CHICAGO BOOTH

The University of Chicago Booth School of Business

A Few Thoughts on Asset Bubbles & Interest Rates

Joseph L. Pagliari, Jr.
Clinical Professor of Real Estate

November 5, 2015

9th Annual Booth Real Estate Conference

Some Thoughts on Bubbles & Rates: Agenda

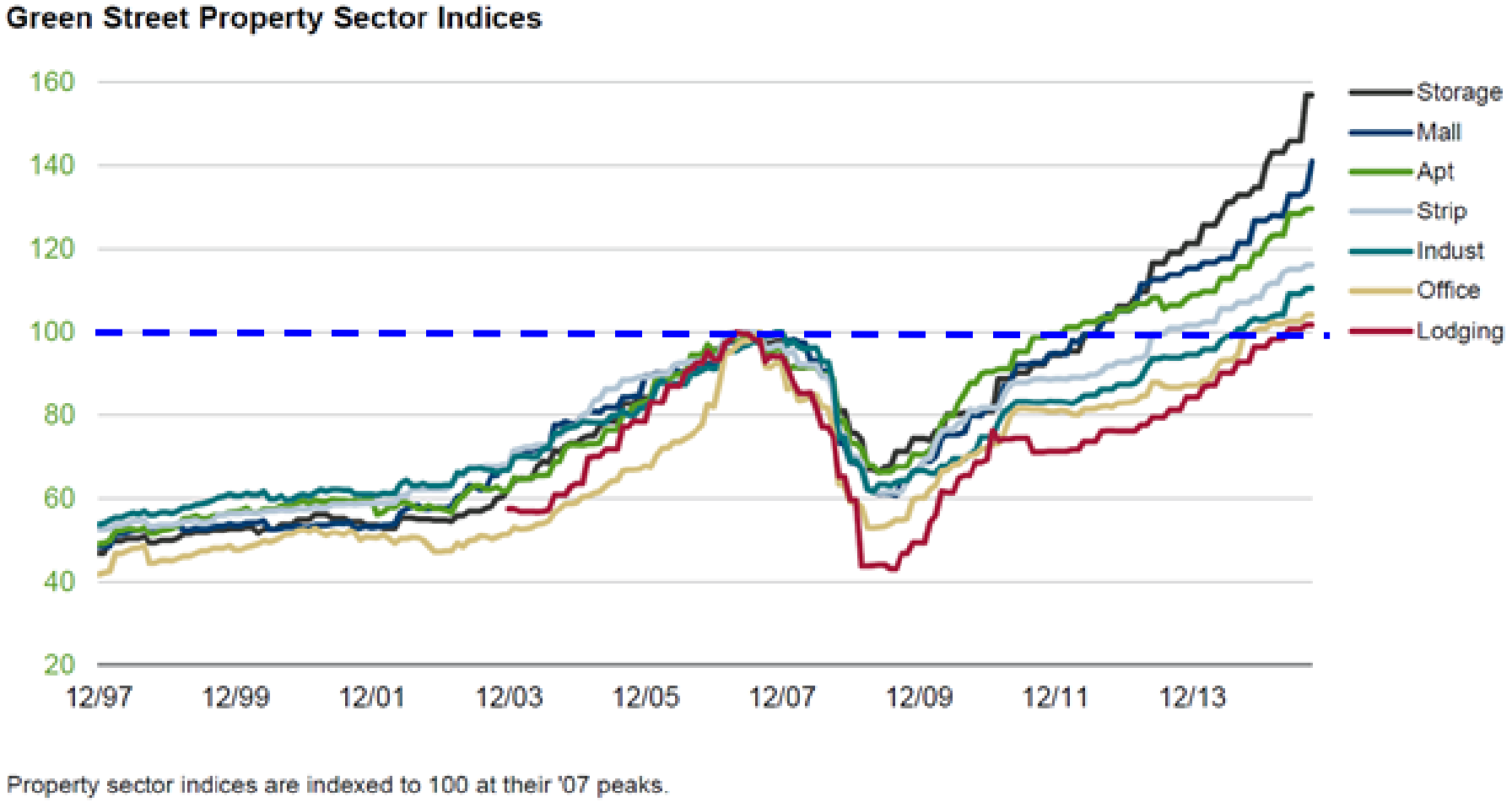
- Real Estate & Asset Bubbles:
  - Long history of asset bubbles
  - Rationalizing "bubbles"
  - Impact on risk & return
  - The volatility of land values
  - Who cares & why?

- 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?



Source: Green Street Advisors, Commercial Property Price Index, October 6, 2015.

"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:

Rational

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).

Irrational

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: Home prices
  - Late 2000s: Commercial real estate prices
- As you look at these examples, candidly ask yourself:

  ⇒ Did you recognize the bubble <u>before</u> it burst?

  It's easy to consider yourself a maven, after the fact!
- 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 volatility 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.]

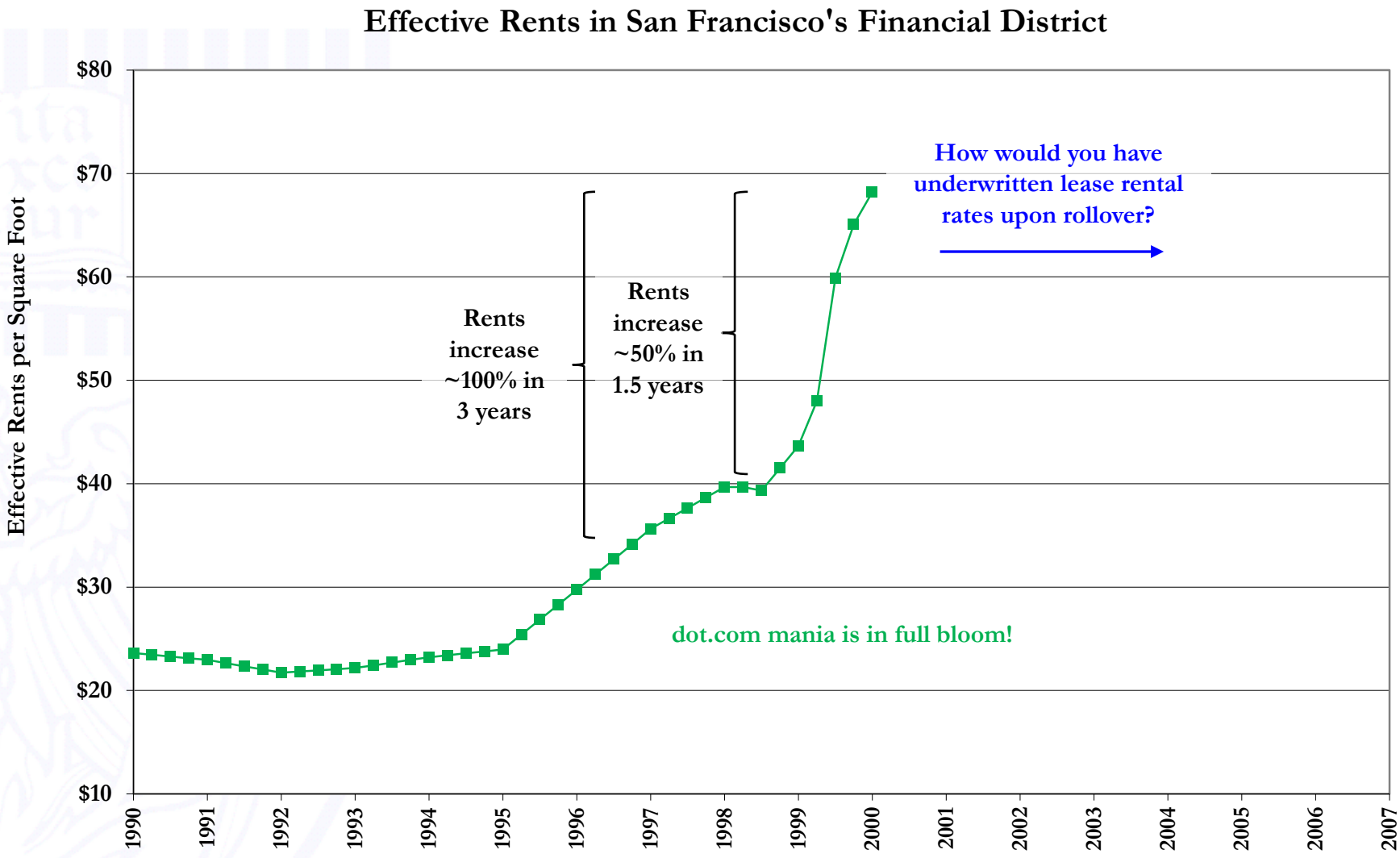
San Francisco Office Rents – Background

- 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:

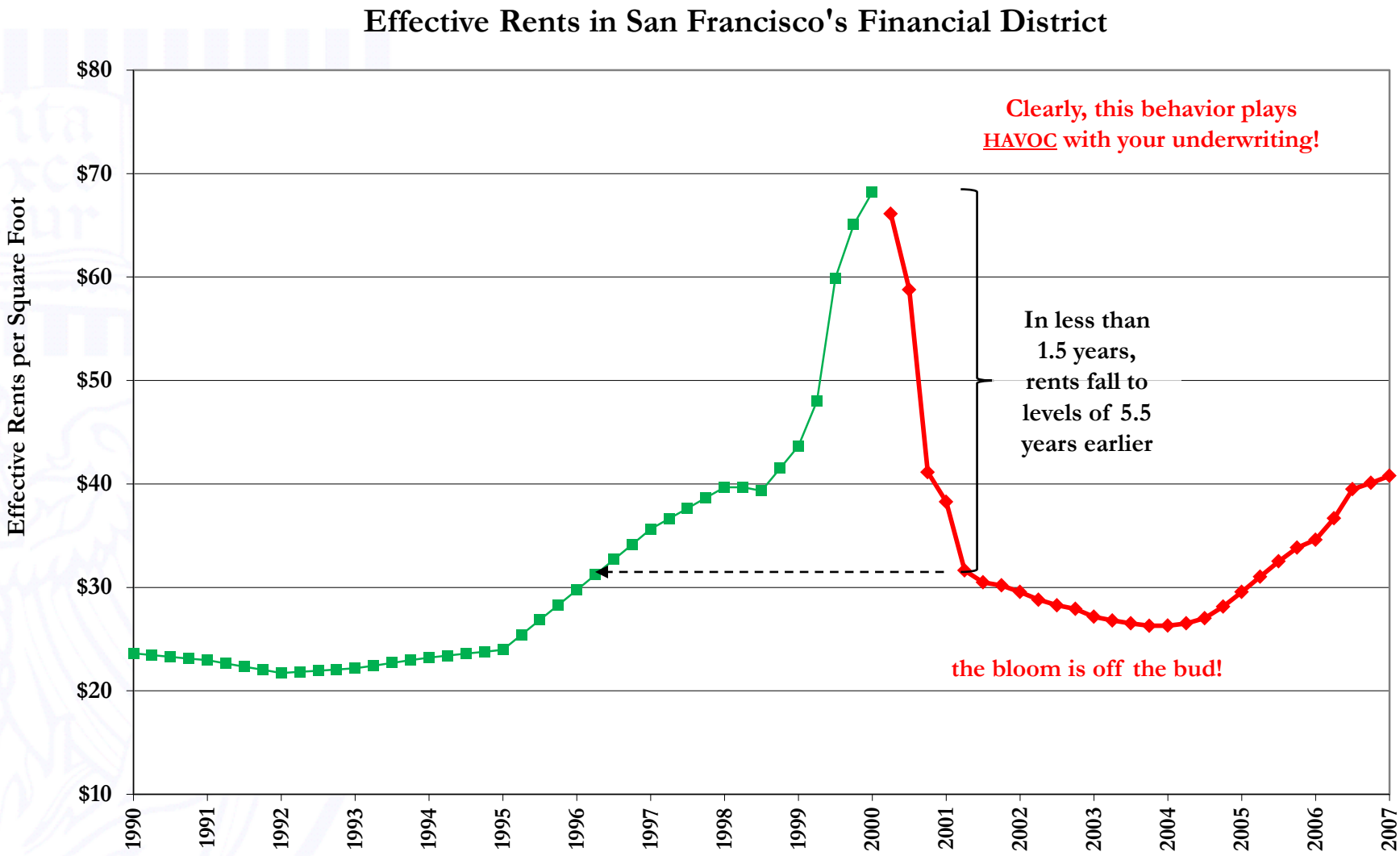
    ⇒ How to underwrite?

