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The University of Chicago Booth School of Business

"Some Thoughts on Real Estate Pricing"

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Some Thoughts on Real Estate Pricing: Agenda

- Context:
  - "Bubble" pricing?
  - Past bubbles
  - Greenspan's definition of a bubble

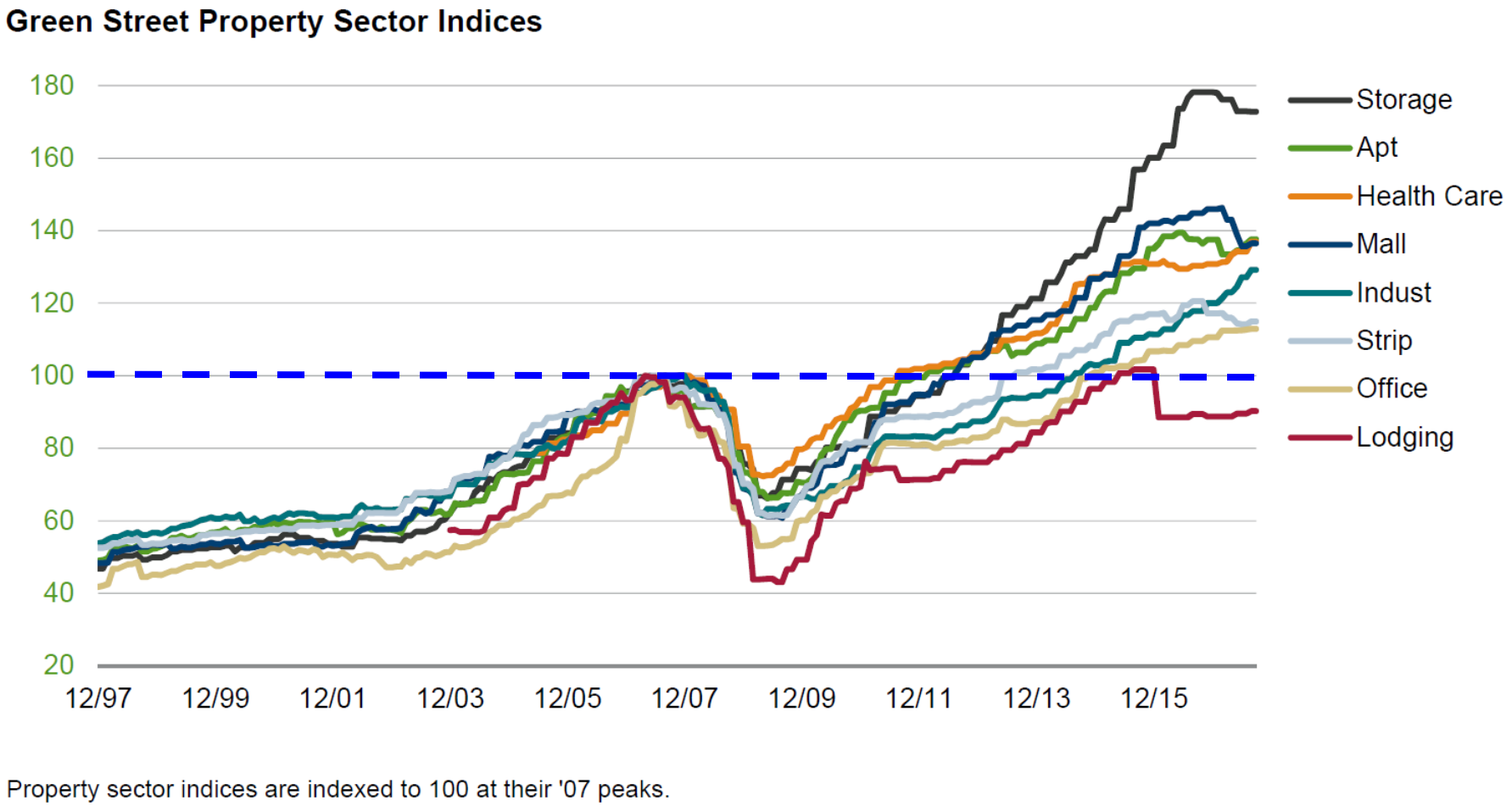
- **The Spread between Interest Rates and Cap Rates:**
  - **Historical perspective – including inflation's role**
  - **Interest rates *v.* cash-flow yields**
  - **Tilting your portfolio: bonds *v.* real estate**
  - **Impacts of shifting capitalization rates**

- **How Real Estate Ought to be Priced:**
  - **What do I want *v.* How will it be generated?**
  - **TIPS market □ real-return requirements**
  - **Current capitalization rates *v.* history**

- **Addendum: Forward (Interest & Inflation) Rates**

Is CRE in "Bubble" Territory?

- How should we view the level of CRE prices?



Source: Green Street Advisors, Commercial Property Price Index, October 10, 2017.

"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 recall three more-recent examples:
  - Late 1990s: San Francisco office rents
  - Mid 2000s: (U.S.) Home prices
  - Mid 2000s: (U.S.) Commercial real estate prices
- As you consider these examples, candidly ask yourself:

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

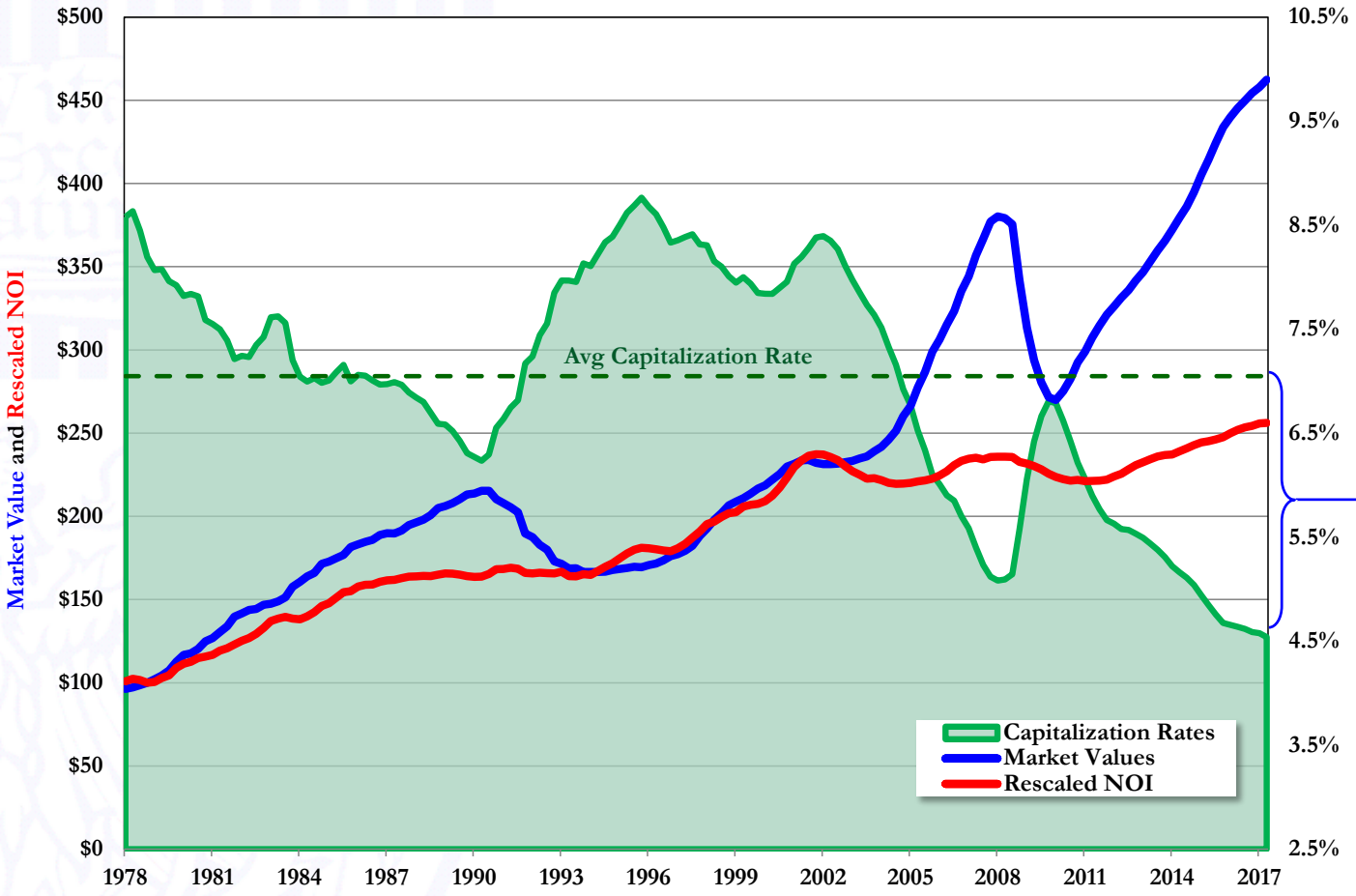
  It's easy to consider yourself an expert, after the fact!
- If so, did you have the (financial) courage to act on it?
- Acting on the recognition of the bubble can take two forms:

1. Avoidance of over-priced assets ← risk-averting strategy
2. Exploit the over-priced assets ← risk-seeking strategy

Using 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.]

