A Few Thoughts on
Asset Bubbles & Interest Rates

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PREA Conference | Alternative Investments Affinity Group
Some Thoughts on Bubbles & Rates: Agenda

► Real Estate & Asset Bubbles:
  ▪ Long history of asset bubbles
  ▪ Rationalizing “bubbles”
  ▪ Impact on risk & return
  ▪ The volatility of land values
  ▪ Who cares & why?

► Interest Rates in a Historical Context:
  ▪ Near all-time lows
  ▪ Cap rates v. interest rates
  ▪ Spreads to Treasuries – varying with LTV & time

► Interest Rates in a Forward-Looking Context:
  ▪ Today’s yield curve → implications for tomorrow’s rates
  ▪ Consensus view on tomorrow’s interest rates
  ▪ Consensus view on tomorrow’s inflation rates
  ▪ Consensus is often wrong → cautionary note
Is CRE in “Bubble” Territory?

• How should we view the level of CRE prices?

Green Street Property Sector Indices

Property sector indices are indexed to 100 at their '07 peaks.

Source: Green Street Advisors, Commercial Property Price Index, September 7, 2016.
“Bubbles” ← Easy to Spot, After They Bust

• Finance has a long history of asset bubbles, dating as far back as at least:
  – 1637: Dutch tulip mania
  – 1711: British South Sea bubble
  – 1763: Mississippi Land Company
  – …

• But, of course, bubbles are easily spotted after they burst!

• Before they burst, there are simply disagreements about the likely path of future prices.

• This is the essence of any debate about current prices:
  ➢ Have prices strayed too far from some sense of “fundamental” value?
The Debate About Asset Prices

In finance (real estate or otherwise), the debate about asset prices generally falls into three possible explanations:

1. “This time is different” – there has been a shift in some underlying structural factor(s) [e.g., globalization, legislation, socio-economic, political, etc.].

2. “Noise” – simply some random fluctuations (with the mistaken impression of trend).

3. “Animal spirits” – a pattern, driven by excessive optimism (a “bubble”) or pessimism, which is about to reverse itself.
More Recent Examples ← Where Were You?

- Let’s consider three more-recent examples:
  - Late 1990s: San Francisco office rents
  - Mid 2000s: (U.S.) Home prices
  - Mid 2010s: (U.S.) Commercial real estate prices

- As you look at these examples, candidly ask yourself:
  → Did you recognize the bubble before it burst?

- If so, did you have the (financial) courage to act on it?

- Acting on the recognition of the bubble can take two forms:
  1. Avoidance of over-priced assets ← risk-averting strategy
  2. Exploit the over-priced assets ← risk-seeking strategy

Using the correction to your advantage. As one example, consider the brilliance and the guts displayed in The Big Short in which certain hedge-fund managers: a) recognized the bubble in home prices, b) understood the exposure in the junior tranches of sub-prime debt and c) invented credit-default swaps on these junior tranches. [CDS existed previously, but not on sub-prime debt.]
Consider the predicament of office-building investors in the late 1990s:

- The “dot.com” market is booming.
- Northern California is the epicenter of the dot.com revolution.
- San Francisco is particularly challenging from a supply/construction perspective (hilly peninsula jutting into the ocean, earthquakes, etc.).
- “Sticky” supply v. variable demand → Particularly prone to boom-&-bust cycles
- Effective rents increase:
  - by ~100% in 3 years and
  - increase by ~50% in 1.5 years:
→ The RE investment question: How to underwrite future rents?
Effective Rents in San Francisco's Financial District

- Rents increase ~100% in 3 years
- Rents increase ~50% in 1.5 years

How would you have underwritten lease rental rates upon rollover?

A notable example: Spieker Properties sold to EOP in early 2001 (with about 30% of Spieker's NOI generated by the bay area).

dot.com mania is in full bloom!

Source: Torto Wheaton Research and Instructor's Calculations
Effective Rents in San Francisco's Financial District

With the benefit of hindsight:

NASDAQ peaks in March, 2000

In less than 1.5 years, rents fall to levels of 5.5 years earlier

Clearly, this behavior plays HAVOC with your underwriting!

the bloom is off the bud!