San Francisco Office Rents → Values



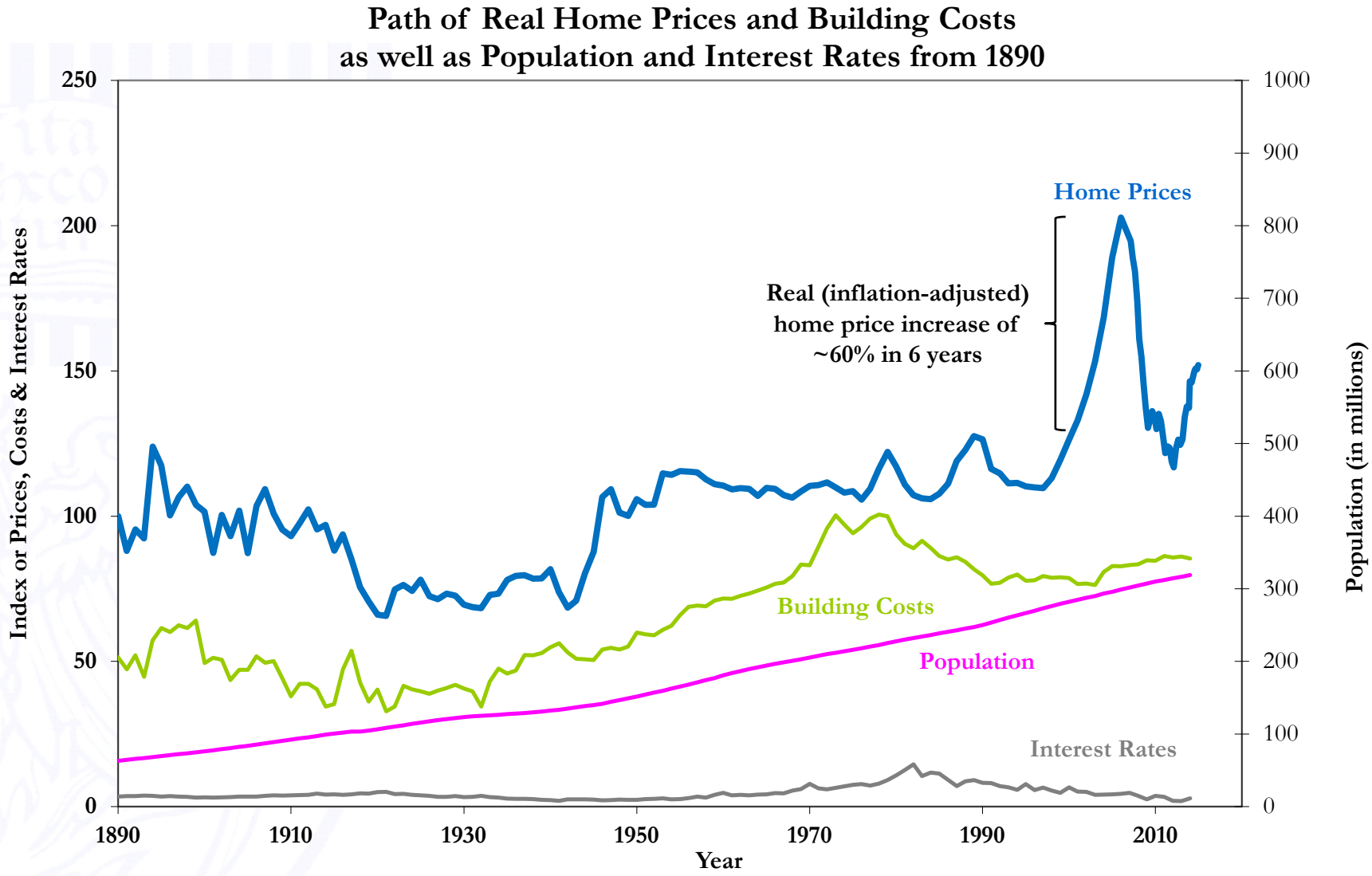
Source: Torto Wheaton Research and Instructor's Calculations

San Francisco Office Rents → Values After the Crash



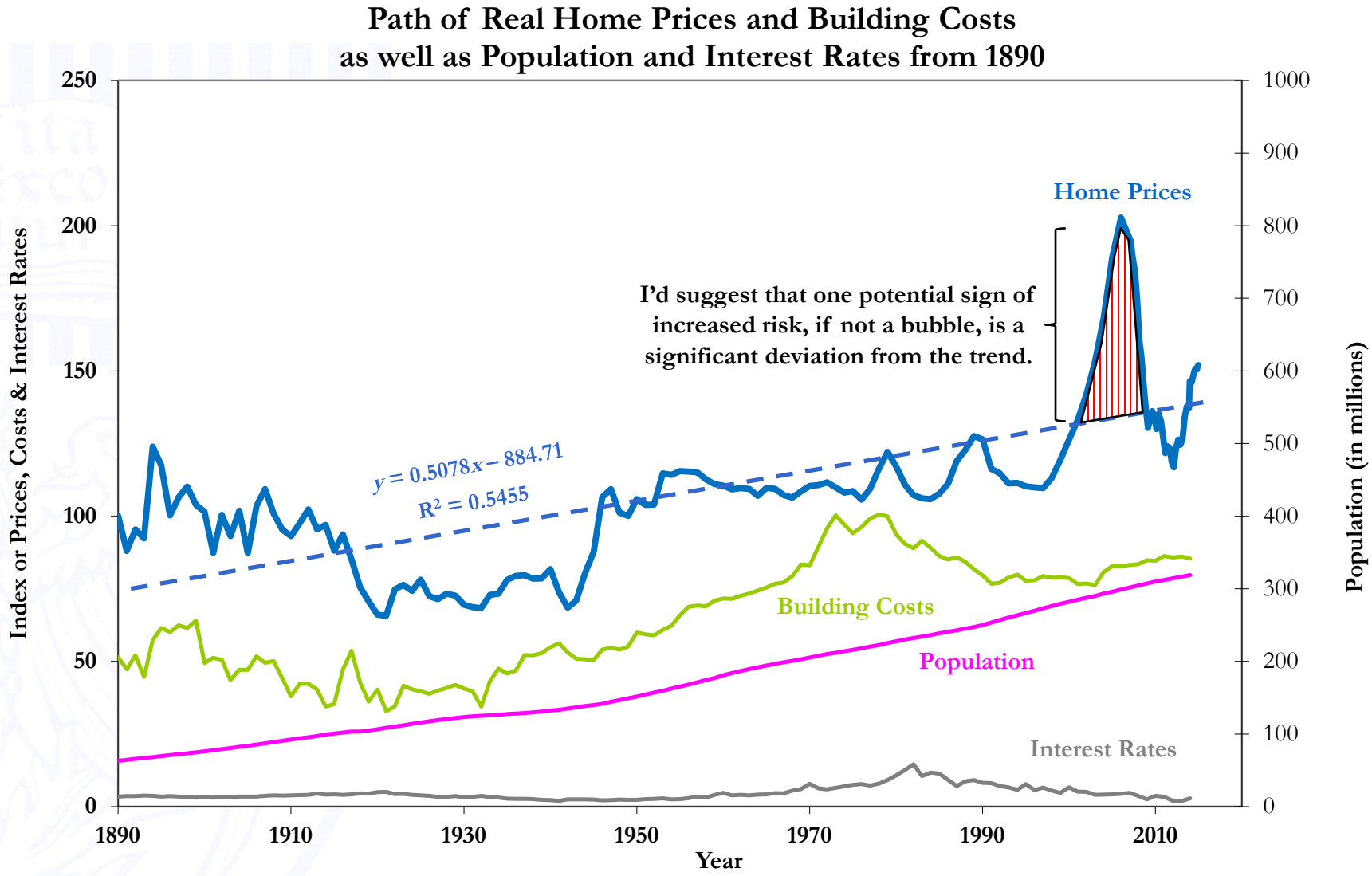
Source: Torto Wheaton Research and Instructor's Calculations

U.S. Home Prices – Perhaps the Best-Known Example



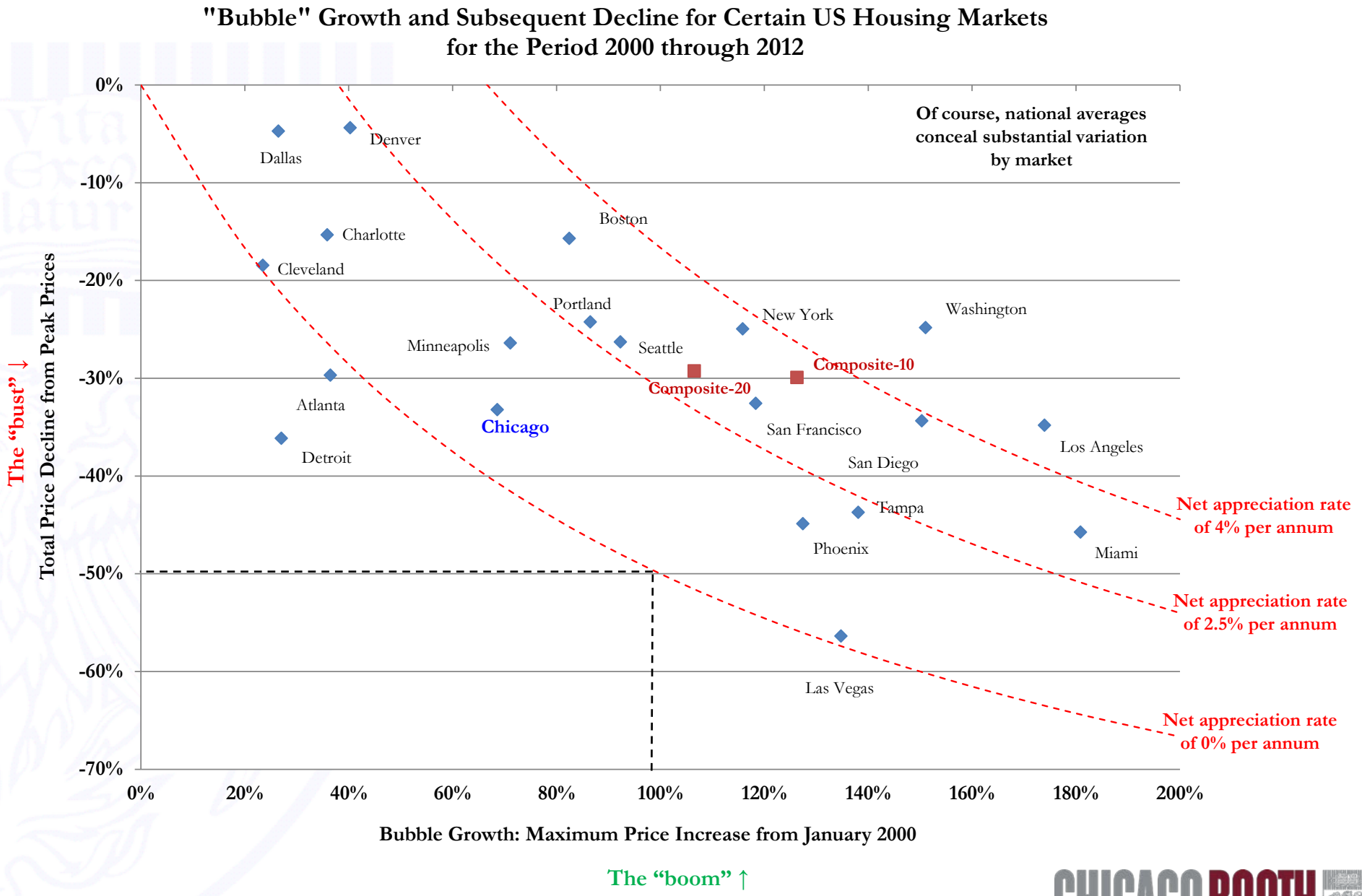
Source: Robert Shiller | *Irrational Exuberance* and Instructor's calculations.

U.S. Home Prices – Deviation from the Trend → Bubble?



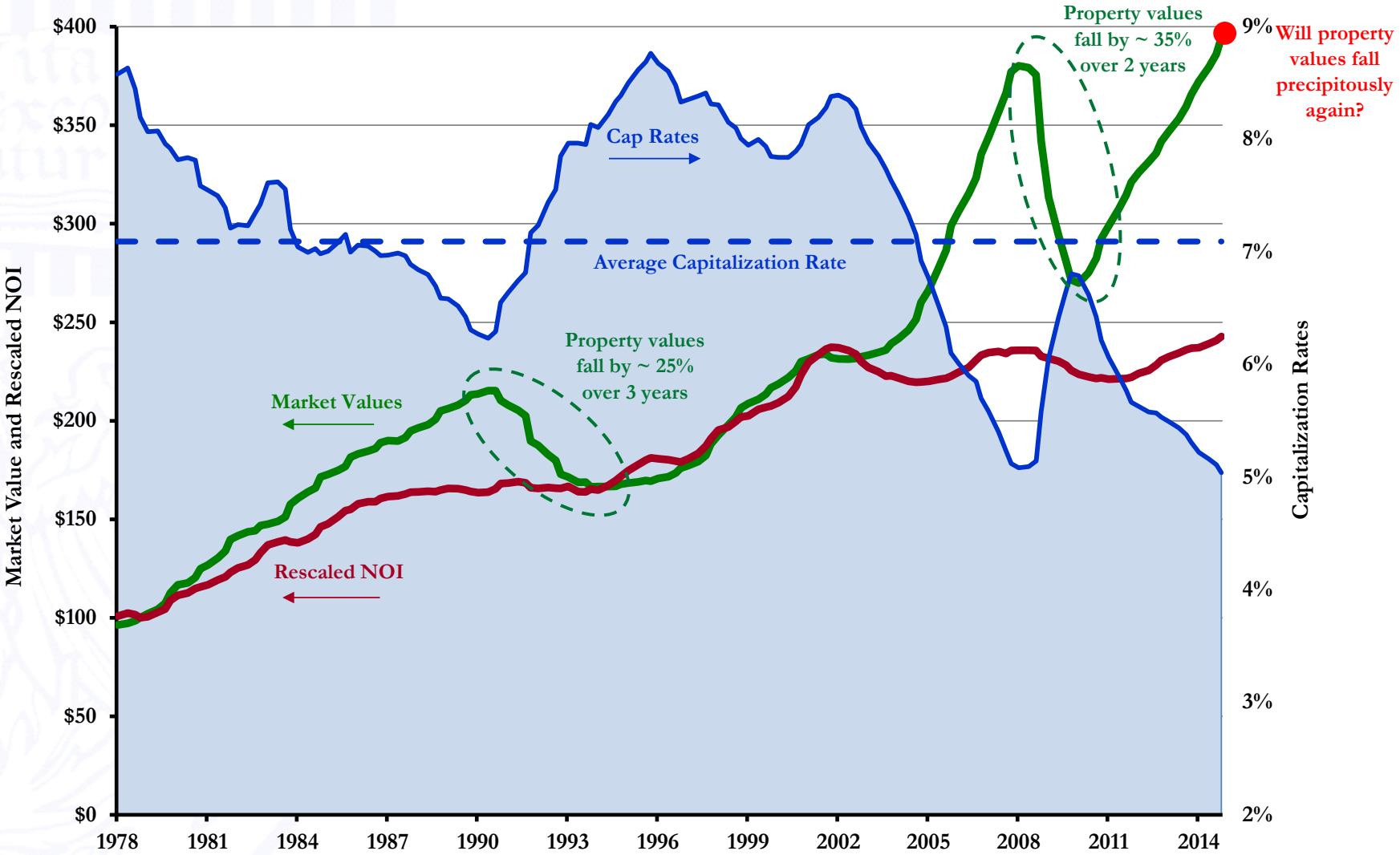
Source: Robert Shiller | *Irrational Exuberance* and Instructor's calculations.