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 (the Second Quarter of) 2017



Some high-yield funds tout that the possible repricing of CRE makes the high-yield safer than equity, but with higher (expected) return.

A point questioned in the accompanying *JPM* article!

"…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}

Alan Greenspan, "The Crisis," Brooking Institute working paper, April 15, 2010.

Cap- Rate Comparison:	
Current Cap Rate	4.62%
Long-Term (Trendless) Average	7.05%
Difference	-2.43%

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  - Historical perspective – including inflation's role
  - Interest rates *v.* cash-flow yields
  - Tilting your portfolio: bonds *v.* real estate
  - Impacts of shifting capitalization rates
- How Real Estate Ought to be Priced:
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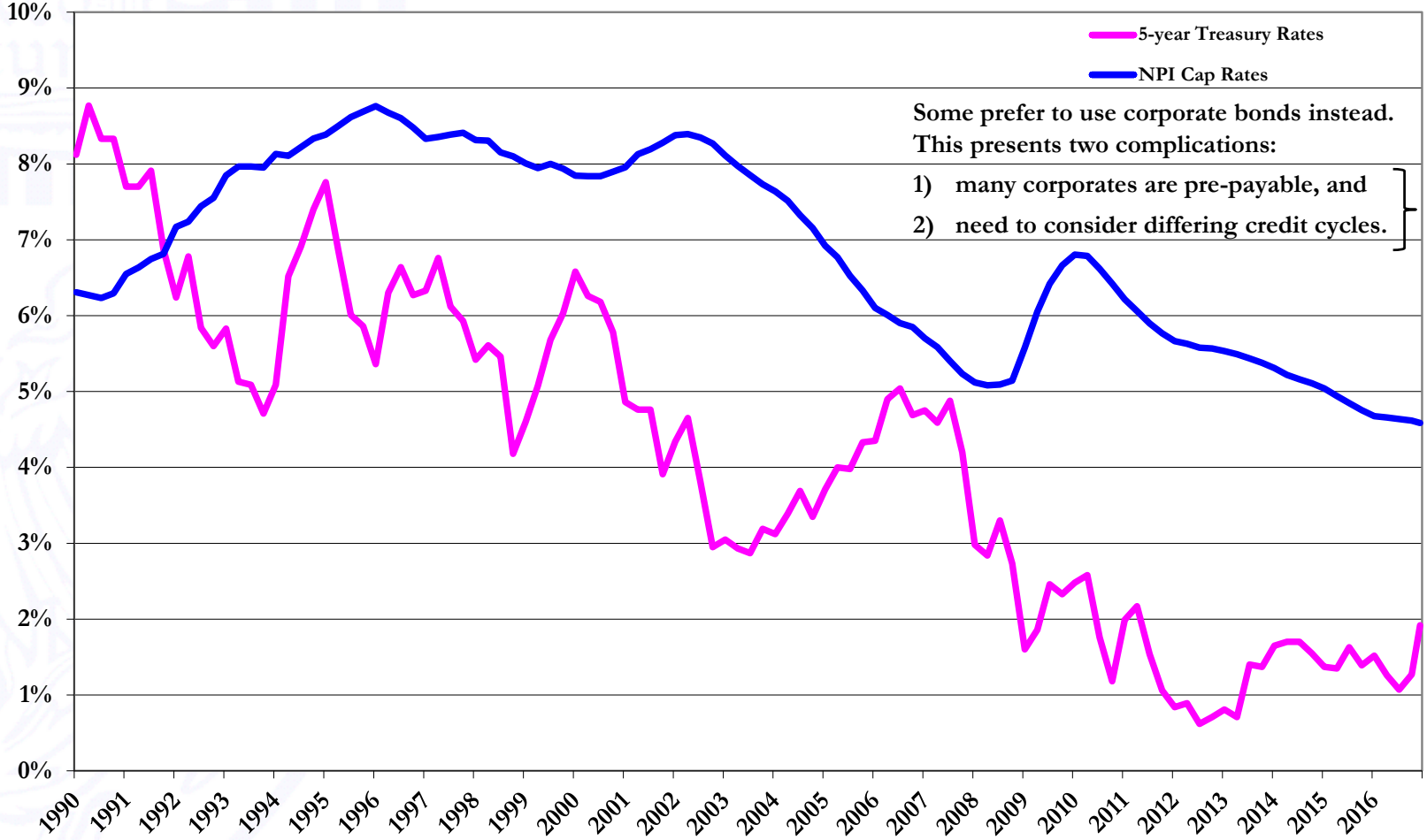
  - TIPS market real-return requirements
  - Current capitalization rates *v.* history
- Addendum: Forward (Interest & Inflation) Rates

Interest Rates *v.* Cap Rates: Short-Term Perspective

- **If you only look at a low-inflation era, you might conclude the two are inexorably linked:**

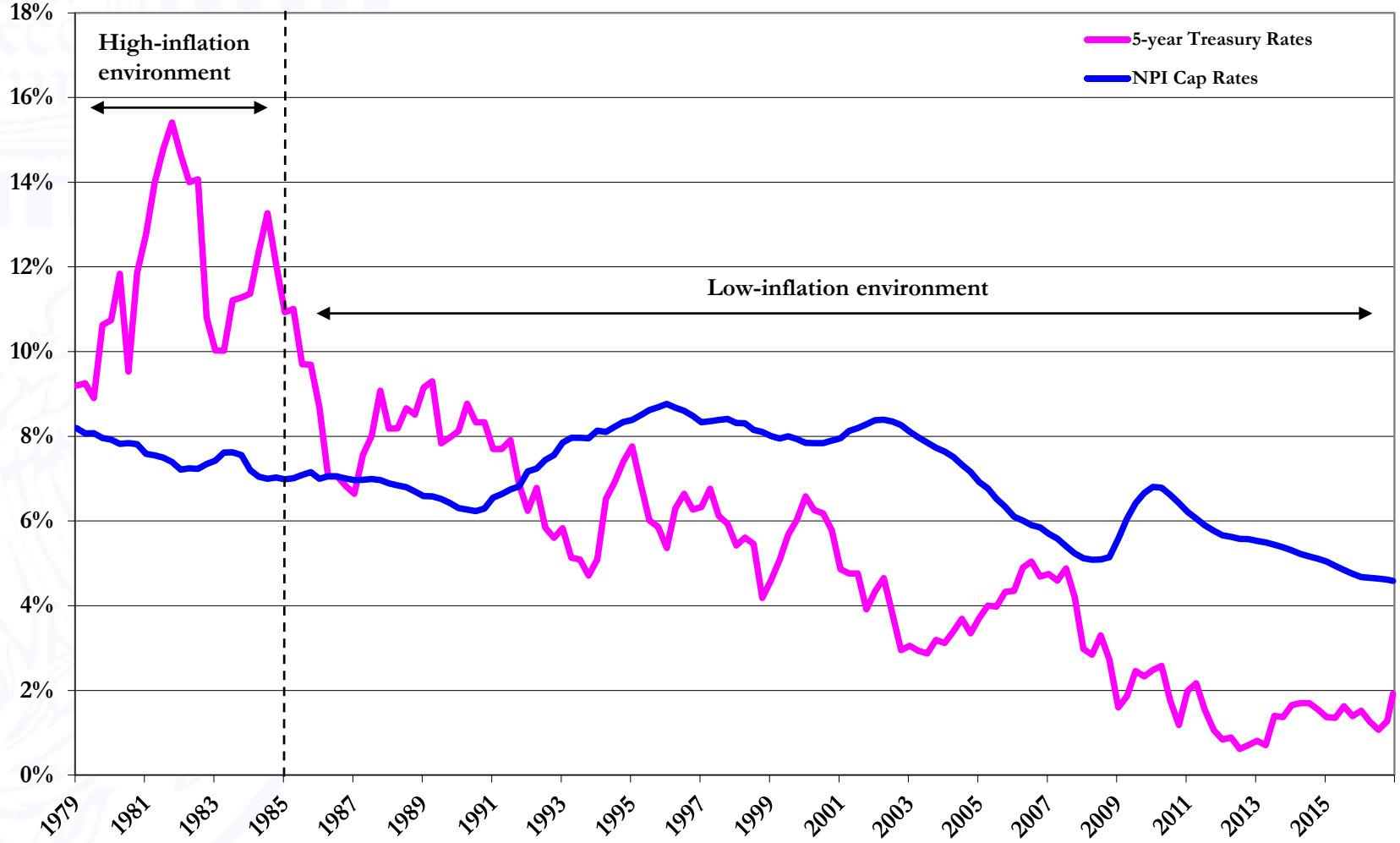
Exhibit 1: Comparison of 5-year US Treasury Rates to NCREIF Cap Rates for the Quarterly Periods 1990-2016