Source: Torto Wheaton Research and Instructor's Calculations
#2. U.S. Home Prices – Perhaps the Best-Known Example

Path of Real Home Prices and Building Costs as well as Population and Interest Rates from 1890

Real (inflation-adjusted) home price increase of ~60% in 6 years

Source: Robert Shiller | *Irrational Exuberance* and Instructor's calculations.
Path of Real Home Prices and Building Costs as well as Population and Interest Rates from 1890

I’d suggest that one potential sign of increased risk, if not a bubble, is a significant deviation from the trend.

Source: Robert Shiller | *Irrational Exuberance* and Instructor's calculations.
"Bubble" Growth and Subsequent Decline for Certain US Housing Markets for the Period 2000 through 2012

The "boom" ↑

The “bust” ↓

Net appreciation rate of 0% per annum

Net appreciation rate of 2.5% per annum

Net appreciation rate of 4% per annum

Of course, national averages conceal substantial variation by market.
#3. What About U.S. Commercial Real Estate Prices?

NCREIF Index - Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through (the Second Quarter of) 2016

Will property values fall precipitously again?
Greenspan’s Definition of a Bubble

“...I define a bubble as protracted period of falling risk aversion that translates into falling capitalization rates that decline measurably below their long term trendless averages. Falling capitalization rates propel one or more asset prices to unsustainable levels. All bubbles burst when risk aversion reaches its irreducible minimum, i.e., credit spreads approaching zero, though analysts’ ability to time the onset of deflation has proved illusive.” {emphasis added}


NCREIF Index - Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through (the Second Quarter of) 2016
Land Values Are the Most “Bubblicious” of All

Path of Real Home Prices and Building Costs as well as Population and Interest Rates from 1890

Land values are essentially a call option on future development opportunities. As such, they are more volatile than the property values themselves.

For convenience, let’s use the earlier home-price data.

Consider the differences between home prices and building costs as a proxy for land values:

\[ \sigma_{\text{Homes}} = 7.3\% \text{ v. } \sigma_{\text{Land}} = 18.8\% \]

Source: Robert Shiller | *Irrational Exuberance* and Instructor's calculations.
**Replacement-Cost Fallacy \( = f(\text{Land Value Volatility}) \)**

- There is an optionality value embedded in land values.
- The value of this option is extremely volatile.
- Consider the typical replacement cost analysis:
  
<table>
<thead>
<tr>
<th>Property Value</th>
<th>Land Value + Replacement Cost of the Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Properties acquired (or developed) during the bubble (almost) always illustrate this inequality
- If you disagree, how many deals lost in investment (or loan) committee because:

  \[
  \text{Property Value} > \text{Land Value} + \text{Replacement Cost of the Improvements}
  \]
But, when the bubble bursts, land values crash and the inequality is reversed!

\[
\text{Property Value} > \text{Land Value + Replacement Cost of the Improvements}
\]

In a crash, land values approach zero

Consider the performance of various high-profile deals following the crash:

- **AMLI announces Morgan Stanley’s bid** (8-05)
- **Carr America announces Blackstone’s bid** (2-06)
- **EOP announces Blackstone’s bid** (11-06)
- **Archstone announces Tishman/Lehman’s bid** (5-07)

The best example may be Tishman/BlacRock’s purchase of Peter Cooper Village (≈80 acres in Manhattan)
Bubble Concerns Worsen the Risk/Return Continuum

Illustration of Changing Risk/Return Continuum as Bubble Concerns Mount

Increased apprehension over the magnitude of a potential bubble leads to a worsening risk/return continuum.

How far the continuum moves reflects your degree of apprehension.

If a sufficient number of market participants share your apprehension, prices will drop such that the initial risk/return continuum is restored.

You are, of course, free to “bet” against the market’s consensus view.