U.S. Home Prices → Market-Level Booms & Busts



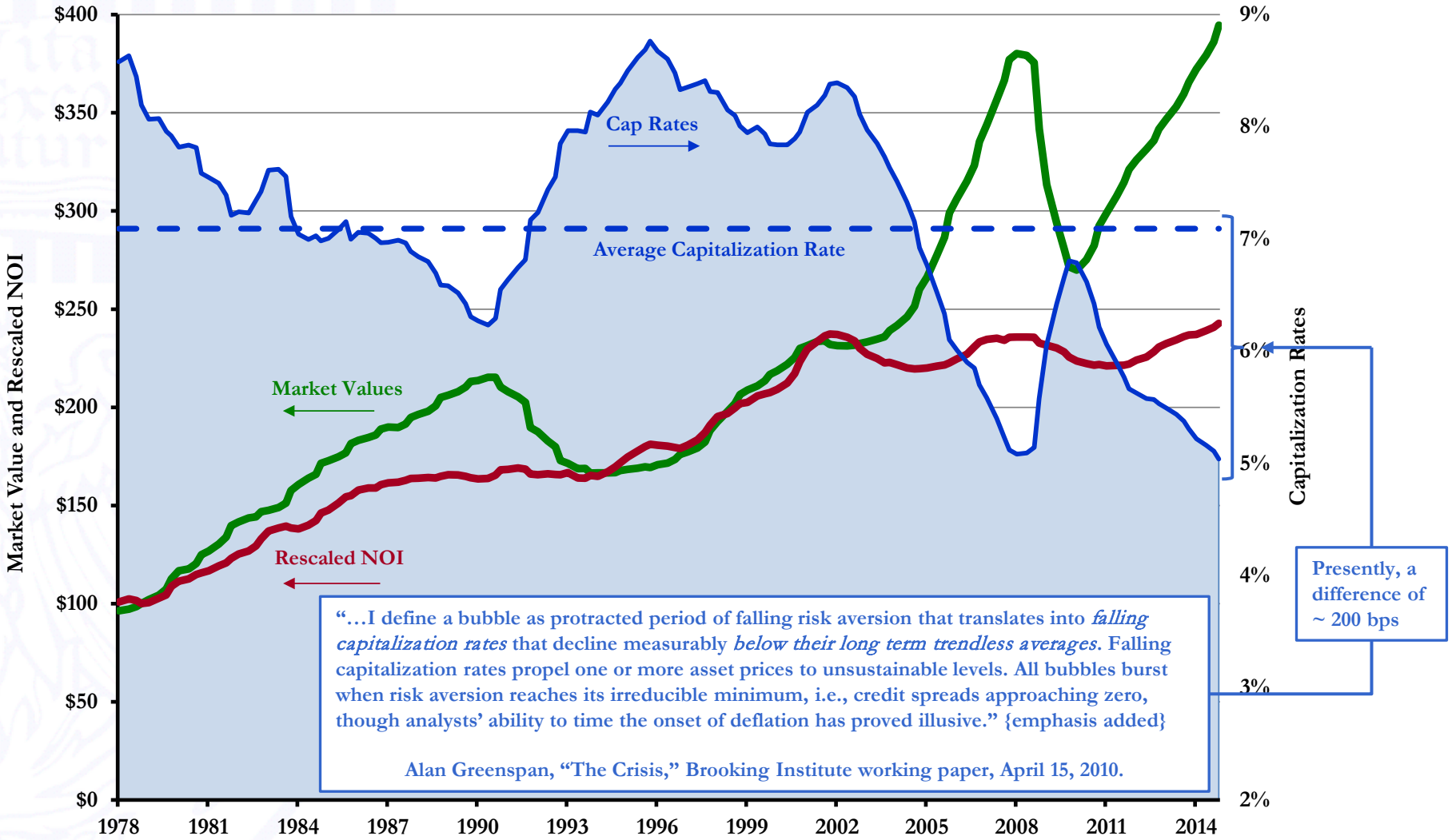
What About U.S. Commercial Real Estate Prices?

NCREIF Index: Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through 2014



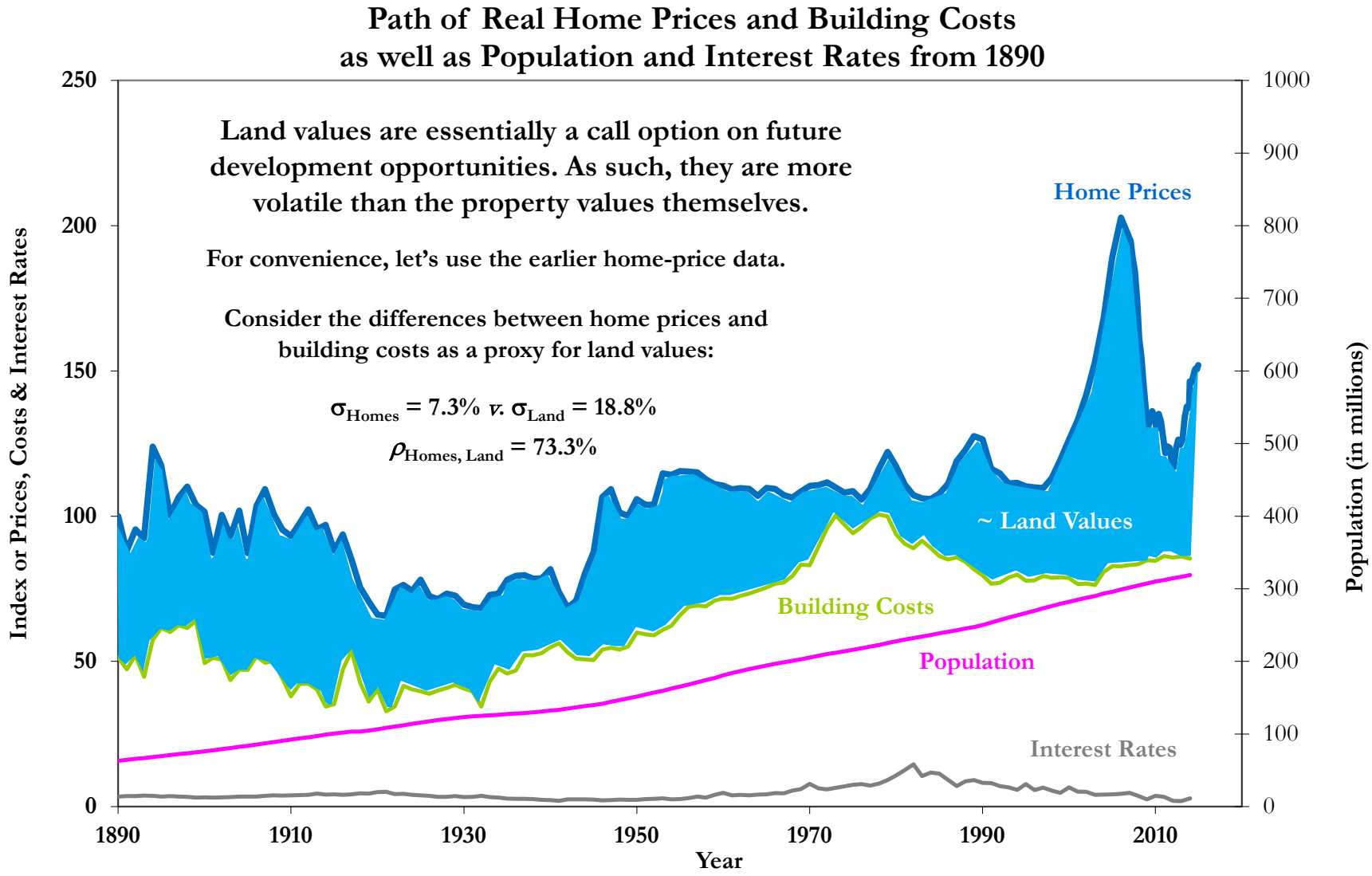
Greenspan's Definition of a Bubble

NCREIF Index: Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through 2014



CHICAGO BOOTH

Land Values Are the Most "Bubblicious" of All



Source: Robert Shiller | *Irrational Exuberance* and Instructor's calculations.

Replacement-Cost Fallacy =*f*(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:

Property Value	<	Land Value + Replacement Cost of the Improvements

This sort of analysis can contribute to inflating the bubble!

- 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:

Property Value > Land Value + Replacement Cost of the Improvements

Replacement-Cost Fallacy→ Deals Done before the Crash

- But, when the bubble bursts, land values crash and the inequality is reversed!

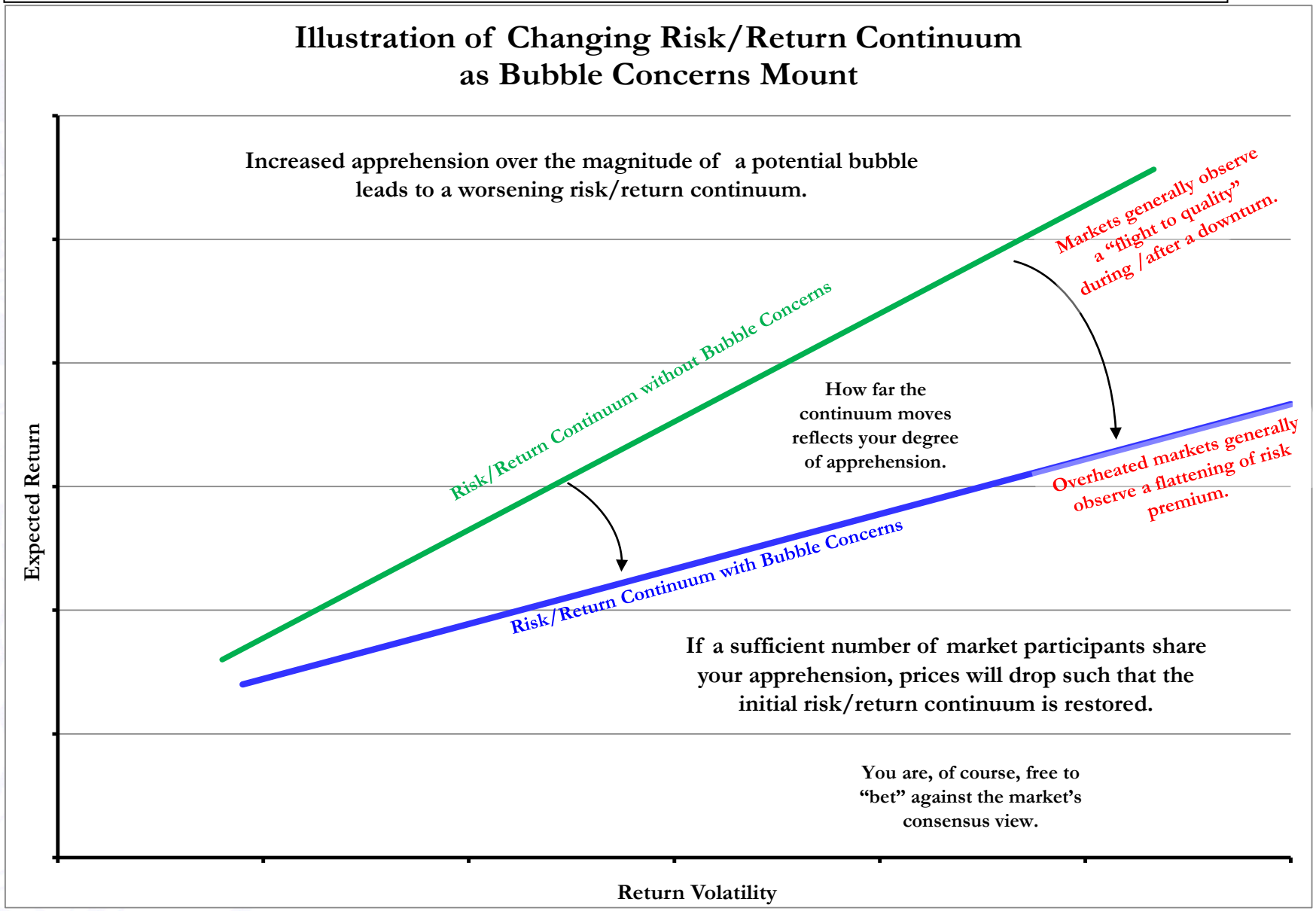
Property Value > Land Value + Replacement Cost of the Improvements

In a crash, land values approach zero

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

Source: Yahoo Finance and Instructor's annotations

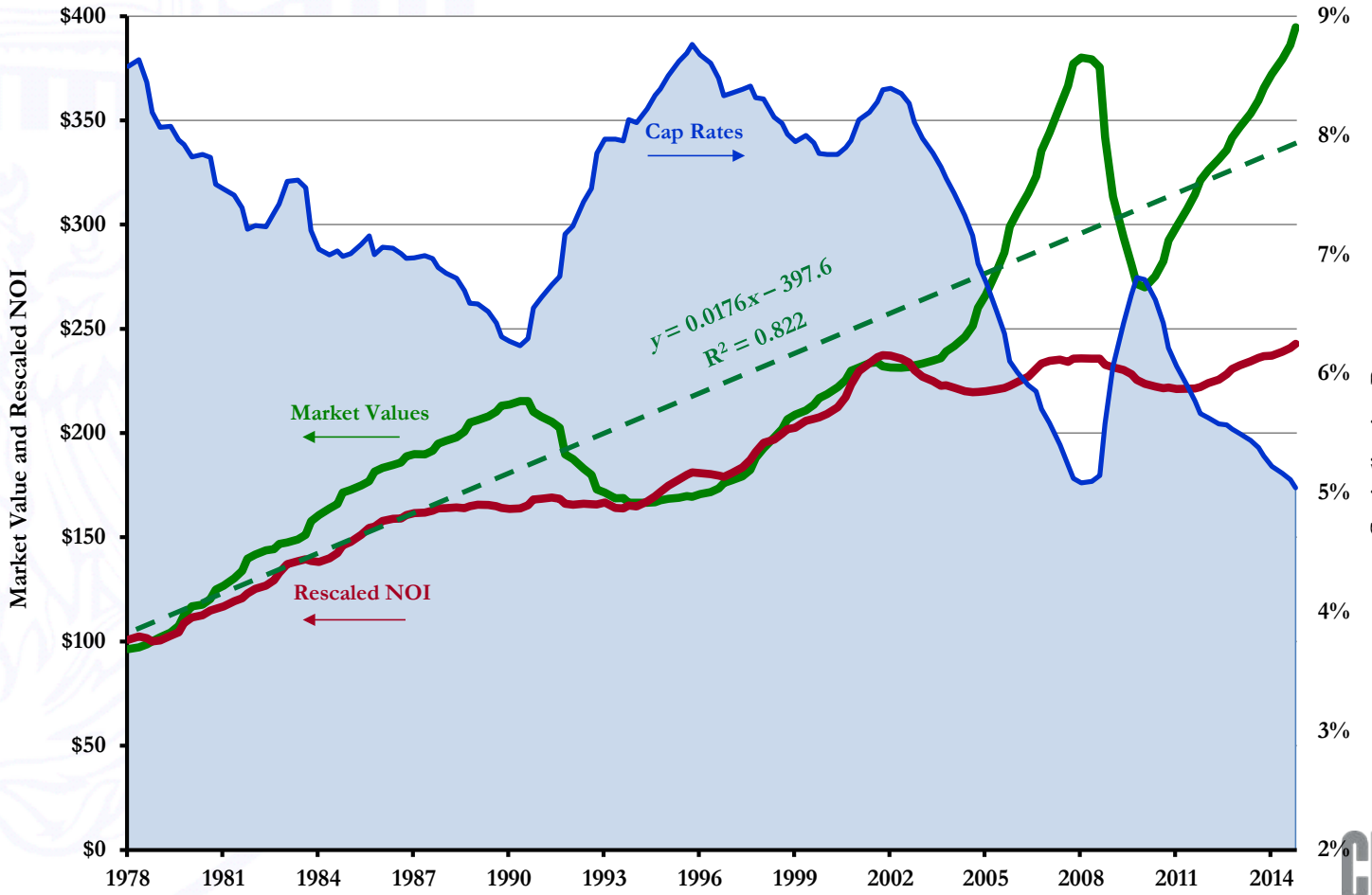
Bubble Concerns Worsen the Risk/Return Continuum



Asset Bubbles ← Deviations from a Trend

- Commercial real estate differs from many other assets in that the "crash" generally does not push <u>asset</u> values to zero (*v.* dot.com stocks being vaporized). Instead, changing property values can be considered as deviations around a trend:

NCREIF Index: Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through 2014



This sort of analysis is not meant to be conclusive about future CRE pricing. Clearly, expected returns on other assets influence the pricing of CRE – as does the path of interest rates (see next section). Instead, this analysis is meant to simply illustrate CRE's pricing volatility.

