- Death and estate sales with multiple heirs on the seller side.
- Note that people do “overpay” or “get bargains”, but economists have this urge to explain all prices as rational!
The possibility of over payment or bargains, or unique preferences is not well accounted for in lender risk of default and loss models.

- Some buyers overpay compared to the most probable price, instantly overestimating the equity they have in the property or have unique utility functions.
- Some buyers get bargains compared to the most probable price, gaining instant equity.
The possibility of over payment or bargains, or unique preferences is not well accounted for in lender risk of default and loss models.

Or maybe they are a local buyer buying in January, who has been scanning the market for two years, buying from a seller urgently in need of a quick sale?
The possibility of over payment or bargains, or unique preferences is not well accounted for in lender risk of default and loss models.

Or maybe they are an out of town Asian buying in the best school district in late June, coming from a high priced San Francisco market?
But the price paid now relative to most probable price is very significant in forecasting default.

• When someone overpays, they are throwing equity away, i.e. 10% over payment equals almost 50% equity gone with a 20% down purchase. This affects loan risk of default.

• How do we mitigate this risk? Appraisal?
Are appraisals useful in predicting over payment?

Information Losses in Home Purchase Appraisals

FRB of Philadelphia Working Paper No. 15-11

37 Pages • Posted: 18 Aug 2015

Paul S. Calem
Federal Reserve Banks - Federal Reserve Bank of Philadelphia

Lauren Lambie-Hanson
Federal Reserve Banks - Federal Reserve Bank of Philadelphia

Leonard I. Nakamura
Federal Reserve Banks - Federal Reserve Bank of Philadelphia

Date Written: 2015-03-06

When contract prices are unknown?

\[\text{Mean} : -1.0\% \\
\text{Median} : -1.8\% \\
\text{Within 10\%} : 60.6\% \\
\text{Appraisals < 0} : 55.3\% \\
\text{Appraisal=Price} : 3.0\% \]
Are appraisals useful in predicting overpayment?

When contract prices are unknown?

When appraisers are told contract prices 92%=>CP
In 2011 the accuracy of AVMs vs Appraisals was fairly close, with a slightly fatter tail on the low side for AVMs.

Today AVMs are more accurate than appraisals in the majority of cases because they use more comps and more information in the valuation process, but their advantage is that they are agnostic about value unlike appraisers, and they provide information about uncertainty.
AVMs provide confidence metrics as well as a value and value range. About 65% to 70% are at 80% + confidence scores.

Note: This should feed into Basel 3 risk metrics, reserve calcs and risk-based pricing for banks.
A look back at GFC Subprime days....

- GDP shrank by 4.7% from 2008 through the first half of 2009.
- 8+ million jobs disappeared between 2008 and 2009.
- $17 trillion in household net worth evaporated from 2007 through the first quarter of 2009, a larger amount than the nation’s GDP of $14.4 trillion in 2008.
- 8+ million home foreclosures is an estimate of what the final number may be since the crisis.
- Home prices plummeted 32% on average from their peak in 2006 to their bottom in early 2009, but some regions experienced much steeper declines than that.
- Retirement account assets fell by $2.8 trillion from September 2007 through December 2008, about a third of their value at the time.
Bank XYZ Certificates: Loan Distribution by LTV Based on Appraisals vs AVMs Using a Basket of Subprime Loans

Number of Loans by LTV Bucket

- Prospectus LTV
- AVM-Calculated LTV
People can overpay and this increases the chances of default