Markets generally observe a “flight to quality” during a downturn.
Commercial real estate differs from many other assets in that the “crash” generally does not push asset values to zero (v. dot.com stocks being vaporized). Instead, changing property values can be considered as deviations around a trend:

This sort of analysis is not meant to be conclusive about future CRE pricing. Clearly, expected returns on other assets influence the pricing ofCRE – as does the path of interest rates (see next section). Instead, this analysis is meant to simply illustrate CRE’s pricing volatility.
If you are a long-term, low-levered CRE investor, these deviations matter little.

So, these asset bubbles matter more to:

- Long-term, high-levered investors – particularly those with short-term debt maturities (e.g., Macklowe’s EOP | Manhattan*) and/or poorly laddered maturities (e.g., pre-crash GGP v. SPG).

- Short-term investors (e.g., value-add & opp funds, developers, etc.).

- High-leverage, high-yield lenders – particularly those with levered balance sheets (e.g., Blackstone mortgage REIT, Colony Capital debt funds, etc.).

- Government agencies (e.g., Fannie, Freddie, HUD, Fed, etc.):
  - with exposure to high-leverage borrowers, and
  - who become the “lenders of last resort” in a downturn.

* Aggravated by $1 billion recourse bridge loan.
Some Thoughts on Bubbles & Rates: Agenda

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  - Who cares & why?

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  - Consensus is often wrong → cautionary note
Some Historical Context

Historical Path of Treasury Bond Interest Rates
1-, 10- and 30-year Maturities for the Period 1954 through YTD 2016

Note: The 30-year bond series begins in 1977, but was discontinued for four years (2002-2006).
Investors’ Concern

Stylized Comparison of Current Interest Rate to History of Long-Term Interest Rates
Valuations & Interest Rates

• Some investors naively assume:
  • Interest Rates ↑ → Asset Prices ↓

• However, a change in interest rates = \( f(\bullet) \):
  • a change in inflation (\( \rho \)) expectations, and/or
  • a change in the real return (\( r \)) requirement.

• These two factors can have very different impacts on asset values:
  • Inflation ↑ → Interest Rates ↑ → Asset Prices ↑
  • Real Return ↑ → Interest Rates ↑ → Asset Prices ↓

  • Inflationary increases may be favorable for real estate
  • Real return increases may be unfavorable for most all asset classes, including real estate
A comparison of cap rates & cash-flow yields v. 5-year Treasury rates:

Comparison of 5-year US Treasury Rates to NCREIF Cap Rates & Cash-Flow Yields for the Quarterly Periods 1979-2015

A “noisy” relationship!
A comparison of cap rates & cash-flow yields v. 5-year Treasury rates:

Comparison of 5-year US Treasury Rates to NCREIF Cap Rates & Cash-Flow Yields for the Quarterly Periods 1979-2015

You can find instances of all four combinations!
• The differential highlights that these are fundamentally different securities:

**Comparison of 5-year U.S. Treasury Rates to NCREIF Cash-Flow Yields for the Quarterly Periods 1979-2015**

- Of course, we should be comparing cash to cash (i.e., Treasury yields vs. CRE’s (unlevered) cash-flow yield)

The spread reflects:
1. the expected growth in CRE’s future cash flows, less
2. the difference in the expected real returns between CRE and Treasuries.

Note: Some investors like to invert this relationship – as it suggests positive or negative (cash-flow) leverage.
Conceptual: Interest Rates v. Current Return

• What does the difference ($\delta$) between bond rates ($i/P_0$) and real estate’s cash-flow yields ($CF_1/P_0$) imply?

• Fundamentally, this is a comparison between a fixed-rate, nominal-yield security and a variable-rate, real-yield security.