Asset Bubbles ← Who Cares?

- 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.

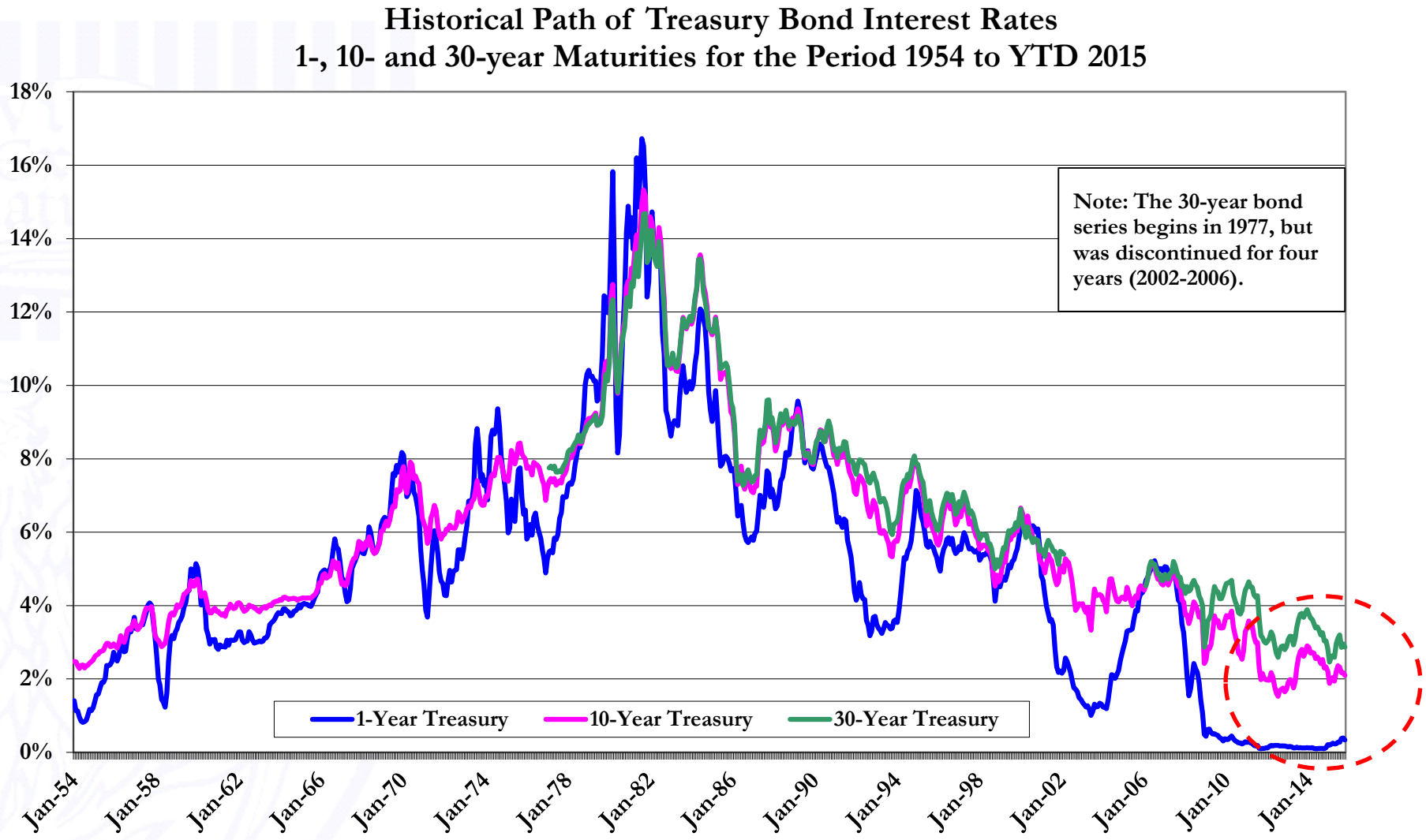
Some Thoughts on Bubbles & Rates: Agenda

- **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

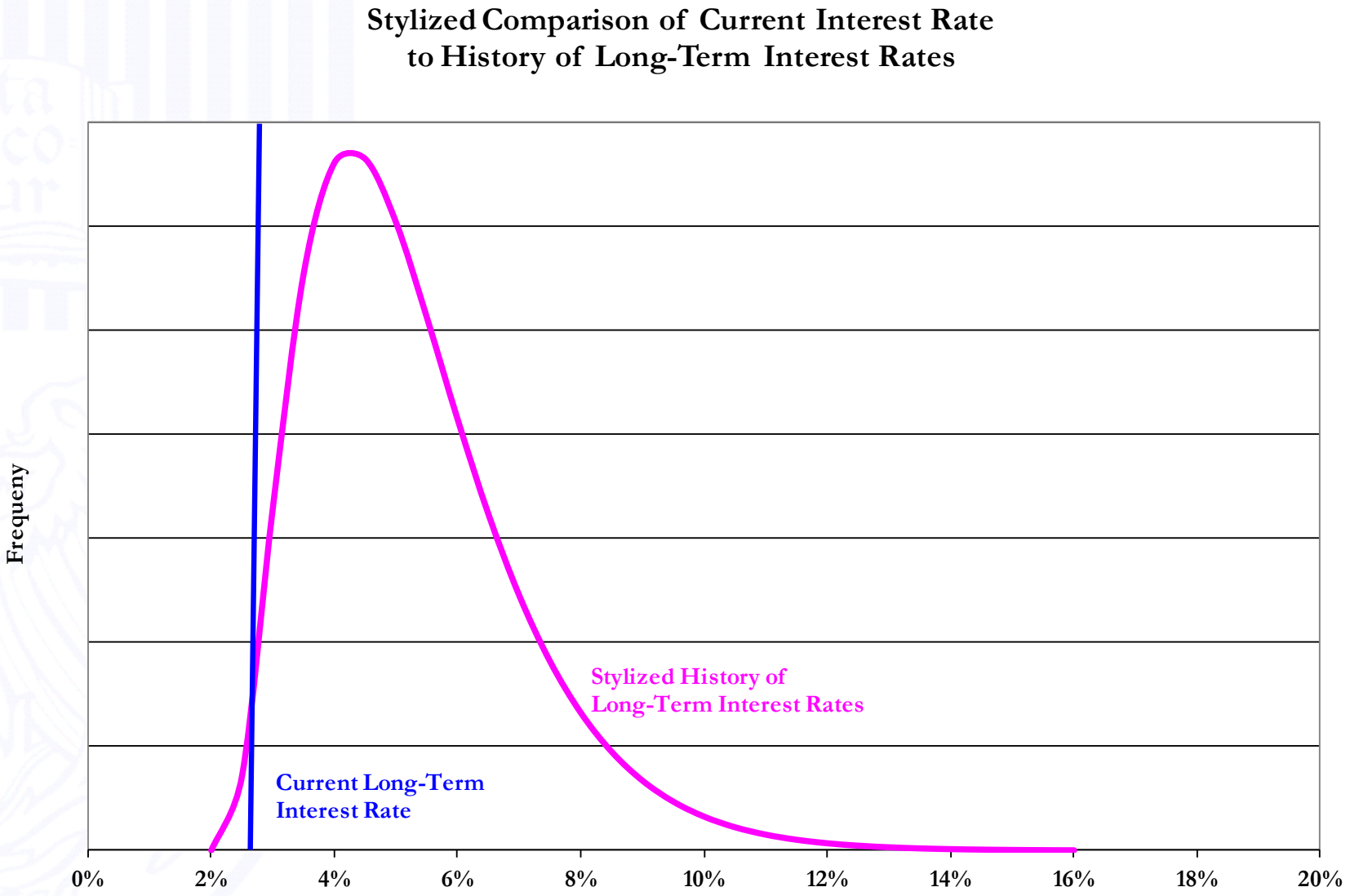
- **Interest Rates in a Forward-Looking Context:**
  - Today's yield curve → implications for tomorrow's rates
  - Consensus view on tomorrow's interest rates
  - Consensus view on tomorrow's inflation rates
  - Consensus is often wrong → cautionary note

Some Historical Context



Source: Federal Reserve Bank of St. Louis | Board of Governors of the Federal Reserve System

Investors' Concern: Fat Right-Side Tail



Valuations & Interest Rates

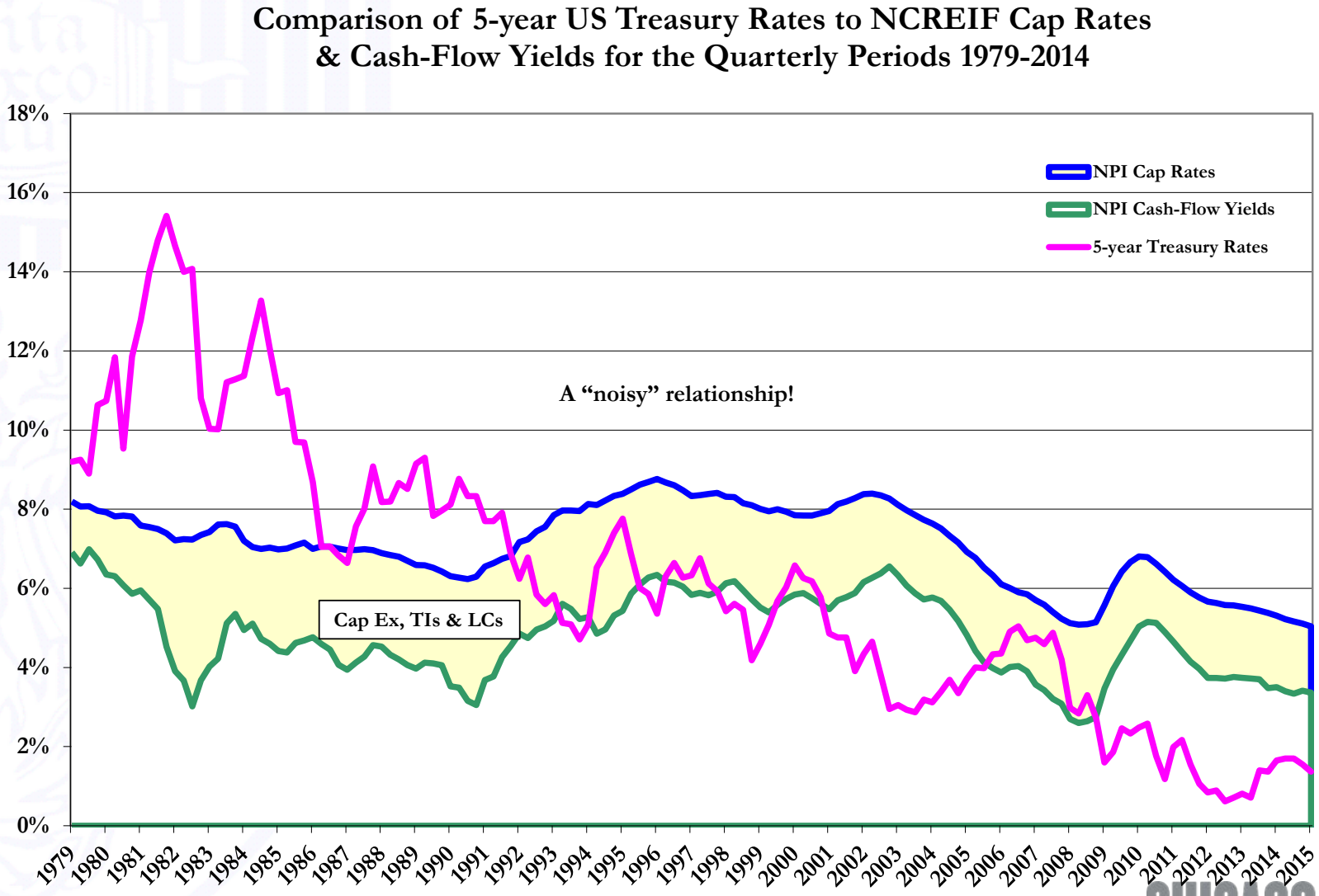
- Some investors naively assume:
  - Interest Rates ↑ ⇒ Asset Prices ↓
- However, a change in interest rates = $f(\bullet)$:
  - a change in inflation expectations, and/or
  - a change in the real return requirement.
- These two factors can have very different impacts on asset values:
  - Inflation ↑ ⇒ 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