Interest Rates *v.* Cap Rates: Long-Term Perspective

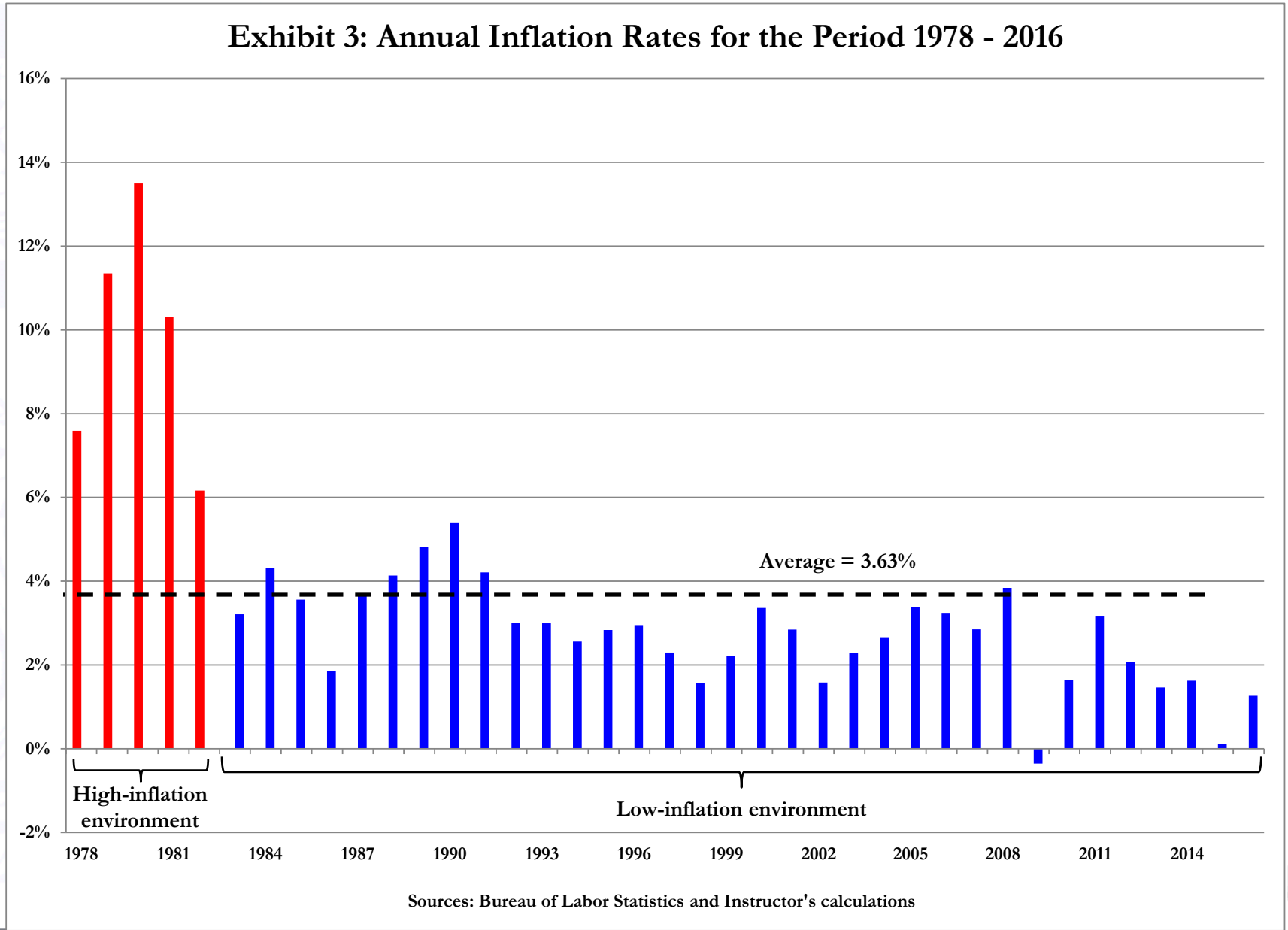
- The linkage is broken when looking at a longer era:

Exhibit 2: Comparison of 5-year US Treasury Rates to NCREIF Cap Rates for the Quarterly Periods 1979-2016



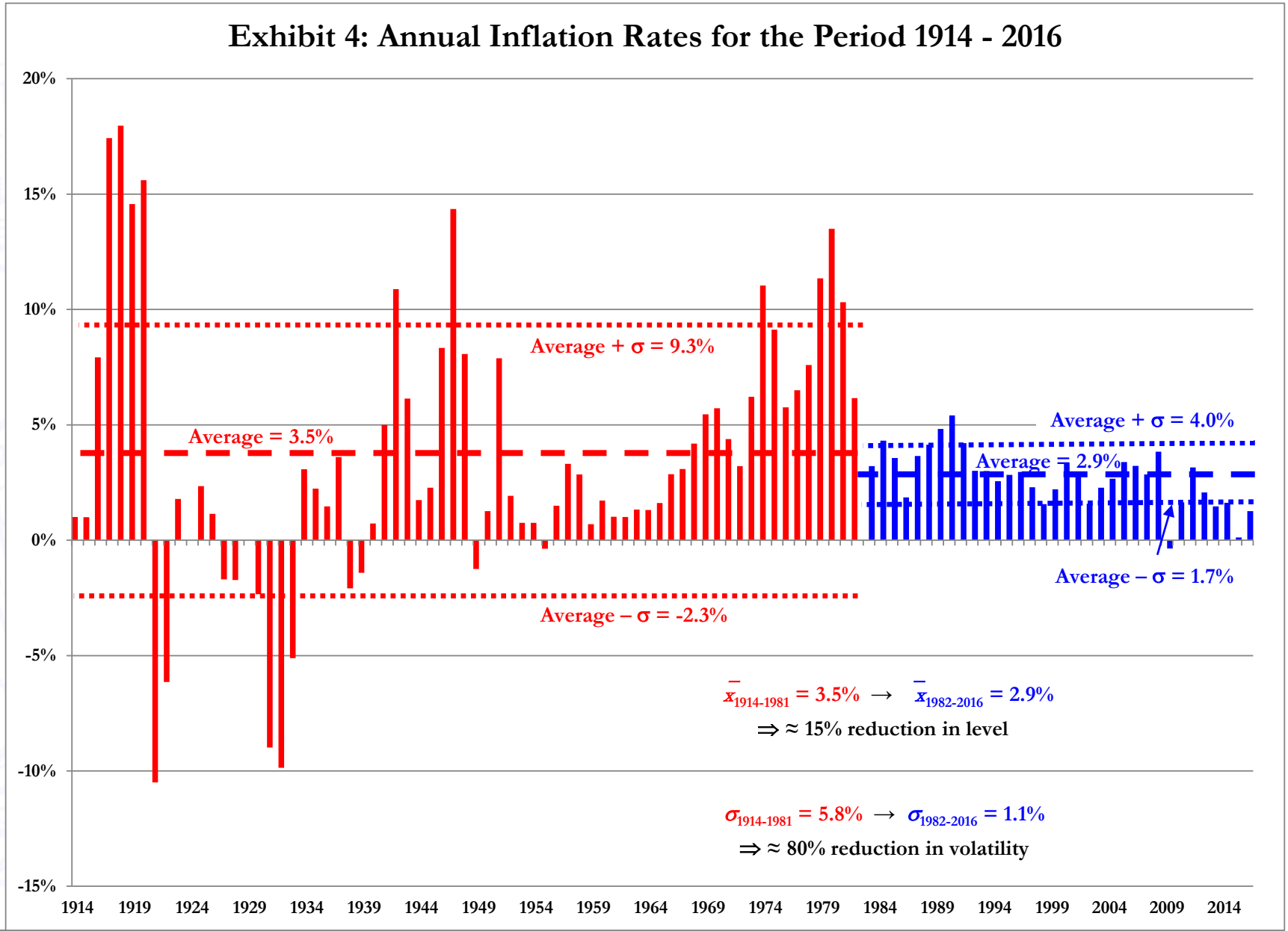
Inflation Rates Over the Life of NCREIF Index

- The Reagan administration is said to have "broken the back" of inflation:



The (Very) Long View on Inflation Rates

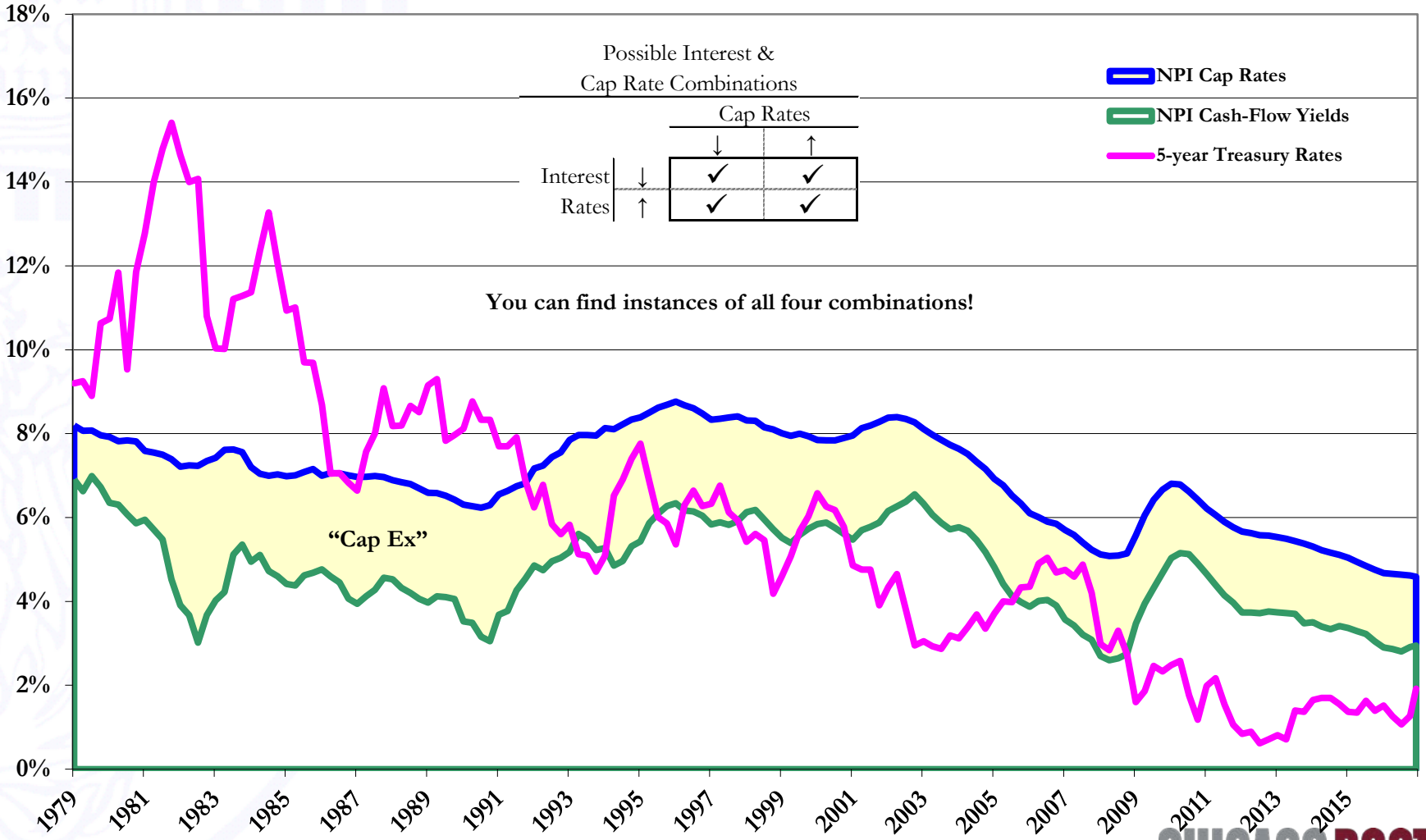
- The new era has exhibited both a lower level and less volatility:



Interest Rates *v.* RE's Cash-Flow Yields

- **Any fair comparison between bonds & real estate must look at cash-flow yields:**

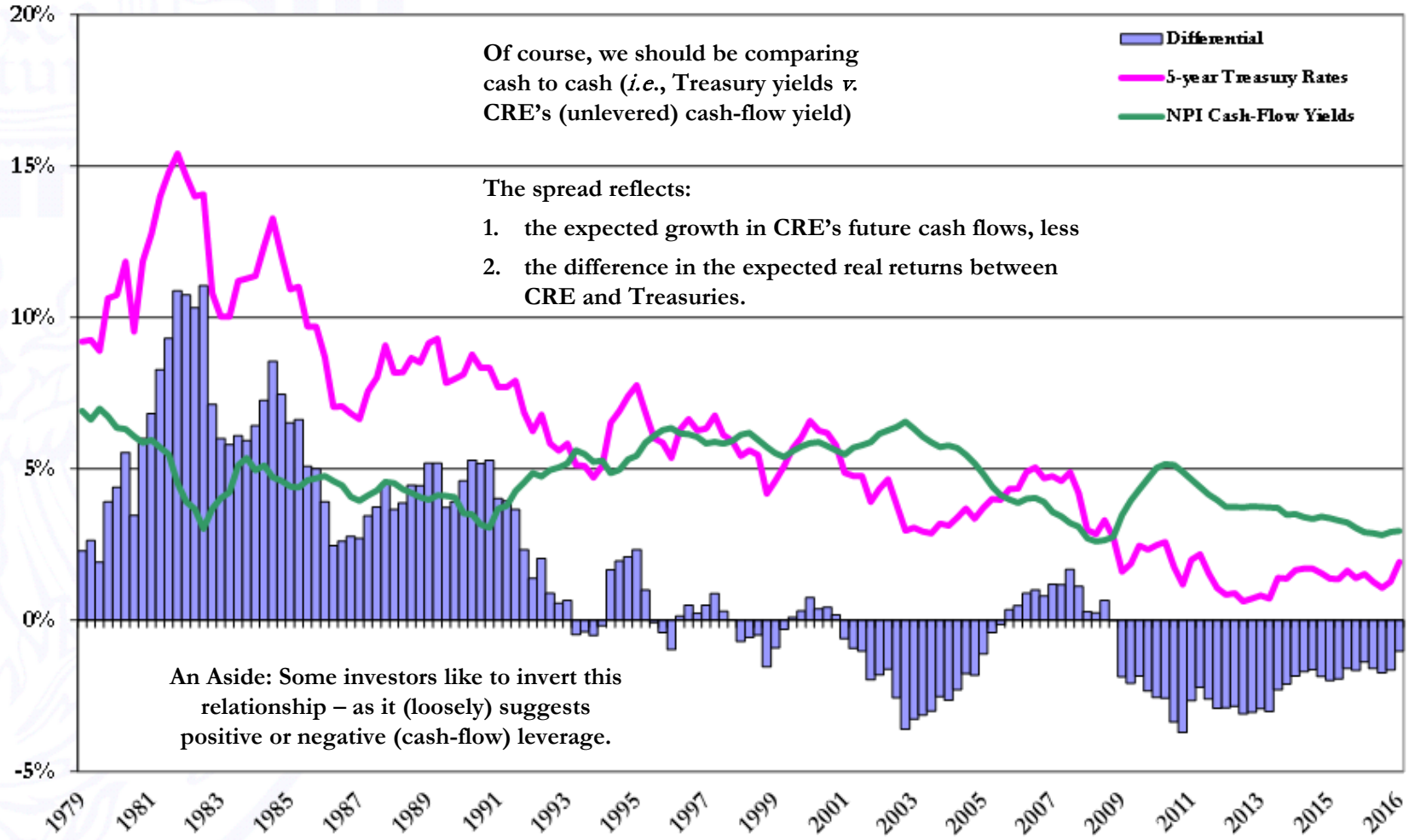
Exhibit 5: Comparison of 5-year US Treasury Rates to NCREIF Cap Rates & Cash-Flow Yields for the Quarterly Periods 1979-2016



Interest Rates *v.* RE's Cash-Flow Yields (continued)

- Another look at (bonds & real estate) cash-flow yields:

Exhibit 6: Comparison of 5-year U.S. Treasury Rates to NCREIF Cash-Flow Yields for the Quarterly Periods 1979-2016



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 and 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}).

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

Support: Interest Rates *v.* Cash-Flow Yields

- 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 also given by:

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

  - This assumes constant cap rates (an assumption we will revisit).

- Let's use these relationships to examine δ

Technical: Interest Rates *v.* Cash-Flow Yields

- **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

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

An Aside: The Path of TIPS Rates

- The real-return requirement on Treasuries is observable via the TIPS market:

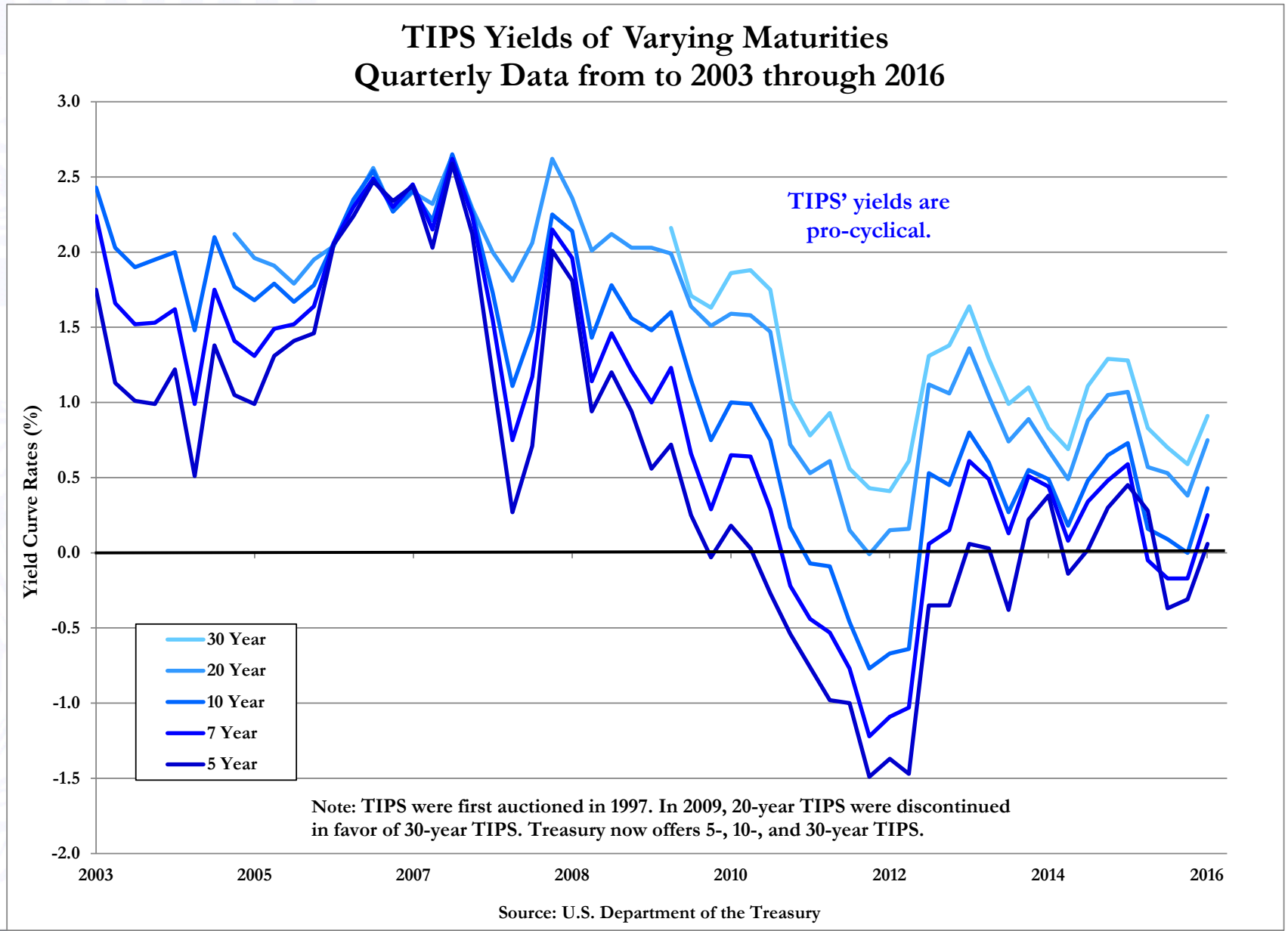
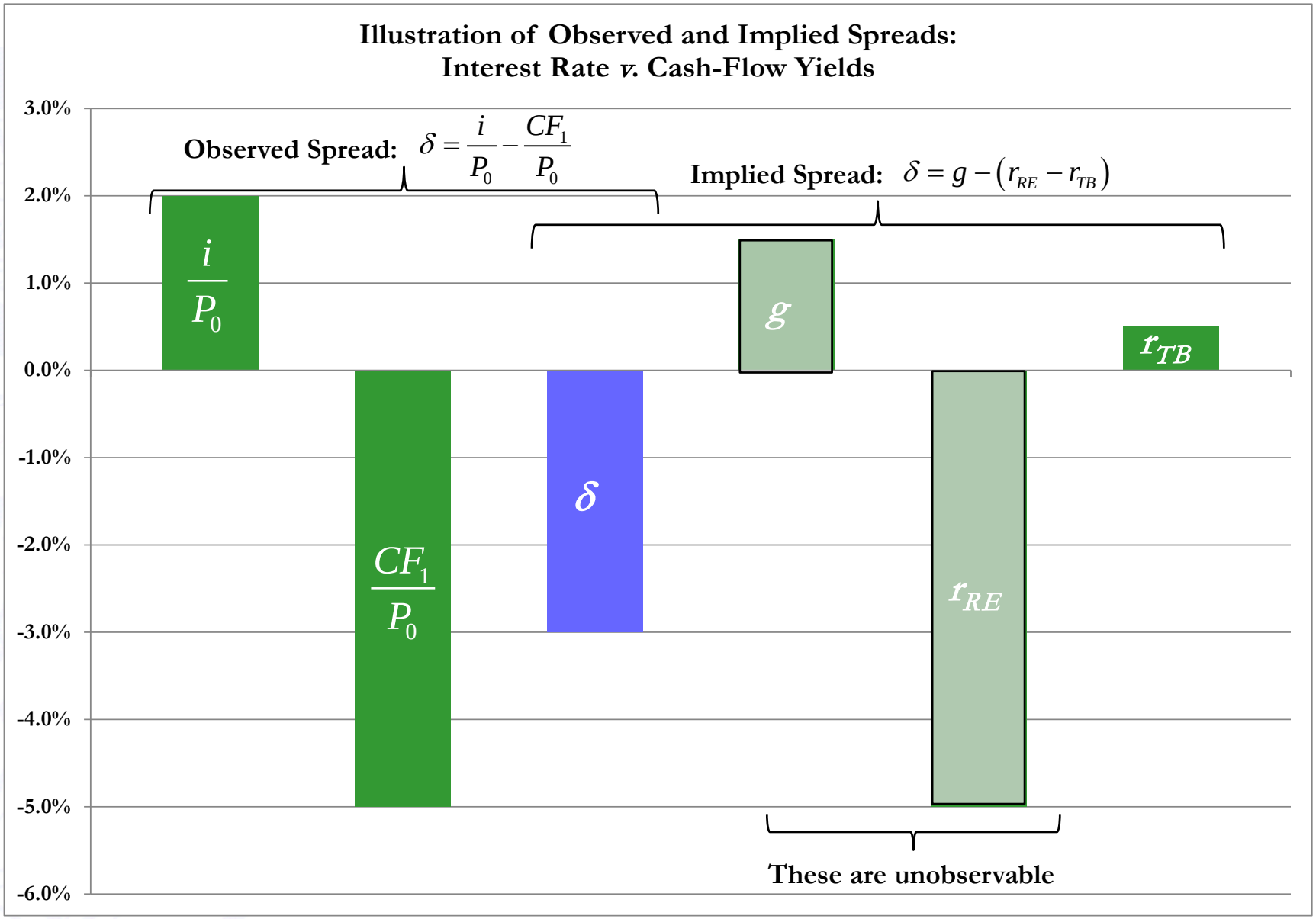


Illustration: Interest Rates *v.* Current Return

- 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%>

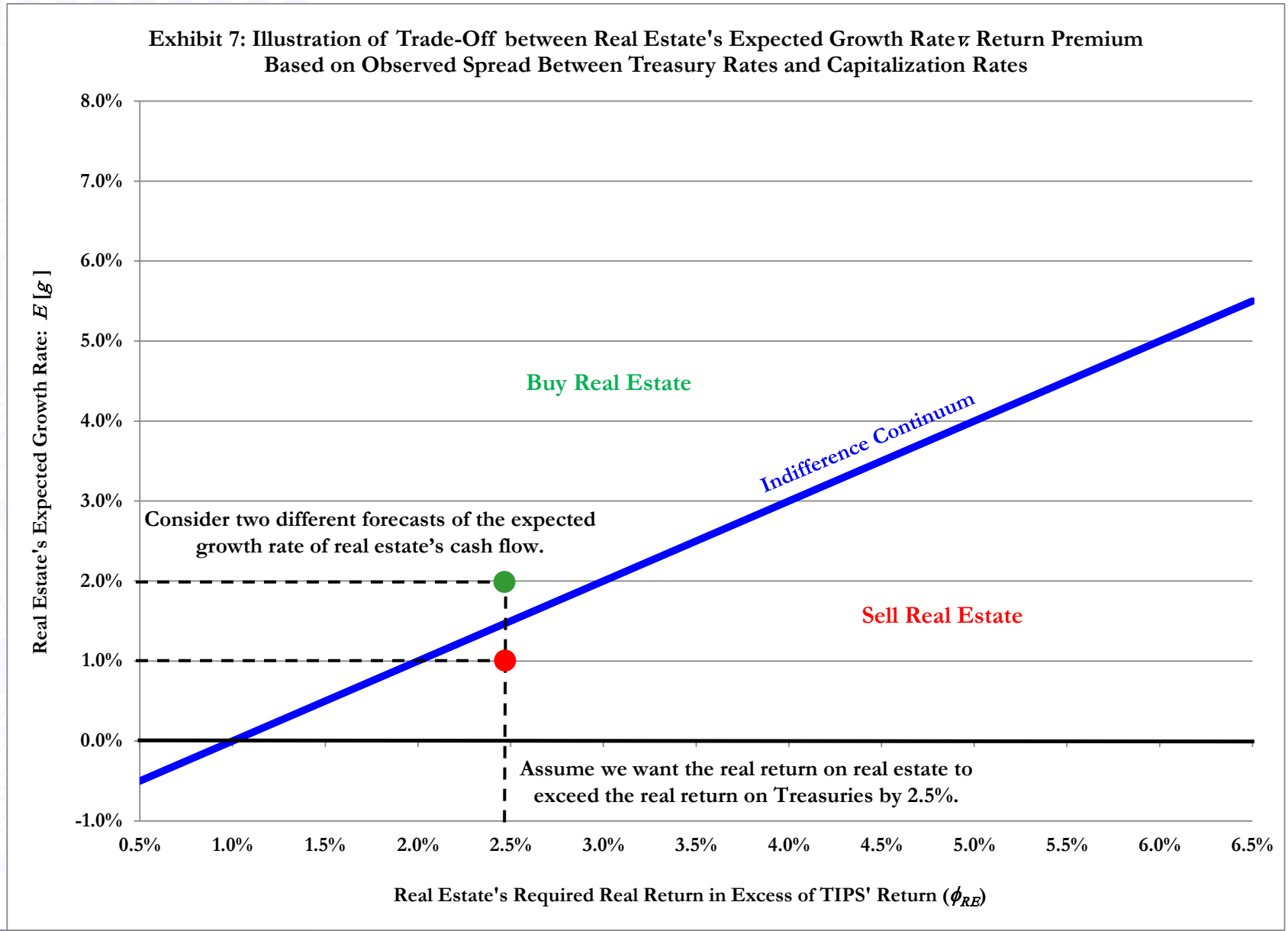
- Also assumes that RE's growth rate equals the inflation rate ($g = \rho$)