• More specifically, the difference equals:

  \[ \delta = g - (r_{RE} - r_{TB}) \]

  • expected RE’s growth ($g$) in cash flow less
  • the difference in:
    • RE’s expected real return ($r_{RE}$), and
    • Treasury bonds’ expected real return ($r_{TB}$).
Illustration: Interest Rates v. Current Return

As an illustration, assume:

- bond rates \((i/P_0) = 2.0\%\)
- real estate’s cash-flow yields \((CF_1/P_0) = 5.0\%\)

\[\therefore\text{ the observed difference } (\delta) = 2.0\% - 5.0\% = <3.0\%>\]

Further assume:

- real estate’s expected cash-flow growth \((g) = 1.5\%\)
- real estate’s real return \((r_{RE}) = 5.0\%\),
- Treasury bond’s real return \((r_{TB}) = 0.5\%\)

\[\therefore\text{ the implied difference } (\delta) = 1.5\% - (5.0\% - 0.5\%) = <3.0\%>\]

Also assumes that RE’s growth rate equals the inflation rate \((g = \rho)\)
Illustration: Interest Rates v. Current Return

Illustration of Observed and Implied Spreads:
Interest Rate v. Cash-Flow Yields

Observed Spread:
\[ \delta = \frac{i}{P_0} - \frac{CF_1}{P_0} \]

Implied Spread:
\[ \delta = g - (r_{RE} - r_{TB}) \]

These are unobservable
An Aside: The Path of TIPS Rates

TIPS Yields of Varying Maturities
Quarterly Data from to 2003 to Present

Note: TIPS were first auctioned in 1997. In 2009, 20-year TIPS were discontinued in favor of 30-year TIPS. Treasury now offers 5-, 10-, and 30-year TIPS.

Source: U.S. Department of the Treasury
An Aside: The Path of TIPS Rates (continued)

Given the 2007-08 financial crisis, the historical average may not be reflective of the equilibrium level.

The historical average 5-year TIPS yield is ~0.64%

Source: U.S. Department of the Treasury
Before considering the difference ($\delta$) between bond rates ($i/P_0$) and real estate’s cash-flow yields ($CF_1/P_0$), we need two relationships:

- The nominal ($k$) and real ($r$) returns on any asset are linked by:

\[ k = (1 + r)(1 + \rho) - 1 \]

- where inflation ($\rho$) is the link between nominal and real returns.

The total (nominal) return on real estate is also given by:

\[ k_{RE} = \frac{CF_1}{P_0} + g \]

- This assumes constant cap rates.

Let’s use these relationships to examine $\delta$. 
Technical: Interest Rates v. Current Return

Consider:

\[ \delta = \frac{i}{P_0} - \frac{CF_1}{P_0} \]

Recall: \( k_{RE} = \frac{CF_1}{P_0} + g \rightarrow \frac{CF_1}{P_0} = k_{RE} - g \)

Rewrite such that \( k = (1+r)(1+\rho) - 1 \)

\[ \approx g \left( r_{RE} - r_{TB} \right) \]
• Of course, mortgage interest rates are priced at a spread to Treasuries:

Illustration of the Cost of Indebtedness as \(f(LTV)\)
for a Given Maturity Date

We borrow at a spread to Treasuries
These Spreads Are Also Volatile

- Lending spreads: generally, a poor predictor of future asset return & volatility:

![Graph showing estimates of annual interest rate at various leverage ratios](image-url)

- Interest Expense at 75% LTV
- Interest Expense at 50% LTV
- Interest Expense at 25% LTV
- Structural Differences ($\gamma$)
- Risk-free Rate
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Today’s Yield Curve & Future Interest Rates

• The “expectations theory” of future interest rates:

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>2.0%</td>
</tr>
<tr>
<td>2 years</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

\[ (1 + .02) (1 + x) = (1 + .025)^2 \quad \rightarrow \quad x \approx .03 \]

Then:

- The implied one-year interest rate in one year is expected to be ~ 3.0%

• That is, bond investors are assumed to be indifferent between:

Holding the 1-year security and “rolling over” to 1-year security in the second year

Holding the 2-year security to maturity
Consider one more period:

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>2.00%</td>
</tr>
<tr>
<td>2 years</td>
<td>2.50%</td>
</tr>
<tr>
<td>3 years</td>
<td>2.75%</td>
</tr>
</tbody>
</table>

Then:
- The implied one-year interest rate in two years is expected to be ~ 3.25%

That is, bond investors are assumed to be indifferent between:

\[
(1 + .025)^2 \ (1 + y) = (1 + .0275)^3 \quad \Rightarrow \ y \approx .0325
\]

Holding the 2-year security and “rolling over” to 1-year security in the third year
Holding the 3-year security to maturity

This approach can be extended to the entirety of today’s yield curve
Yield Curve for U.S. Treasury Rates as of September 27, 2016

An upward-sloping yield curve implies a rise in future interest rates.