History: Current Return *v.* Interest Rates

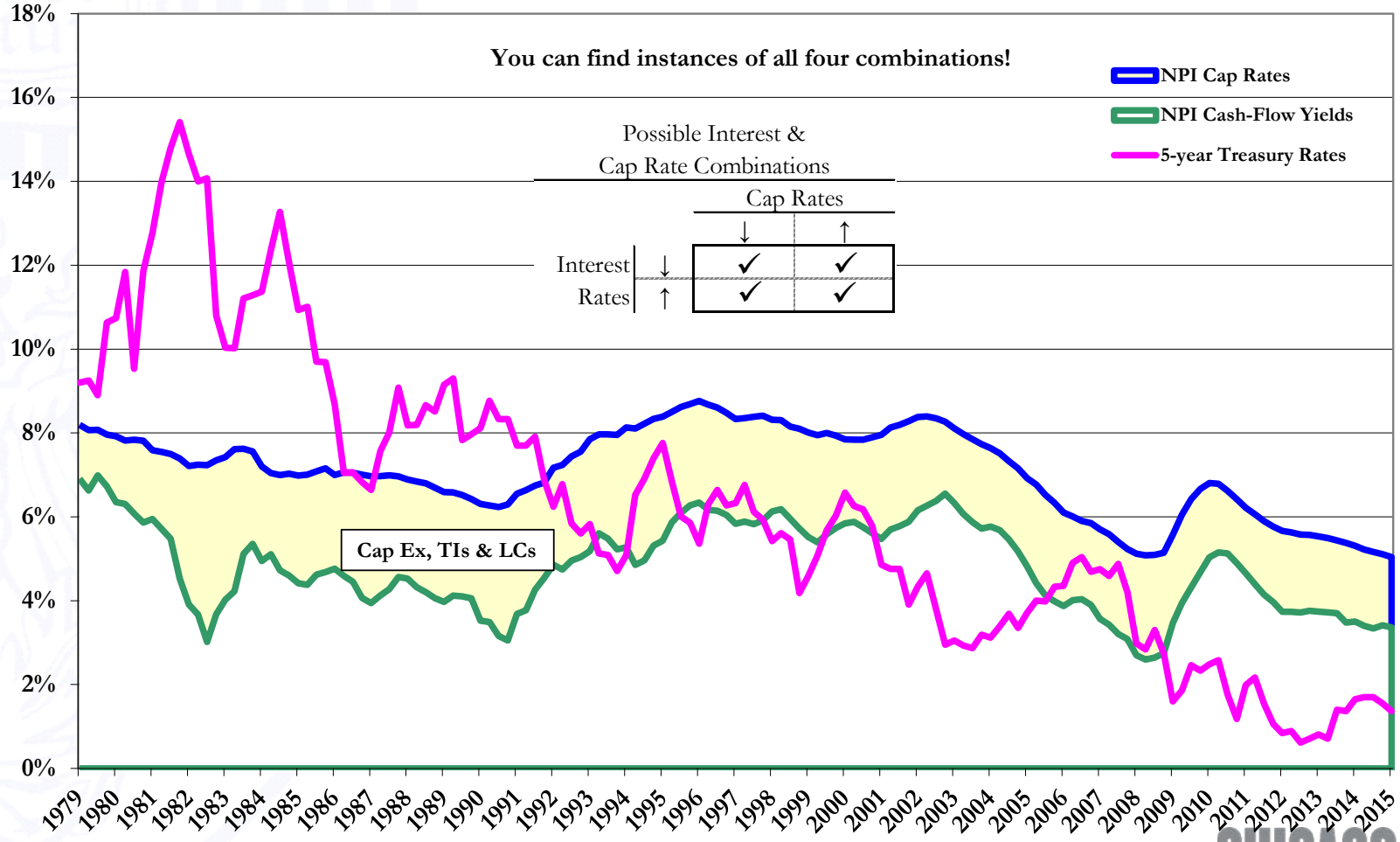
- **A comparison of cap rates & cash-flow yields v. 5-year Treasury rates:**



History: Current Return *v.* Interest Rates

- **A comparison of cap rates & cash-flow yields *v.* 5-year Treasury rates:**

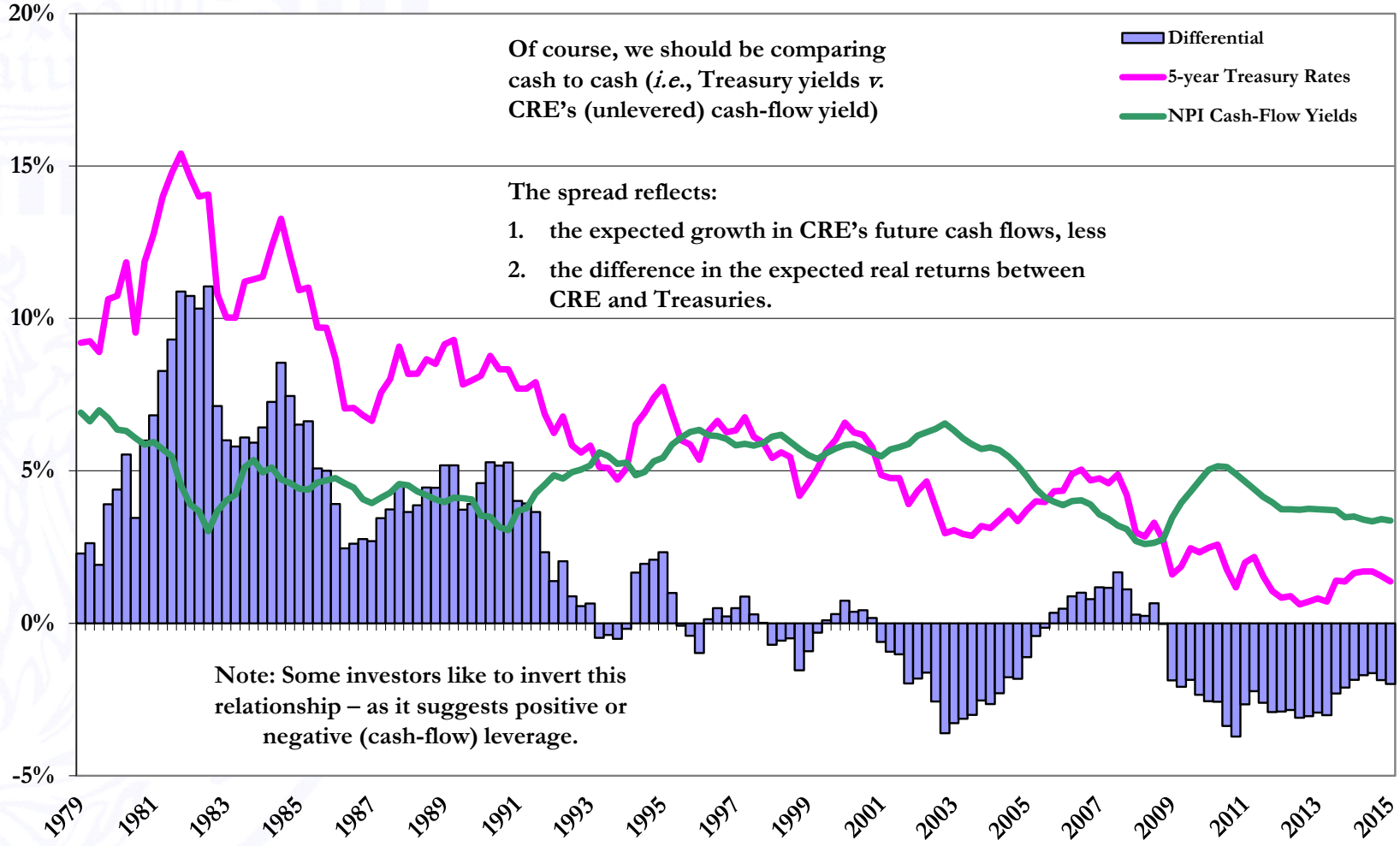
Comparison of 5-year US Treasury Rates to NCREIF Cap Rates & Cash-Flow Yields for the Quarterly Periods 1979-2014



History: Interest Rates *v.* Current Return

- **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 1979-2014



CHICAGO BOOTH

Conceptual: Interest Rates *v.* Current Return

- What does the difference (δ) 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 with a variable-rate, real-yield security.

- More specifically, the difference equals:

  - expected RE's growth (g) in cash flow <u>less</u>
  - the difference in:
    - RE's expected real return (r_{RE}), and
    - Treasury bonds' expected real return (r_{TB}).