Illustration: Interest Rates *v.* Current Return



Portfolio Tilt Based on Estimates of Unobservables

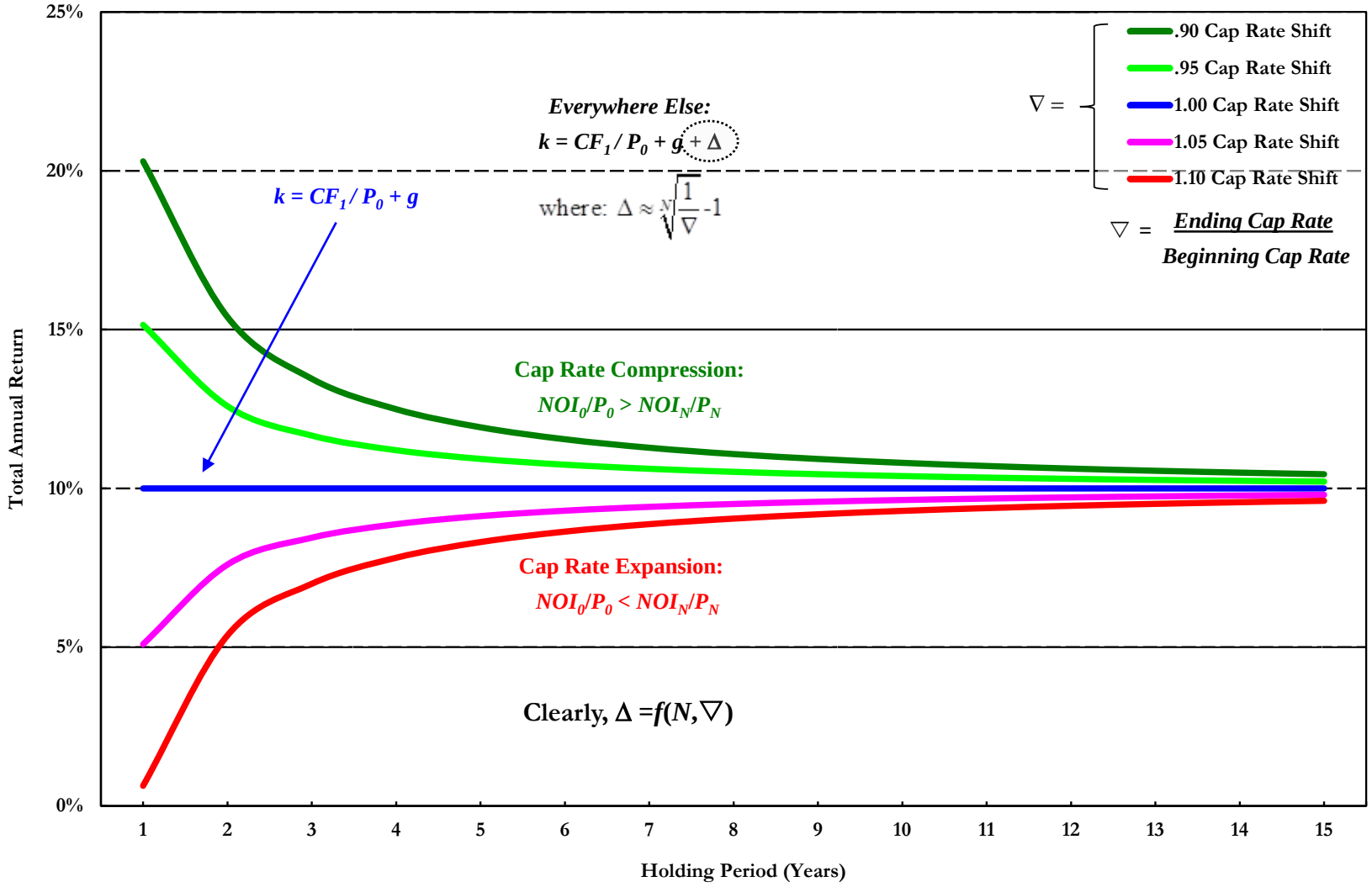
- One equation with two unknowns produces an "indifference continuum":



What About Cap-Rate Shifts?

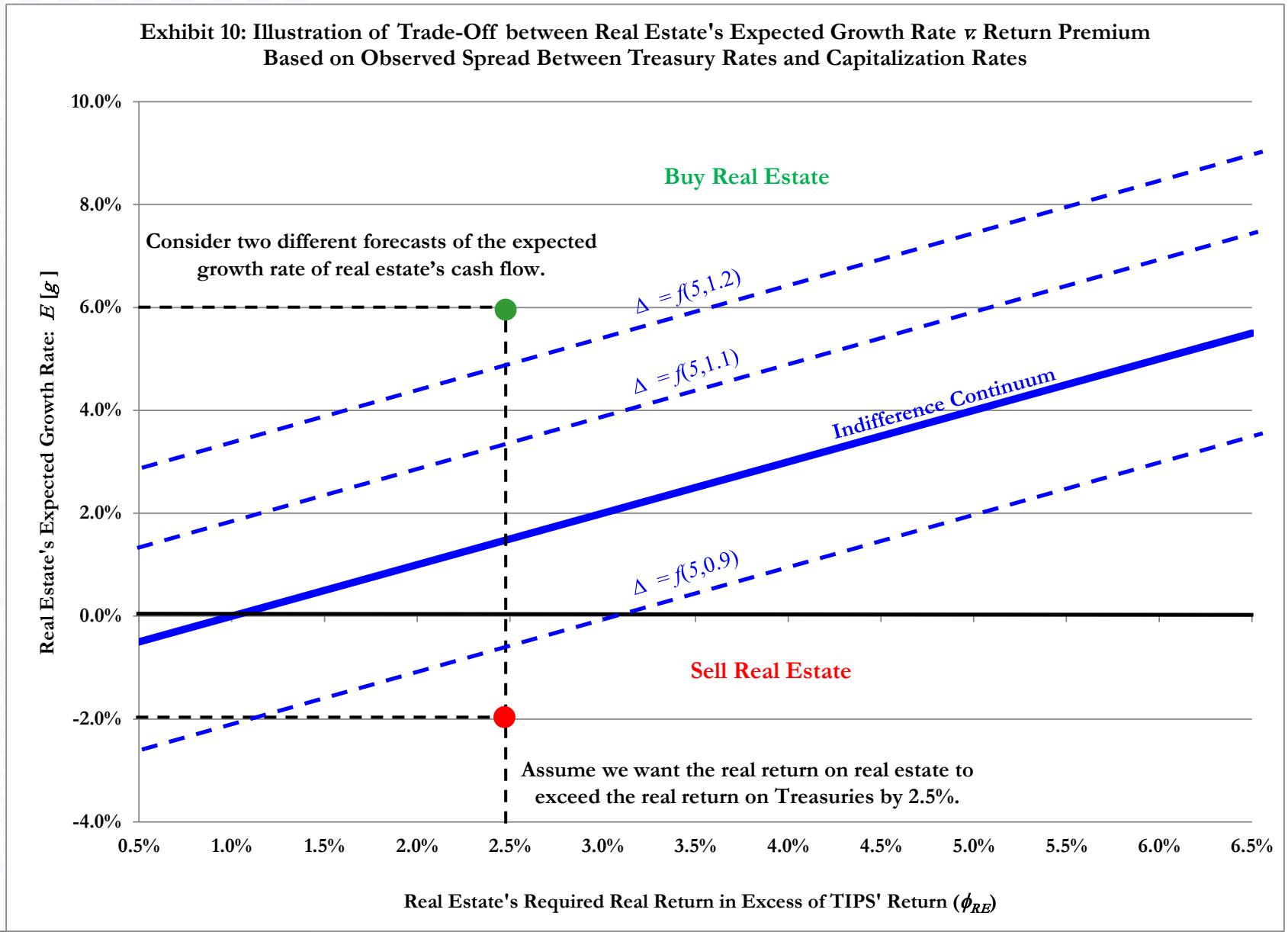
- The prior analyses assume constant cap rates: $k = CF_1/P_0 + g$.
- Let's consider shifts (∇):

Exhibit 8: Total Annual Return Based Upon
Various Capitalization-Rate Shifts and Holding Periods



Portfolio Tilt Based with Cap-Rate Shifts

- **Forecasting cap-rate shifts modifies our "indifference continuum":**



Another Digression: Realized Components of Return

- **Expand our earlier return-generating equation:** $k = NOI_1/P_0 * \bar{b} + \lambda\rho + \Delta + \varepsilon$.
- **Substantial differences by property type:**