Sources: US Department of the Treasury and Instructor's calculations.
Market’s View of Expected Future One-Year Rates

Current and Implied Forward 1-Year Treasury Rates as of September 27, 2016

The consensus view suggests that the 1-year Treasury rate rises, by \( \approx 150 \text{ bps} \), to \( \approx 2.05\% \)

Rates Available Currently and Implied for Subsequent Years
Market’s View of Expected Future Five-Year Rates

Current and Implied Forward 5-Year Treasury Rates as of September 27, 2016

The consensus view suggests that the 5-year Treasury rate rises, by ≈ 100 bps, to ≈ 2.15%
Market’s View of Expected Future Ten-Year Rates

Current and Implied Forward 10-Year Treasury Rates as of September 27, 2016

The consensus view suggests that the 10-year Treasury rate rises, by \( \approx 70 \text{ bps} \), to \( \approx 2.25\% \).
Today’s Yield Curve → Expected Inflation

Imputed Inflation Rates
Based Upon Current Treasury Bonds & TIPS Yields

The consensus view suggests that the inflation rates rise to ≈ 1.5%

Imputed Treasury Bond Yield Curve
Imputed TIPS Yield Curve
Maximum Imputed Inflation Rates

Sources: U.S. Department of the Treasury [Rates as of September 27, 2016] and Instructor's calculations.
Caveat: Market’s View Is Often Wrong

This “hairy” chart illustrates the divergence between actual and expected.
This chart also illustrates the divergence between actual and expected. Market-predicted LIBOR rate exceeded the actual by 73 bps, on average.
A Similar Perspective: Long-Term (10-Year) Treasuries

Implied rates higher than realized rates

Implied rates lower than realized rates

Cautionary Note

• If you are really good at forecasting future interest rates:
  – Get out of the real estate business!
  – Get into the bond-trading business:
    ➢ sit in your pajamas,
    ➢ trade from home for < 1 hour/day, and
    ➢ hit the beach (golf course, bike trails, etc.) the rest of your day!
Some Thoughts on Bubbles & Rates: Addendum

- Multifamily & Asset Bubbles, Specifically:
  - Recent pricing
  - Historically, strong risk-adjusted returns
  - NIMBY v. YIMBY: Is the worm about to turn?
What About Multifamily Prices?

Apartment - Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through (the First Quarter of) 2016

Property values fall by ~ 15% over 3 years
Presently, a difference of ~ 210 bps

Property values fall by ~ 30% over 2 years
Will property values fall precipitously again?
In addition to having the lowest average vacancy rate, the apartment sector did so with the least volatility.
The Growth in Rents | Only Apts Beat Inflation

Rental Rates by Property Type for the Period 1994 - 2015

- Apartments: $1,432 per unit/month
- Office: $30.53 per square foot/year
- Industrial: $5.69 per square foot/year
- Retail: $19.34 per square foot/year

Sources: CBRE and Instructor's calculations.
Historical Performance of the NCREIF Property Index and Various Property Types for the Period 1978 through (the Second Quarter of) 2016

- **Apartments = Winner | Before & After Risk**
- **Highest return**
- **Best risk-adjusted return**
- **Worst risk-adjusted return**
- NIMBY
- YIMBY
• Changing NCREIF Apartment Composition

- The NCREIF apartment index, increasingly moving away from “Garden.”
- Garden ← NIMBY v. Urban/High-Rise ← YIMBY:

**NCREIF Apartment Allocations, for the Period 1991-2015**

In earlier years, garden apartments was dominate.
• Consider the Anecdotal Buzz

• Wherever you look, it seems the headlines are all pretty much the same.

• An aside: Which city is pictured here? Does it matter?