For loans stated as 80% LTV we found that when the AVM calculated LTV was above 80% these were 72% more likely to default than when the 80% LTV was confirmed.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>p-value</th>
<th>Exp(B)</th>
<th>95% C.I. for Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVM LTV &gt; 80*</td>
<td>0.5406</td>
<td>0.0000</td>
<td>1.7171</td>
<td>1.4565, 2.0242</td>
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<tr>
<td>FICO*</td>
<td>-0.0118</td>
<td>0.0000</td>
<td>0.9883</td>
<td>0.9863, 0.9902</td>
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<td>LTV*</td>
<td>0.1040</td>
<td>0.0000</td>
<td>1.1096</td>
<td>1.0932, 1.1264</td>
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<tr>
<td>%chg. in HPI*</td>
<td>-0.0687</td>
<td>0.0000</td>
<td>0.9336</td>
<td>0.9260, 0.9412</td>
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<tr>
<td>%chg. in Unemployment*</td>
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<td>0.0000</td>
<td>1.0296</td>
<td>1.0265, 1.0326</td>
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<td>Interest Rate</td>
<td>-0.0111</td>
<td>0.0310</td>
<td>0.9890</td>
<td>0.9552, 1.0239</td>
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<tr>
<td>ln(Original Balance)*</td>
<td>0.2124</td>
<td>0.0210</td>
<td>1.2366</td>
<td>1.0324, 1.4813</td>
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<tr>
<td>Non-Owner Occupied*</td>
<td>0.5714</td>
<td>0.0000</td>
<td>1.7707</td>
<td>1.4013, 2.2374</td>
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<tr>
<td>Full Documentation*</td>
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<td>0.0000</td>
<td>0.5716</td>
<td>0.4594, 0.7110</td>
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<td>Refinance*</td>
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<td>Single Family Property</td>
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<td>1.0402</td>
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<tr>
<td>HVMLT 2005-16</td>
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<td>0.4420</td>
<td>1.2418</td>
<td>0.7148, 2.1573</td>
</tr>
<tr>
<td>HVMLT 2005-8*</td>
<td>0.4726</td>
<td>0.0260</td>
<td>1.6042</td>
<td>1.0572, 2.4341</td>
</tr>
<tr>
<td>INDX 2005-AR16IP*</td>
<td>0.4104</td>
<td>0.0480</td>
<td>1.5074</td>
<td>1.0031, 2.2650</td>
</tr>
<tr>
<td>RALI 2005-QO1*</td>
<td>0.6586</td>
<td>0.0020</td>
<td>1.9320</td>
<td>1.2811, 2.9137</td>
</tr>
<tr>
<td>RALI 2005-QO5*</td>
<td>0.7543</td>
<td>0.0000</td>
<td>2.1260</td>
<td>1.4227, 3.1771</td>
</tr>
<tr>
<td>Constant*</td>
<td>-5.7157</td>
<td>0.0000</td>
<td>0.0033</td>
<td>0.0000, 0.0659</td>
</tr>
</tbody>
</table>

*denotes statistically significant variables at 95% confidence level (p-value <5%)
Using only those claimed as 80% LTV or less which loans DEFAULTED?

- When AVM confirmed LTV was 80% or less: 22%
- When AVM showed LTV was actually above 80%: 38%
A note on race and housing valuation bias

Median Home Prices Paid by Race for USA Buyers of One Large National Bank
2020-2022 (sample of a few million observations)

Now if I tell you older cheaper homes have more appraisal error and are harder to appraise and that the lender uses the lower of appraised value or purchase price, who gets penalized more?
Next: Is the housing market finally getting more efficient?
Is the housing market getting more efficient?

- Since 2011 days on market has declined until recently: All CBAs
Typical patterns of home selling over time from listing to final sale or expiration. Note many still expire without selling.
San Diego County Single Family Sold Market Time Distribution
(Jan 2022 to June 2023)

Mode is 7 days
Higher priced homes take longer to sell
Just for fun: Has Trump’s Brand had an impact on sale prices?
Trump Tower: 223 Saratoga, Honolulu, HI

Not enough Trump supporters with money in Hawaii?
Can we forecast housing prices? 1988 ASSA presentation
Short Term Technical Market Condition Indicators of Price Trends

- Months remaining inventory
- Selling Price/Listing Price Ratios
- Days on Market
- Percentage of listings that expire without selling
- Percentage of listings that drop asking prices
- Percentage of sales that are REOs, Foreclosures or Short Sales
- Inventory for sale as percentage of total stock in local market
Market conditions and MRI drives appreciation rates: Example: Phoenix

Maricopa County Single Family Market Condition Ranking and Median Price Annual Percent Change

- HOT
- STRONG
- GOOD
- NORMAL
- SOFT
- WEAK
- DISTRESSED

Market Condition Ranking

Price Percent Change
Modest positive outlook
We note that for the US Months Remaining Inventory (MRI) leads Price Changes by 2 to 6 months but even a year ahead we see a strong correlation
This is US Data 1993 to Jan 2023 (Shifted 2 qtrs.)
For all metros the MRI has been declining until recently. Here is San Diego through 2022.
Months of Inventory Remaining for Single Family in San Diego in June of 2024

Anything under 3 months is considered low. These figures are up significantly from a few years ago, but still low.
When to buy or sell aside from MRI? Price seasonality is significant!  