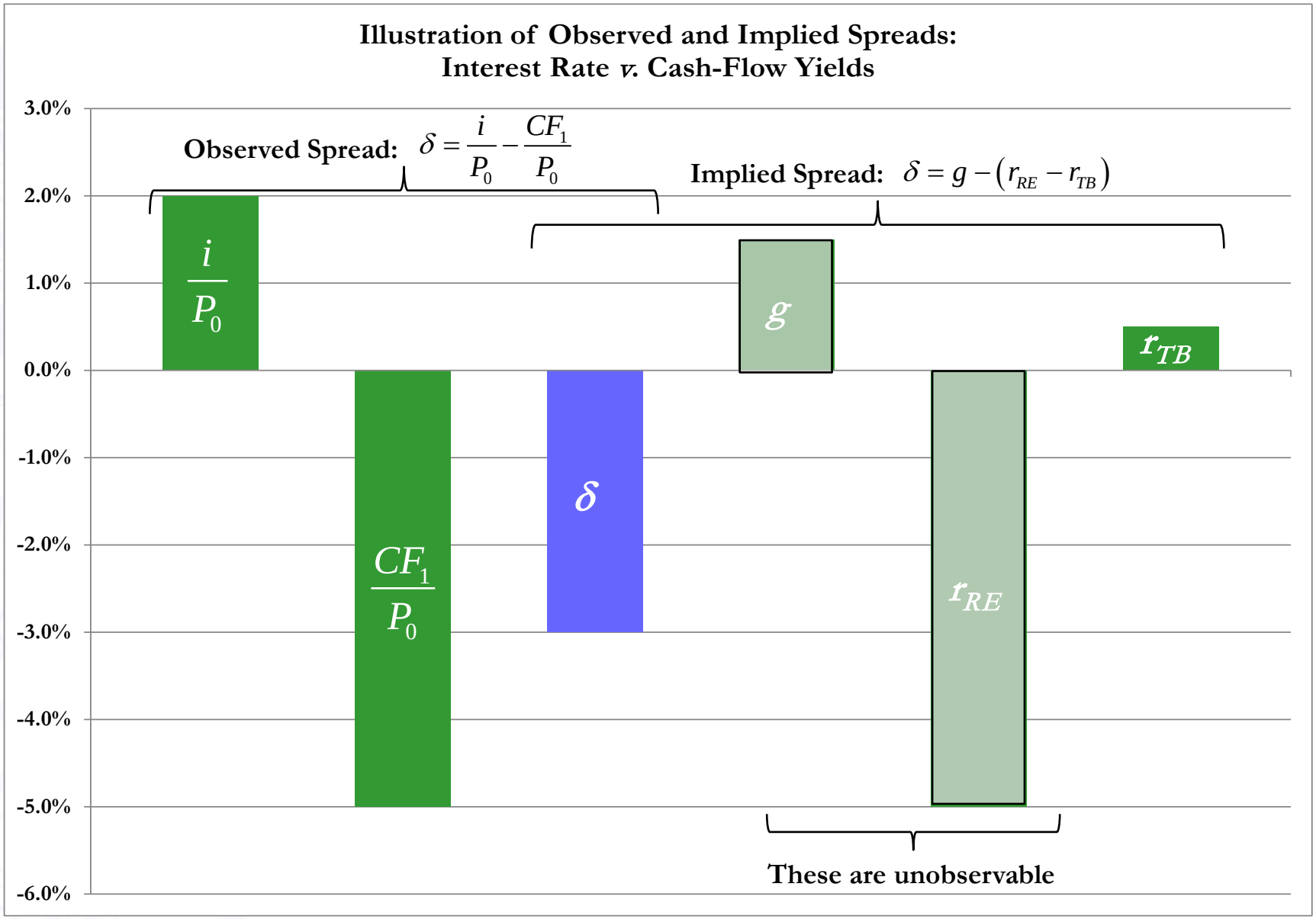
$$\delta = g - (r_{RE} - r_{TB})$$

Illustration: Interest Rates *v.* Current Return

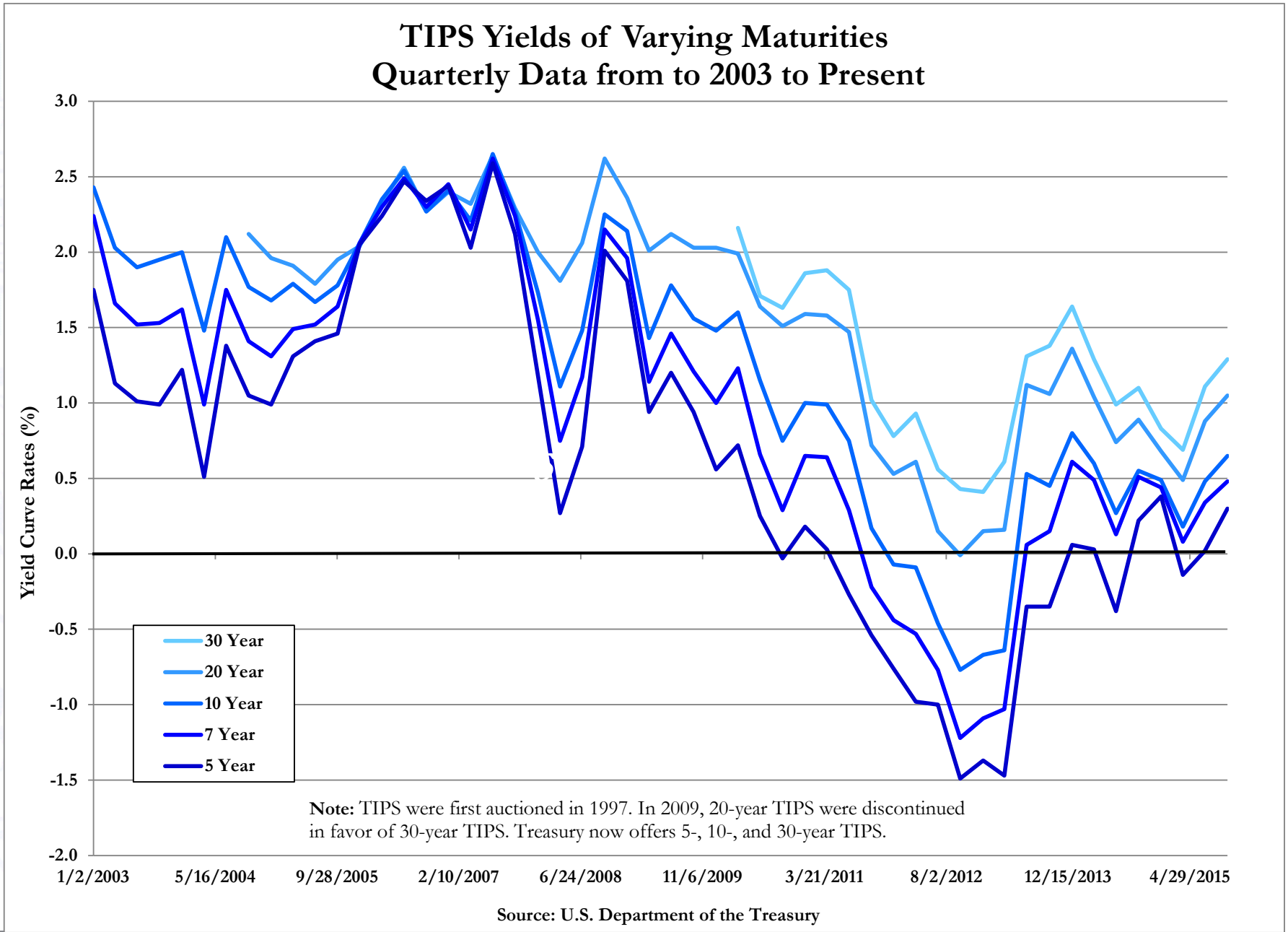
- As an illustration, assume:
  - bond rates (i/P_0) = 2.0%
  - real estate's cash-flow yields (CF_1/P_0) = 5.0%
- ∴ the observed difference (δ) = 2.0% - 5.0% = <3.0%>
- Further assume:
  - real estate's expected cash-flow growth (g) = 1.5%
  - real estate's real return (r_{RE}) = 5.0%,
  - Treasury bond's real return (r_{TB}) = 0.5%
- ∴ the implied difference (δ) = 1.5% - (5.0% - 0.5%) = <3.0%>

- Also assumes that RE's growth rate equals the inflation rate ($g = \rho$)

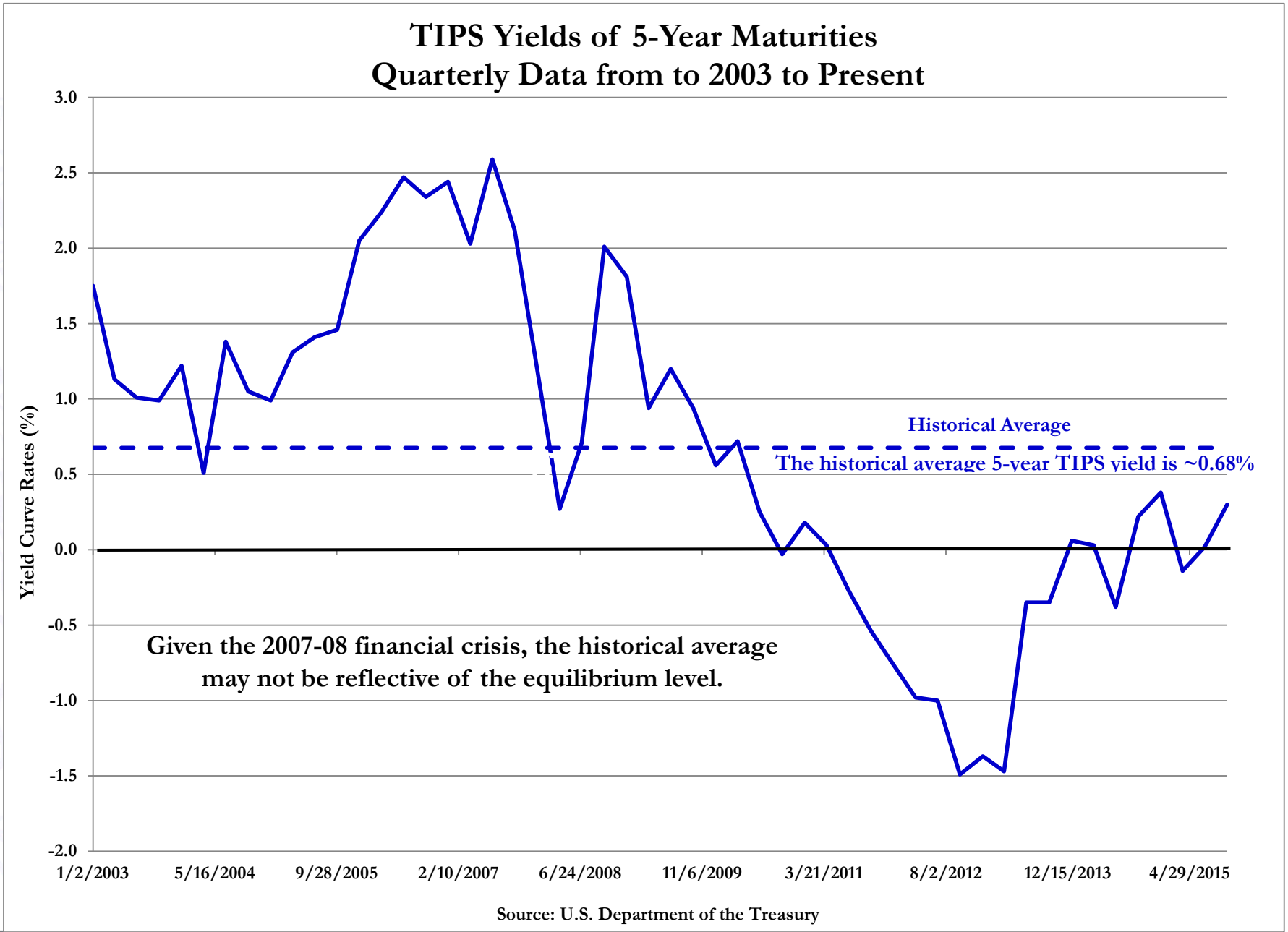
Illustration: Interest Rates *v.* Current Return



An Aside: The Path of TIPS Rates



An Aside: The Path of TIPS Rates



Technical: Interest Rates *v.* Current Return

- Before considering the difference (δ) 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 (ρ) is the link between nominal and real returns.

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

$$k_{RE} = \frac{CF_1}{P_0} + g$$

  - This assumes constant cap rates.

- Let's use these relationships to examine δ

Technical: Interest Rates *v.* Current Return (continued)

- **Consider:**

$$\delta = \frac{i}{P_0} - \frac{CF_1}{P_0}$$

Recall: $k_{RE} = CF_1/P_0 + g \Rightarrow CF_1/P_0 = k_{RE} - g$

$$= \frac{i}{P_0} - \left(k_{RE} - g\right)$$

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

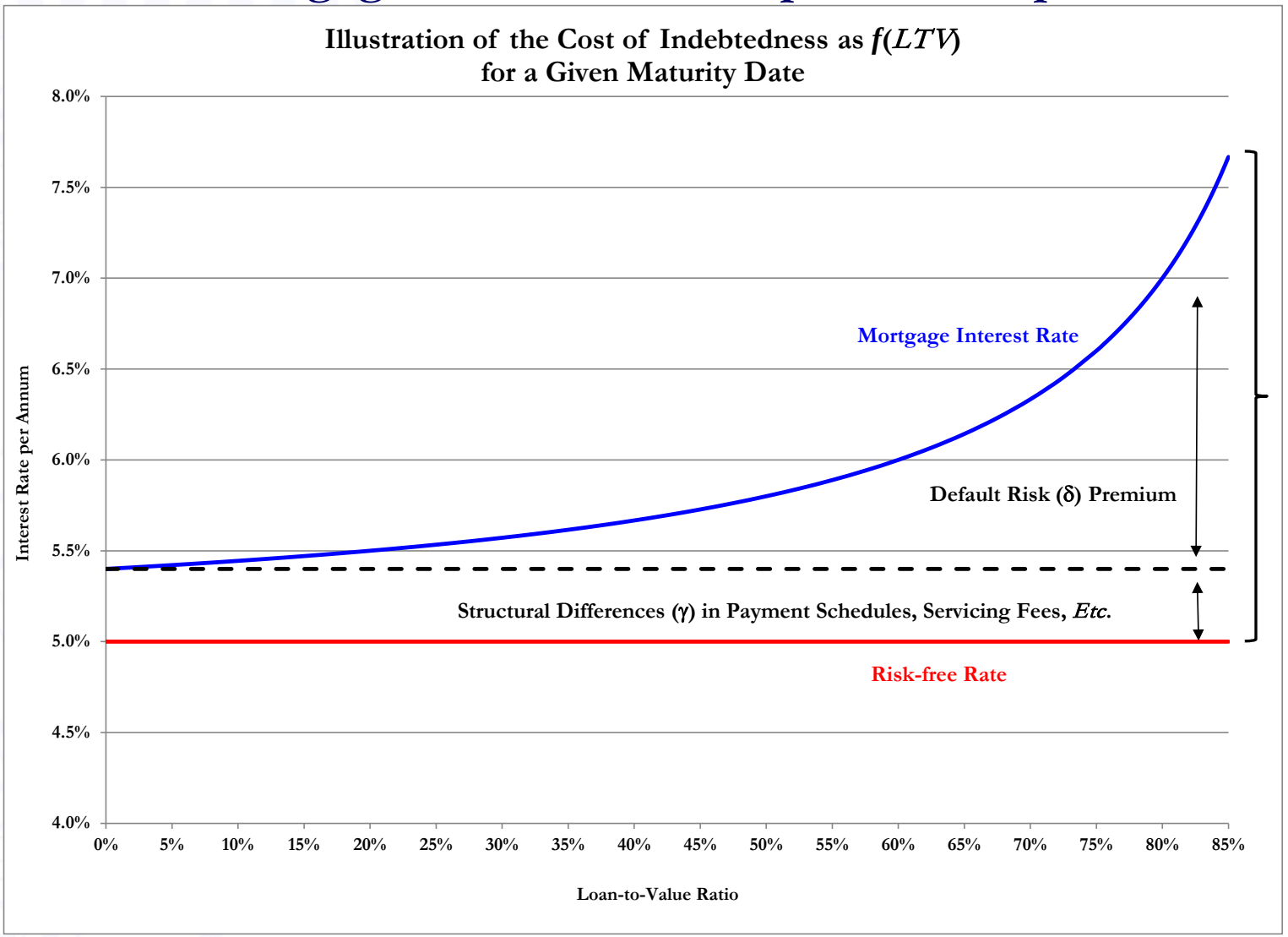
$$= \left(1 + r_{TB}\right)\left(1 + \rho\right) - 1 - \left[\left(1 + r_{RE}\right)\left(1 + \rho\right) - 1 - g\right]$$

Eliminate & collect terms

$$\approx g - \left(r_{RE} - r_{TB}\right)$$

Mortgage Interest Rates

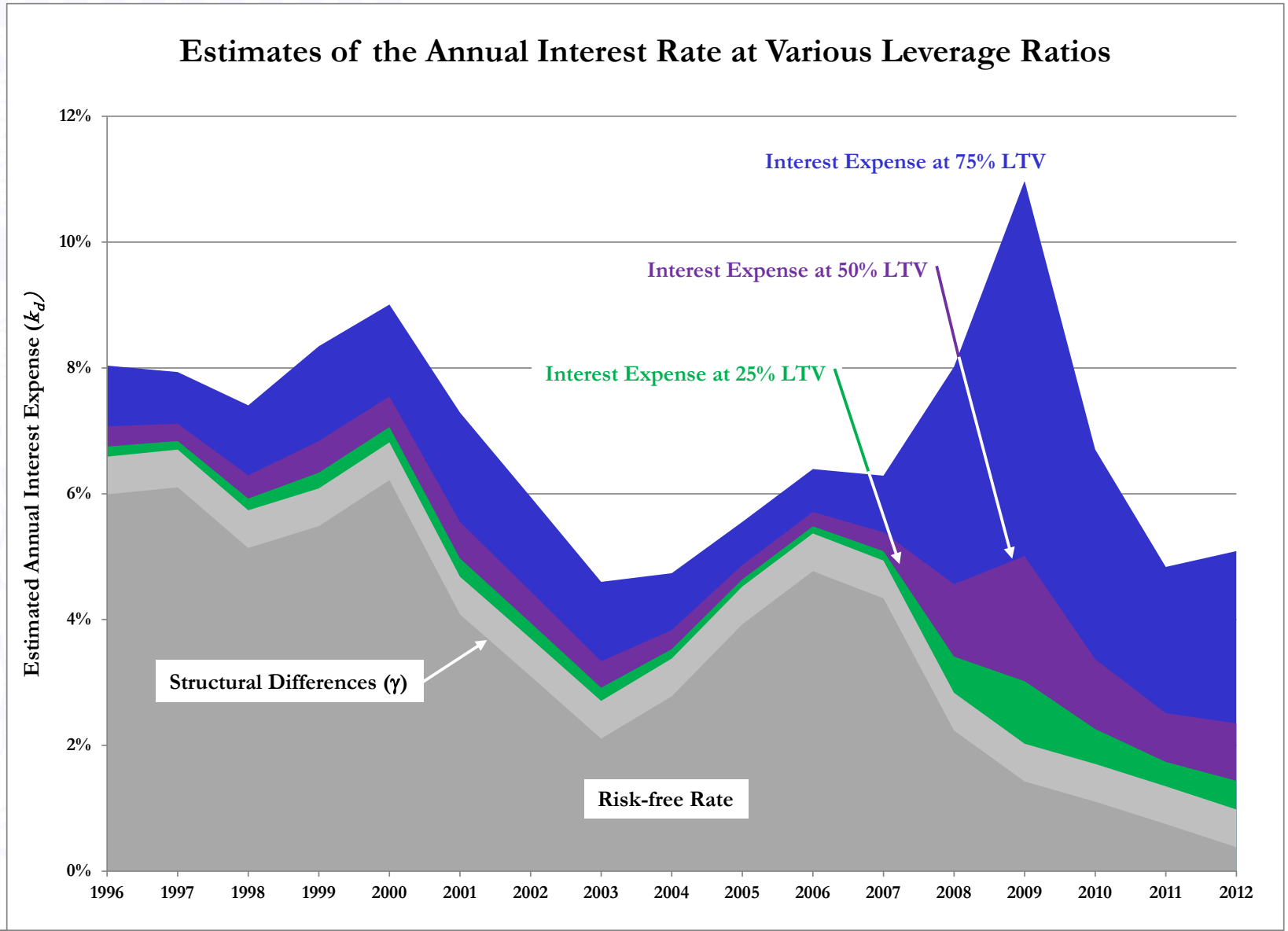
- Of course, mortgage interest rates are priced at a spread to Treasuries:



We borrow at a spread to Treasuries

These Spreads Are Also Volatile

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



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

Today's Yield Curve & Future Interest Rates

- The "expectations theory" of future interest rates:

Maturity	Rate
1 year	2.0%
2 years	2.5%

Then:

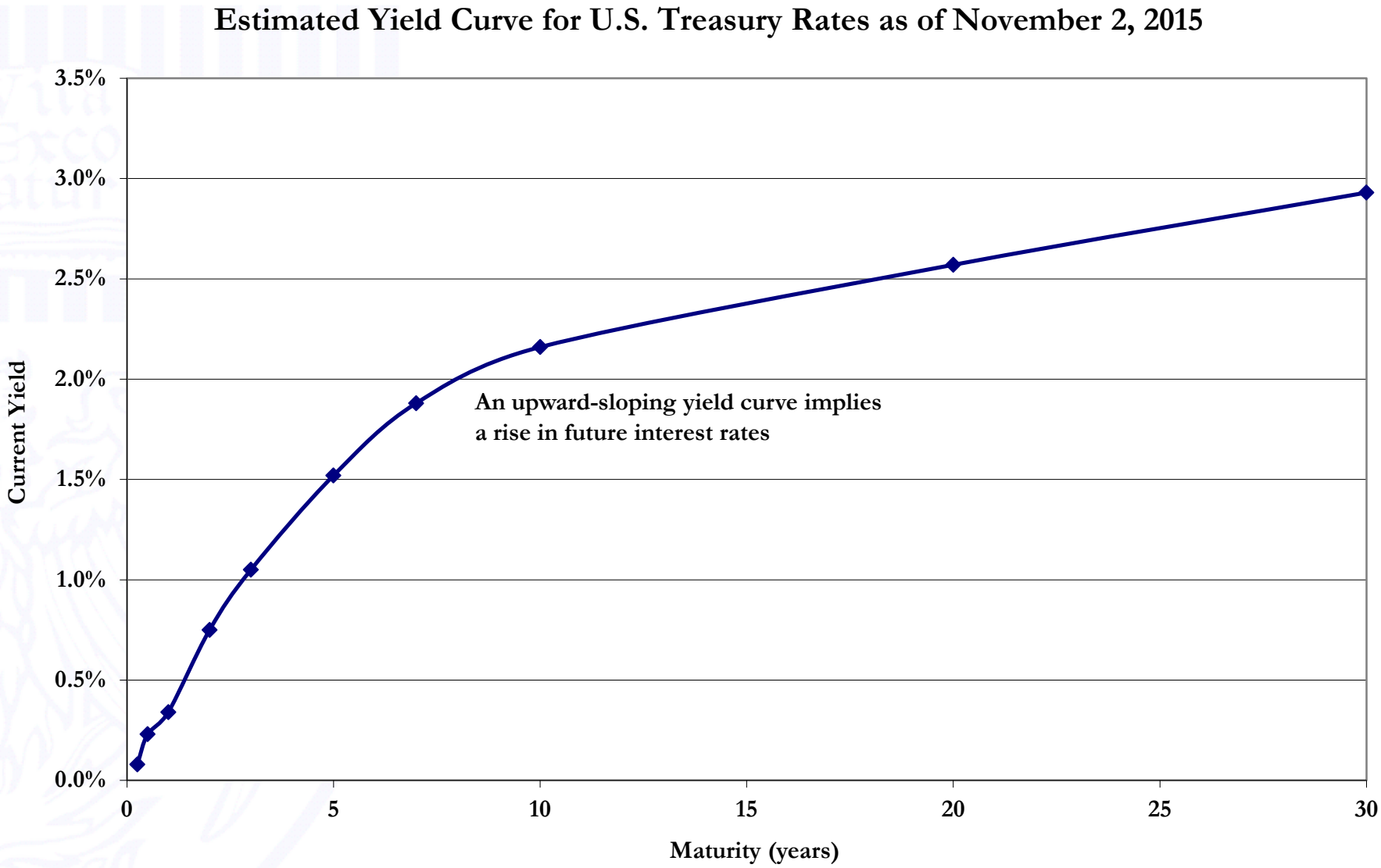
The implied one-year interest rate in one year is expected to be ~ 3.0%

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

$$\underbrace{(1 + .02)\,(1 + x)}_{\text{Holding the 1-year security and "rolling over" to 1- year security in the second year}} = \underbrace{(1 + .025)^2}_{\text{Holding the 2-year security to maturity}} \Rightarrow x \approx .03$$

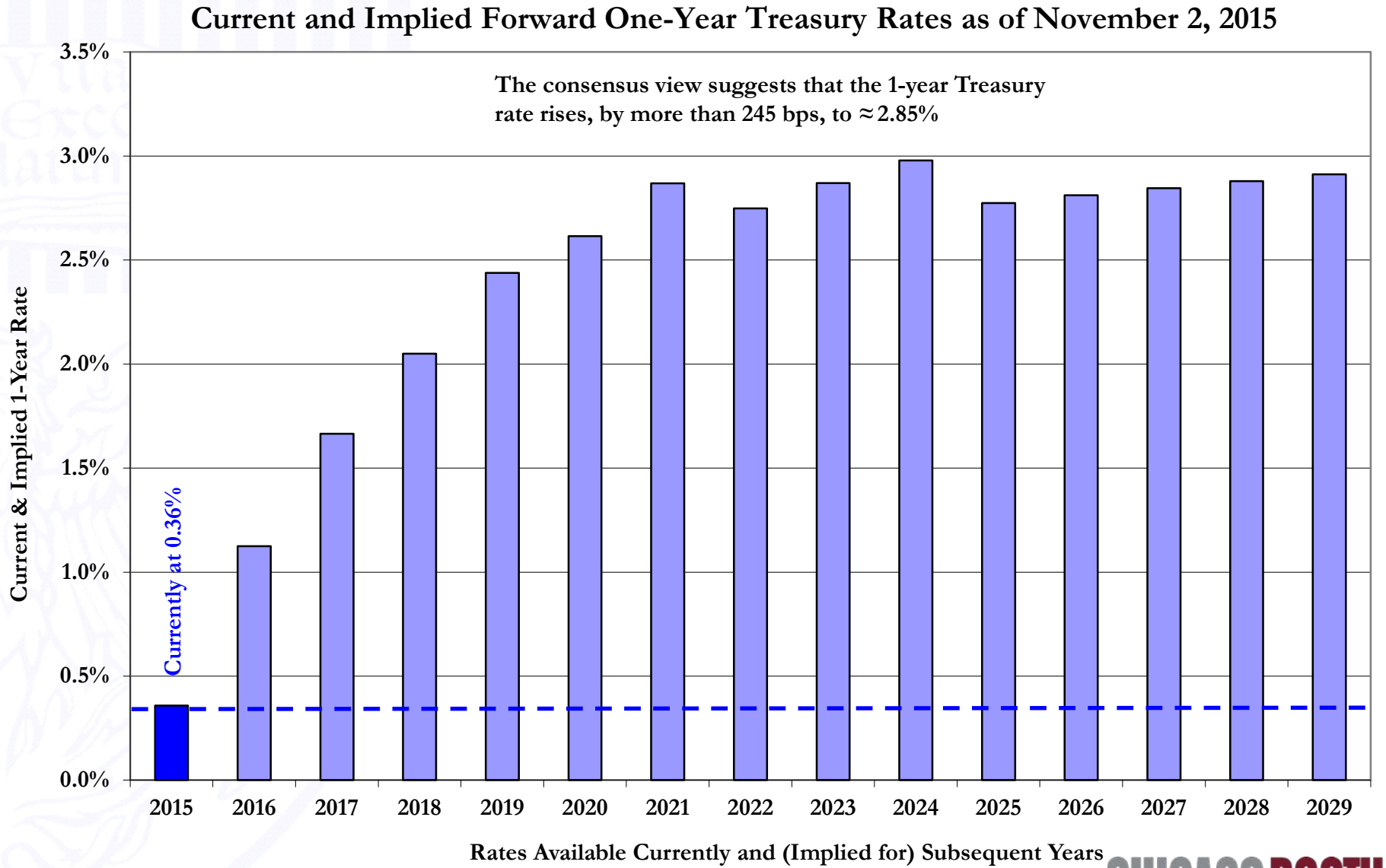
- This approach can be extended to the entirety of today's yield curve

Today's Yield Curve

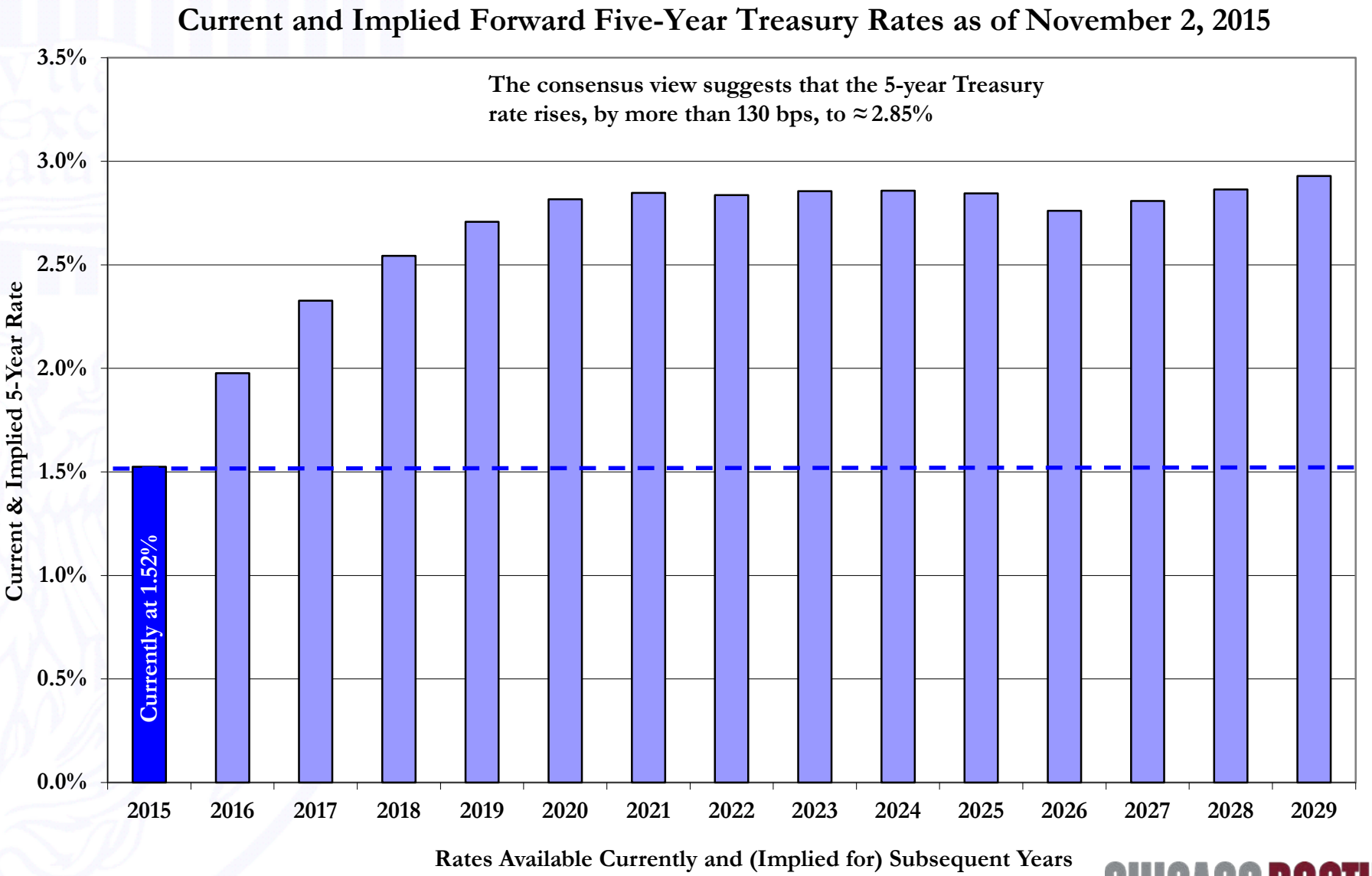


Sources: U.S. Department of the Treasury and Citadel Realty's calculations.