Exhibit 9: Annualized Components of Return by NPI Property Type for the Period 1978 through 2016

	Total NPI	Apartment	Office		Industrial		Retail	
			CBD	Suburban	Warehouse	R&D/Flex	Shops	Malls
	(39 Years)	(39 Years)	(39 Years)	(39 Years)	(39 Years)	(39 Years)	(39 Years)	(34 Years)
Components of Return:								
Initial Income Yield (NOI_1/P_0)	8.51%	8.46%	8.92%	8.53%	7.74%	8.93%	8.11%	7.76%
x Average Dividend Pay-out Ratio ($\bar{b}$)	67.1%	80.4%	64.0%	61.8%	68.5%	69.2%	74.6%	65.6%
= Dividend Yield (CF_1/P_0)	5.71%	6.80%	5.71%	5.27%	5.30%	6.17%	6.05%	5.09%
+ Earnings Growth (g)	2.42%	2.84%	2.29%	1.42%	2.98%	2.28%	2.22%	3.57%
= Fundamental Return ($CF_1/P_0 + g$)	8.13%	9.64%	7.99%	6.70%	8.28%	8.45%	8.26%	8.66%
+ Shift in Capitalization Rates (Δ)	0.54%	0.43%	0.83%	0.51%	0.41%	0.39%	0.36%	0.60%
+ Other Effects	0.62%	0.48%	0.89%	0.50%	1.08%	0.61%	0.82%	0.98%
= **NCREIF Total Return – Nominal (k)**	**9.29%**	**10.55%**	**9.72%**	**7.71%**	**9.77%**	**9.44%**	**9.45%**	**10.23%**
NCREIF Total Return – Real (r)	5.60%	6.83%	6.02%	4.08%	6.07%	5.76%	5.76%	7.34%
Inflationary Characteristics:								
Inflation (ρ)	3.49%	3.49%	3.49%	3.49%	3.49%	3.49%	3.49%	2.69%
NOI Inflation Pass-Thru Rate (λ)	69.5%	81.5%	65.5%	40.8%	85.4%	65.3%	63.5%	132.5%
Pricing Characteristics:								
Beginning Capitalization Rate (NOI_0/P_0)	8.19%	7.98%	8.71%	8.35%	7.42%	8.84%	7.94%	7.49%
Ending Capitalization Rate (NOI_N/P_N)	4.59%	4.48%	3.98%	4.96%	4.90%	5.50%	5.13%	4.31%
Risk Measure:								
Annual Volatility (σ)	7.62%	7.80%	11.45%	9.08%	7.38%	8.82%	6.17%	7.41%

Note: Nearly 90% of long-run returns determined by the Fundamental Return.

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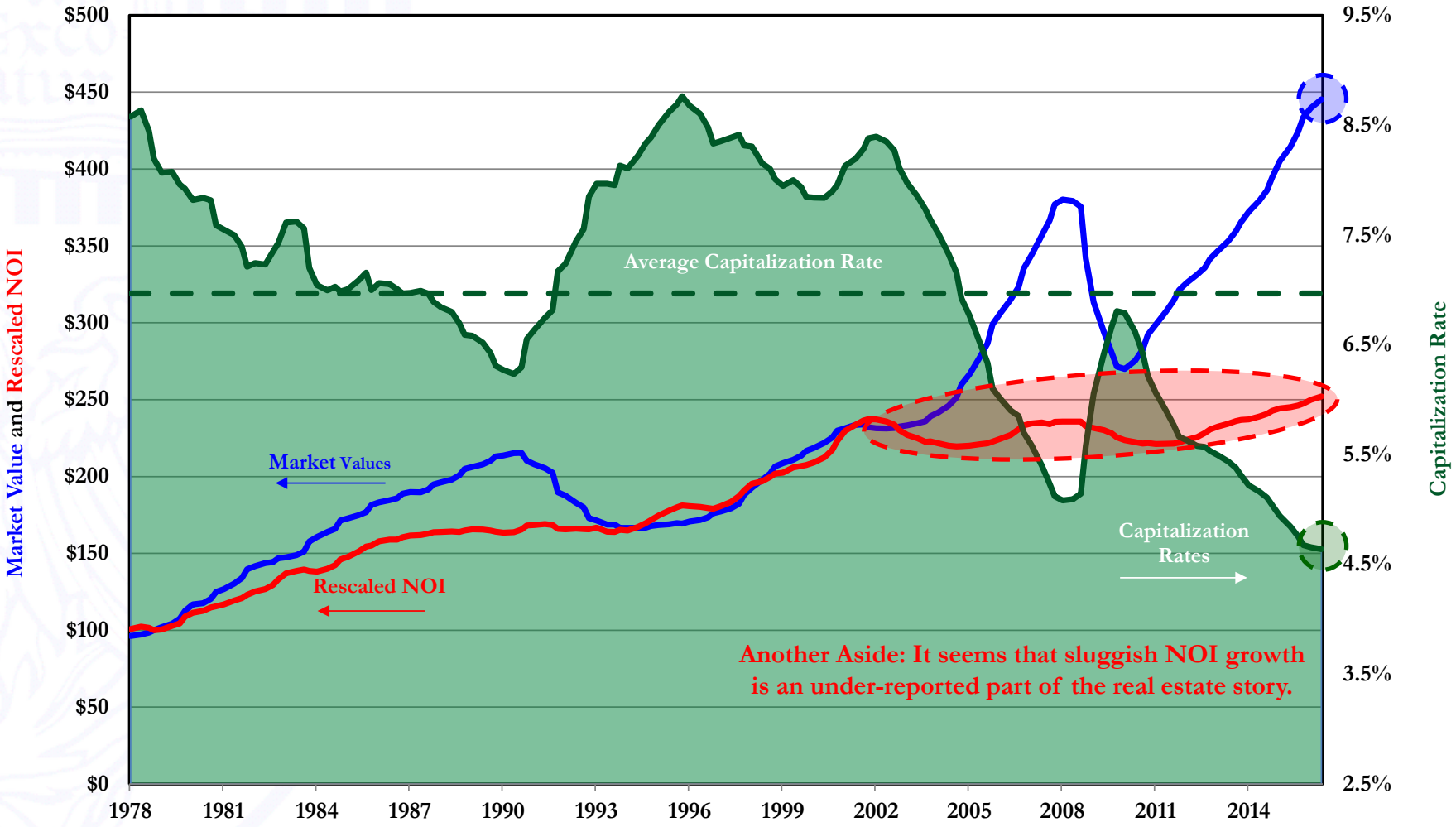
The Path of Values & Cap Rates

- High prices and low cap rates have many of us apprehensive:

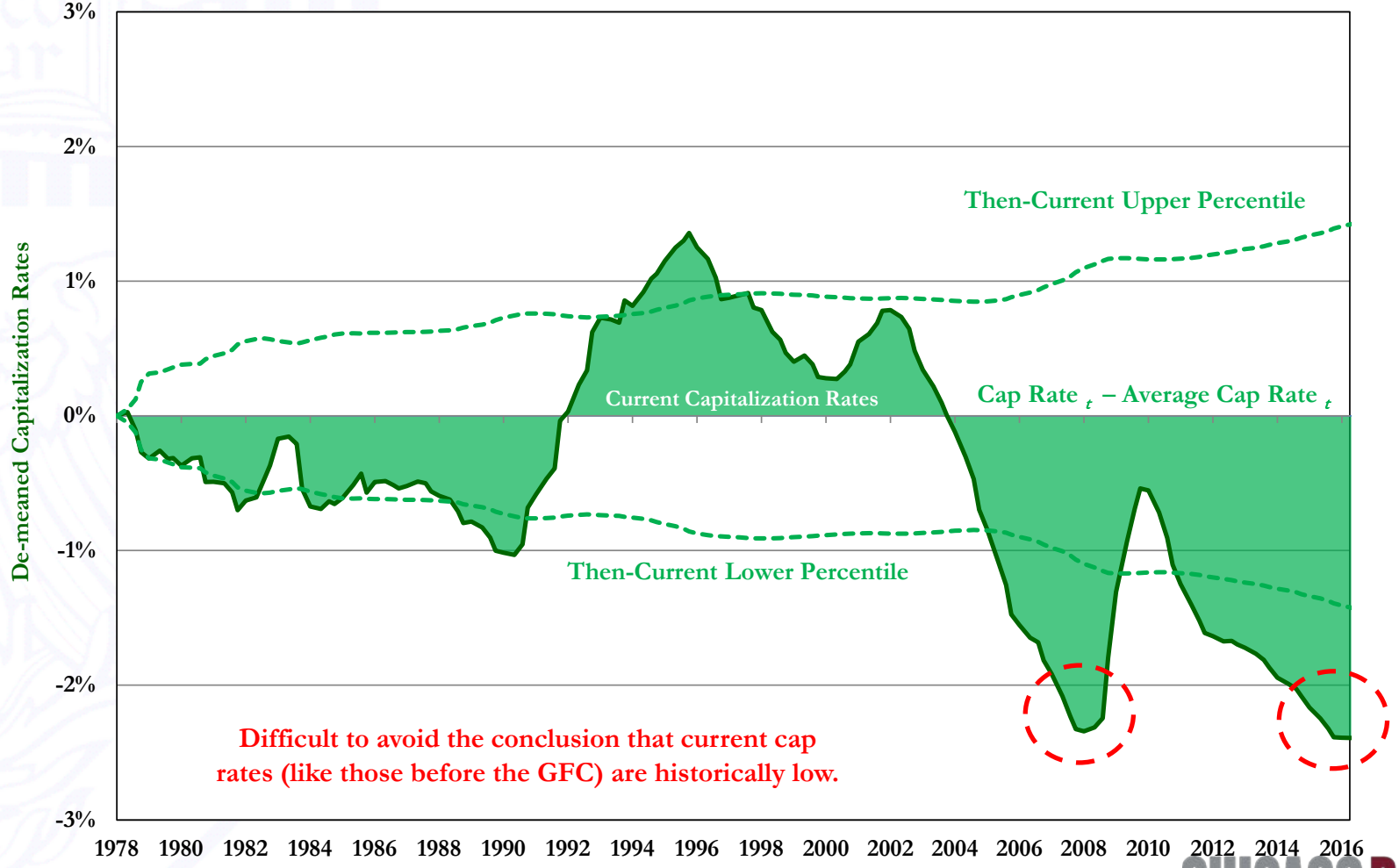
Exhibit 11: NCREIF Index - Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through 2016