When you value properties matters. 
Markets exhibit consistent seasonal patterns, i.e.
When you value properties matters. Markets exhibit consistent seasonal patterns, i.e.

If property is appraised in Jan. versus June there is a 10% difference in price per sq ft.
How have the higher mortgage rates affected the market? Or how have the artificially low rates affected the market?

Remember 2021 when rates dropped below 3%?
Interest Rates Weigh On and Lock In Housing

Source: Mortgage Bankers Association, Bureau of Economic Analysis
These mortgages were mostly made to lower credit borrowers before 2007 and cannot be refinanced. None of these (97%) will refinance unless desperate for cash.
People are borrowing a slightly lower percentage of the home price.
The percentage of homes being sold **all cash** is now 24% of all sales, but first-time home buyers are in trouble with rates at 7.0% and insufficient equity to borrow less.
For homes over $3 million, more than half are now all cash purchases. This segment of the market is driven by the stock market as much as by interest rates.
If we try and predict prices with only MRI it does not work that well.
Now add interest rates and it works much better.
San Diego County Number of New Home Sale: SF by Year

New Home Number of Sales
Single Family

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>8569</td>
</tr>
<tr>
<td>2007</td>
<td>3172</td>
</tr>
<tr>
<td>2011</td>
<td>2050</td>
</tr>
<tr>
<td>2015</td>
<td>2155</td>
</tr>
<tr>
<td>2019</td>
<td>2222</td>
</tr>
<tr>
<td>2023</td>
<td>612</td>
</tr>
</tbody>
</table>
San Diego County Number of New Home Sale: Condo by Year

![Bar Chart](chart.png)

- **2003**: 2357
- **2007**: 3498
- **2011**: 512
- **2015**: 751
- **2019**: 1715
- **2023**: 795
Note that **new** condo sales prices have softened while existing SF unit prices have started to flatten. The condo segment of the market is more interest rate dependent.
San Diego SF Home Prices Now Exceed $1.33 million on average

They actually exceeded $1 Million on average since the end of 2020.
Are NIMBYs to blame for our housing prices?

The Hoyt Index is based on these measures

✓ Community Involvement in Entitlement Process: NIMBYs
✓ Construction Costs
✓ Land Availability based on natural and political constraints
✓ Infrastructure requirements
✓ Environmental restrictions and regulations, i.e. CEQA, CA Coastal Commission
✓ Process complexity (modification or starting from scratch with each change)
✓ Time required to get approvals (One Paseo took 11 years)
San Diego
Prices Reflect Difficulty of Development and Economic Growth

<table>
<thead>
<tr>
<th>City</th>
<th>Price Per Sq Ft 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philly, Pa</td>
<td>$-</td>
</tr>
<tr>
<td>San Diego</td>
<td>$20</td>
</tr>
<tr>
<td>Honolulu</td>
<td>$40</td>
</tr>
<tr>
<td>San Jose</td>
<td>$60</td>
</tr>
<tr>
<td>San Fran</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

Supply Inelastic

<table>
<thead>
<tr>
<th>City</th>
<th>Price Per Sq Ft 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dayton, OH</td>
<td>$100</td>
</tr>
<tr>
<td>Albuquerque</td>
<td>$120</td>
</tr>
<tr>
<td>Cleveland</td>
<td>$140</td>
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<tr>
<td>Kansas City</td>
<td>$160</td>
</tr>
<tr>
<td>Billings</td>
<td>$200</td>
</tr>
</tbody>
</table>

Supply Elastic
Thank you for your attention!