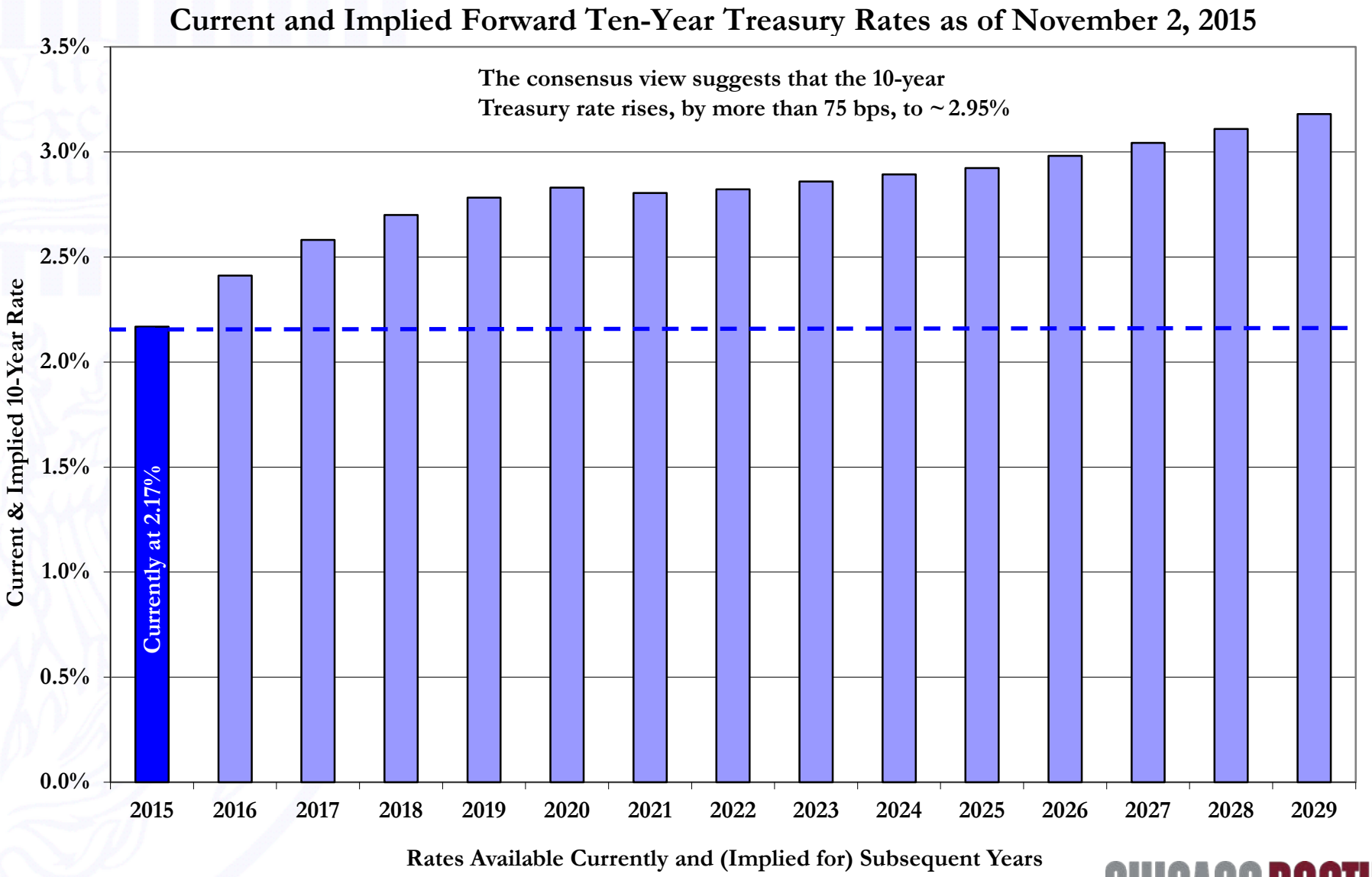
Market's View of Expected Future One-Year Rates



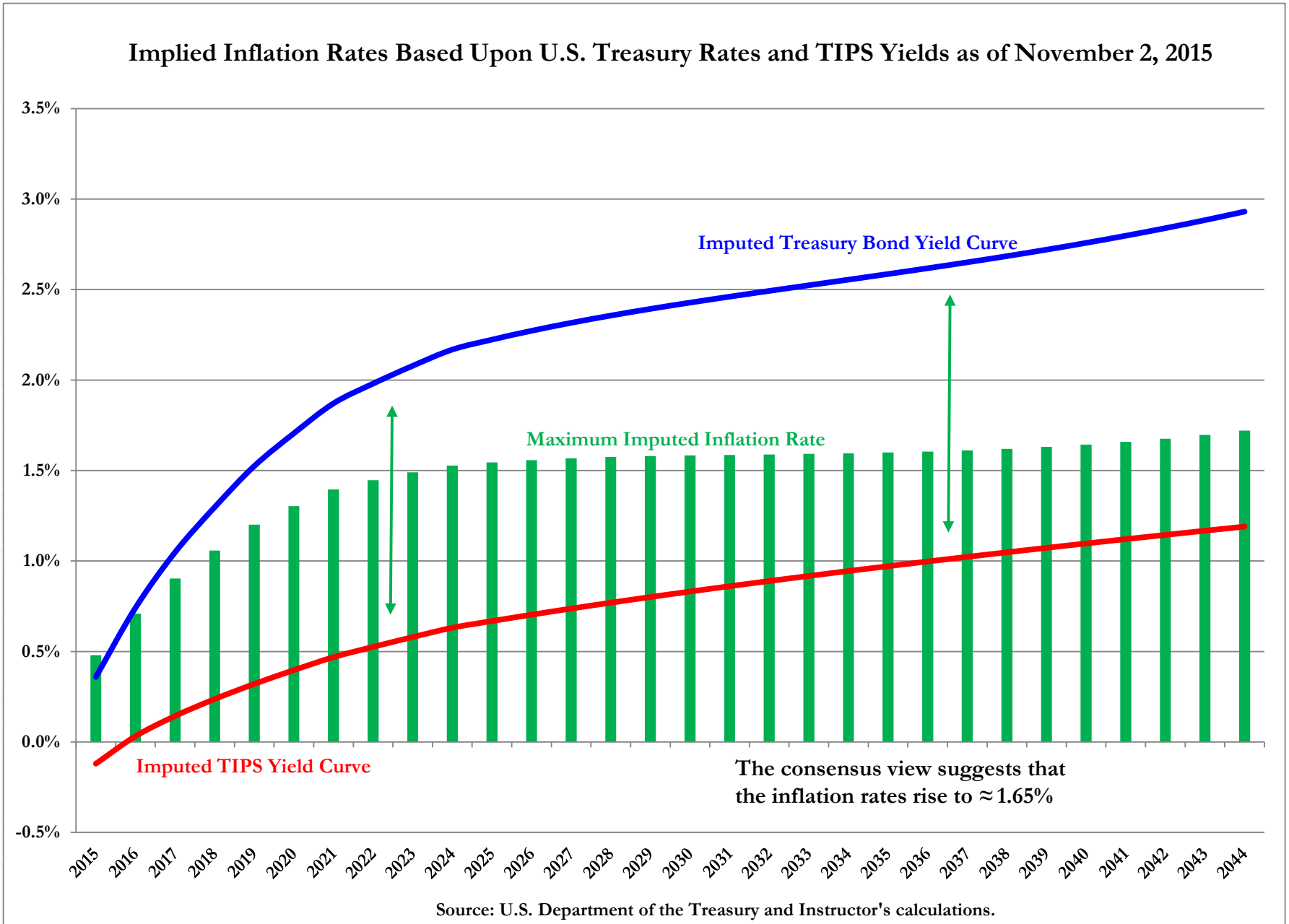
Market's View of Expected Future Five-Year Rates



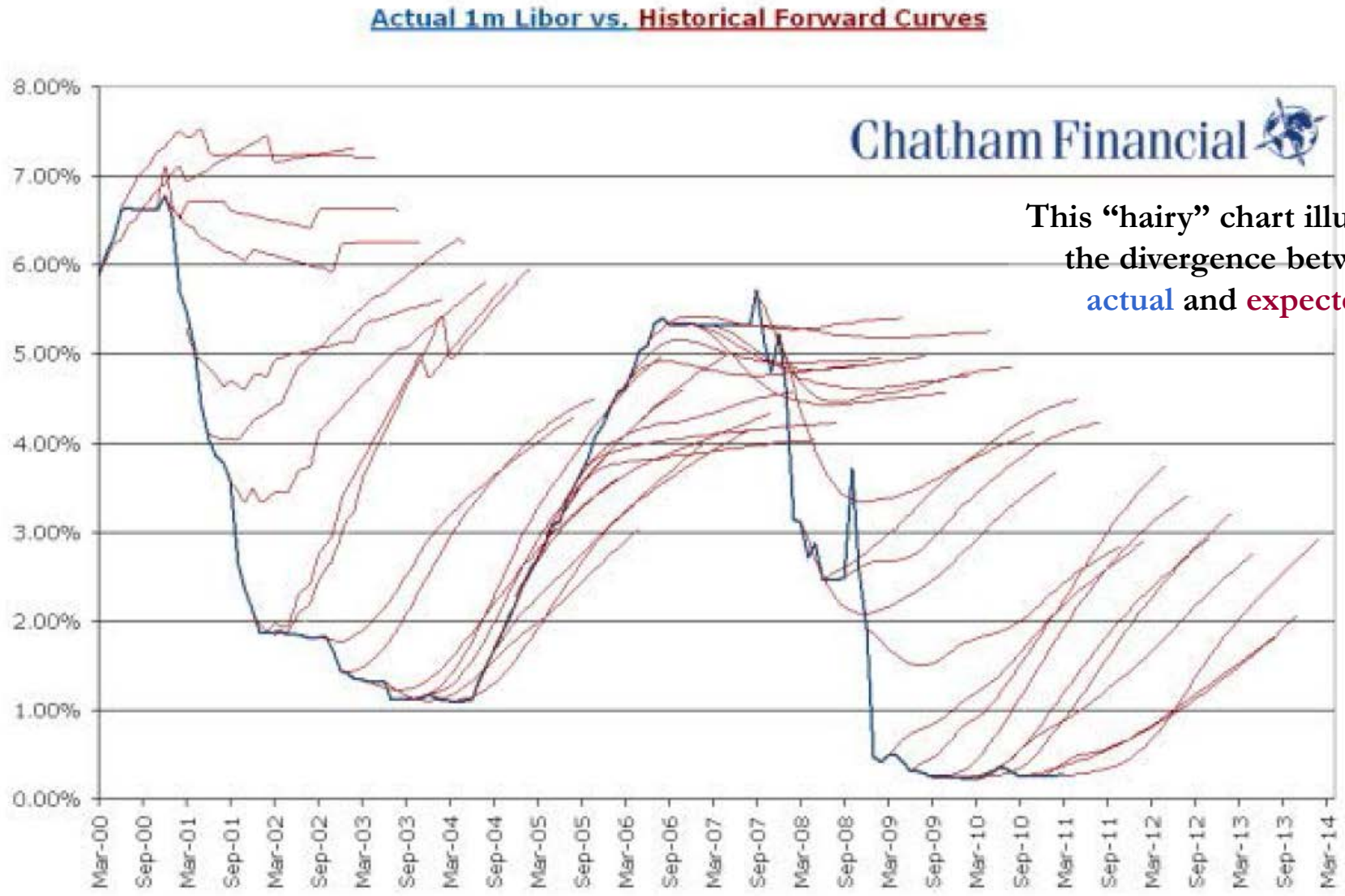
Market's View of Expected Future Ten-Year Rates



Today's Yield Curve → Expected Inflation



Caveat: Market's View Is Often Wrong



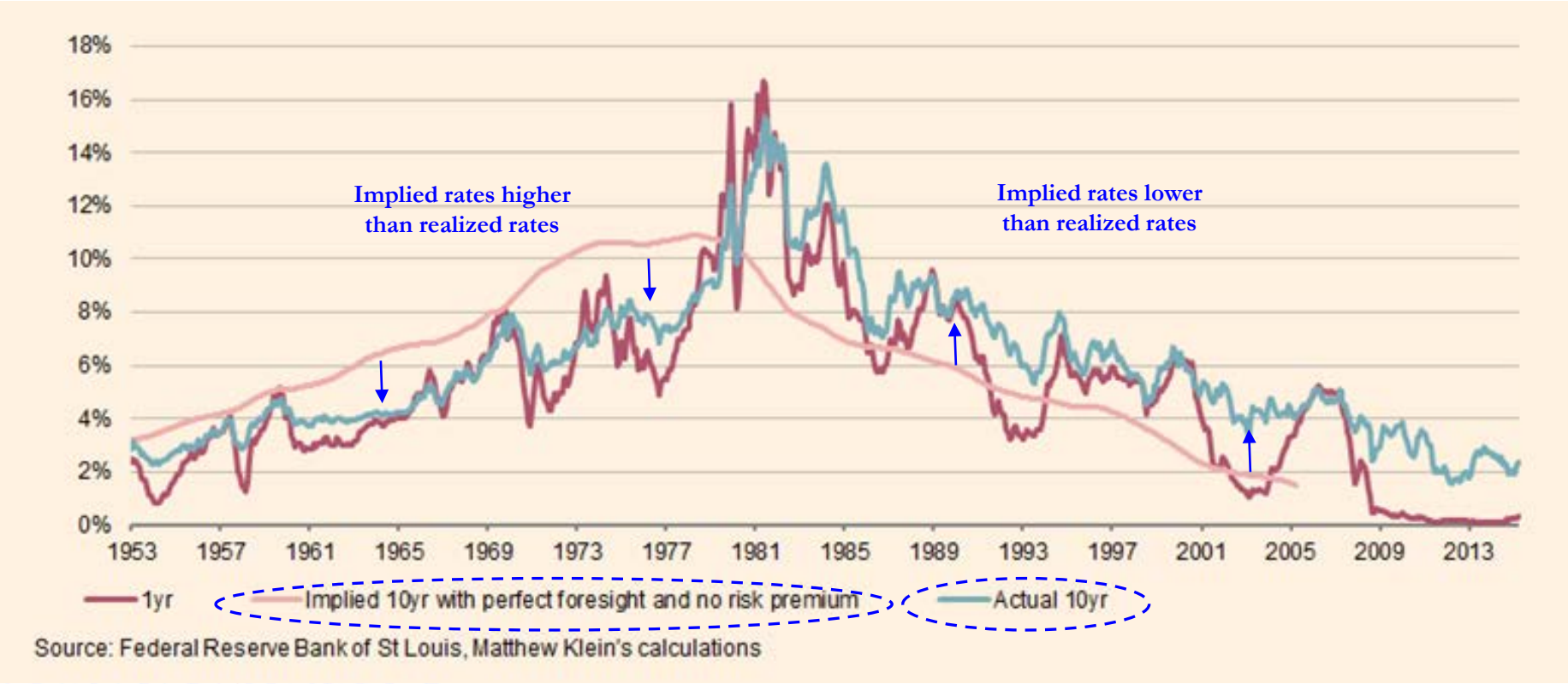
This "hairy" chart illustrates the divergence between actual and expected.

A Similar Perspective on Market's Omnipotence

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



Sources: Matthew C. Klein, "Greenspan's Bogus 'Conundrum'," *FT Alphaville*, September 3, 2015 and referenced in John Cochrane's *Grump Economist* blog, September 16, 2015.

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

    $\Rightarrow$ Sit in your pajamas,

    $\Rightarrow$ trade from home for < 1 hour/day, and

    $\Rightarrow$ hit the beach (golf course, bike trails, *etc.*) the rest of your day!