A Statistical Look at Capitalization Rates

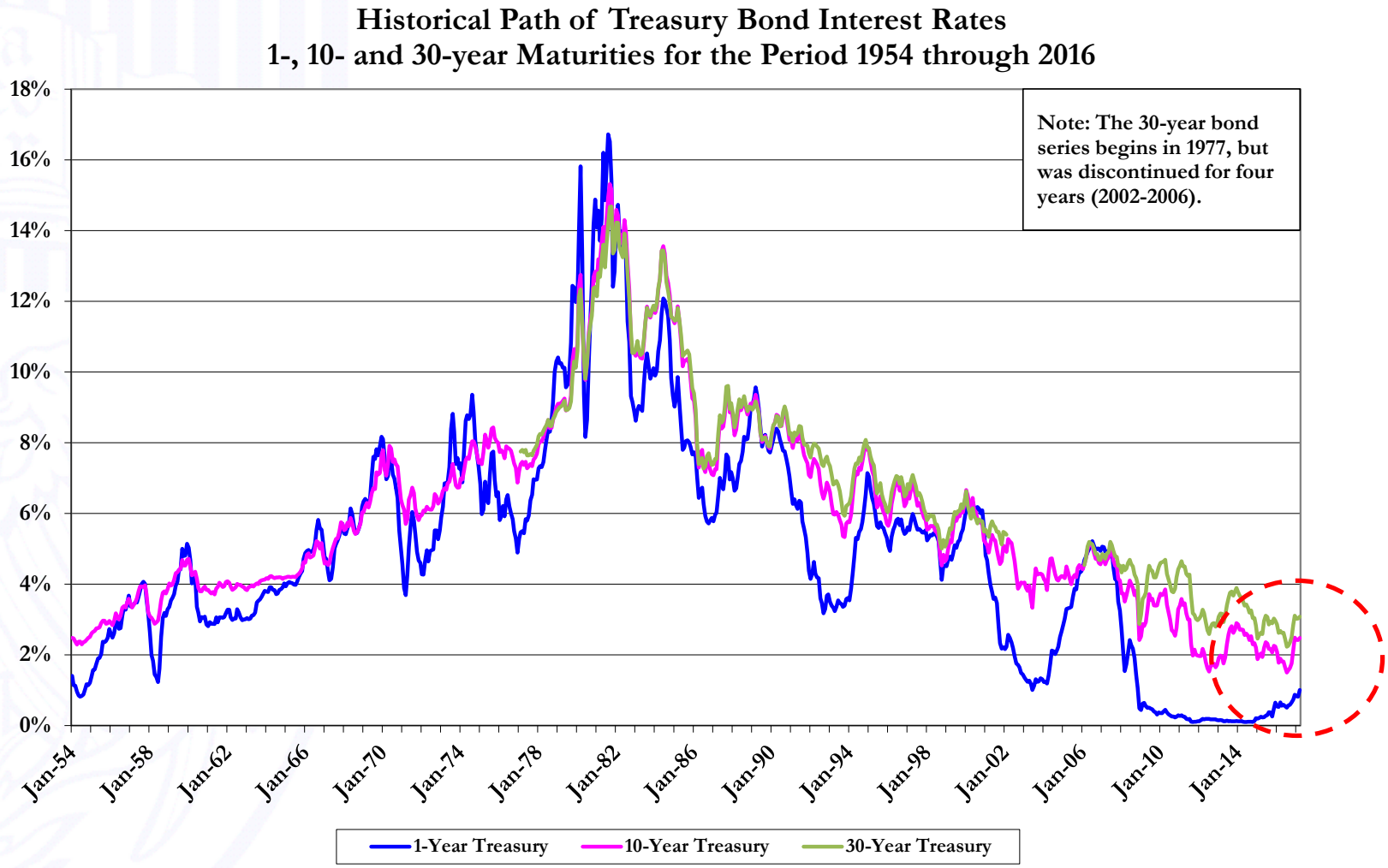
- Examining the evolving mean, $\bar{x}$, and volatility, σ, of capitalization rates:

Exhibit 12: NCREIF Index - Various Measures of De-Meaned Capitalization Rates
for the Period 1978 through 2016



Possible Explanation: Path of Interest Rates?

- Of course, we rationalize cap rates based on interest rates:



What Is the Appropriate Cash-Flow Yield?

- **WANT**: Recall the link between the nominal (k) and real (r) returns:

$$k_{RE} = (1 + r_{RE})(1 + \rho) - 1$$

- **HOW**: Ignoring cap-rate shifts (∇ =1.0), total return is also given by:

$$k_{RE} = \frac{CF_1}{P_0} + g = \frac{CF_1}{P_0} + \lambda\rho \qquad \{ \text{Recall: } g = \lambda\rho \}$$

- Let's set these equations to one another (and solve for CF_1/P_0):

What We Want / How We Will Get It

$$(1 + r_{RE})(1 + \rho) - 1 = \frac{CF_1}{P_0} + \lambda\rho$$

Eliminate and collect terms

$$\frac{CF_1}{P_0} = r_{RE}(1 + \rho) + \rho(1 - \lambda)$$

Real return, grossed up for inflation

Uncompensated portion of inflation

Variations on the Appropriate Cash-Flow Yield

- Recall the appropriate cash-flow yield:

$$\frac{CF_1}{P_0} = r_{RE}(1+\rho) + \rho(1-\lambda)$$

- Consider the first of two cases:

1. If markets are in equilibrium ($\lambda = 1.0 \Rightarrow g = \rho$), then:

$$\frac{CF_0(1+\rho)}{P_0} = r_{RE}(1+\rho) + \rho(1-1)$$

{ Recall: $CF_1 = CF_0(1 + \lambda\rho)$ }

Eliminate and collect terms

$$\frac{CF_0}{P_0} = r_{RE}$$

- So, if markets are in equilibrium, then real estate's real return is its trailing cash-flow yield (CF_0/P_0), *irrespective* of the inflation rate!

Variations on the Appropriate Cash-Flow Yield

- Again, recall the appropriate cash-flow yield:

$$\frac{CF_1}{P_0} = r_{RE}\left(1+\rho\right)+\rho\left(1-\lambda\right)$$

- Consider the second of two cases:

2. Markets generally talk in terms of cap rates, so let's restate:

$$\frac{CF_1}{P_0} = \frac{NOI_1\left(\bar{b}\right)}{P_0} = r_{RE}\left(1+\rho\right)+\rho\left(1-\lambda\right)$$

{ Recall: $NOI_1 * \bar{b} = CF_1$ }

Restate terms

$$\frac{NOI_1}{P_0} = \frac{r_{RE}\left(1+\rho\right)+\rho\left(1-\lambda\right)}{\bar{b}}$$

- If history is a fair guide to the future, then multiply the appropriate cash-flow yield by 3/2 (*i.e.*, $\bar{b} \approx 2/3$) in order to find the appropriate capitalization rate.

Likely Real Returns in the Current Environment

- Recall the appropriate capitalization rate and solve for r_{RE}:

$$\frac{NOI_1(\bar{b})}{P_0} = \frac{r_{RE}(1+\rho)+\rho(1-\lambda)}{\bar{b}}$$

Restate terms

$$r_{RE} = \frac{\frac{NOI_1}{P_0}\bar{b} - \rho(1-\lambda)}{(1+\rho)}$$

- Consider some plausible parameterization:

$$r_{RE} = \frac{(4.5\%)(67\%) - .02(1-.7)}{(1+.02)} \approx 2.5\%$$

Recall: $\bar{r}_{RE} \approx 5.6\%$

However, today's 5-year TIPS ≈ 0.2%

Valuations & Interest Rates: Conceptual

- Some investors naively assume:
  - Interest Rates ↑ → Asset Prices ↓
- However, a change in interest rates = $f(\bullet)$:
  - a change in inflation (ρ) 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

Valuations & Interest Rates: Technical

- **Restate earlier equation(s) in terms of price (P_0):**

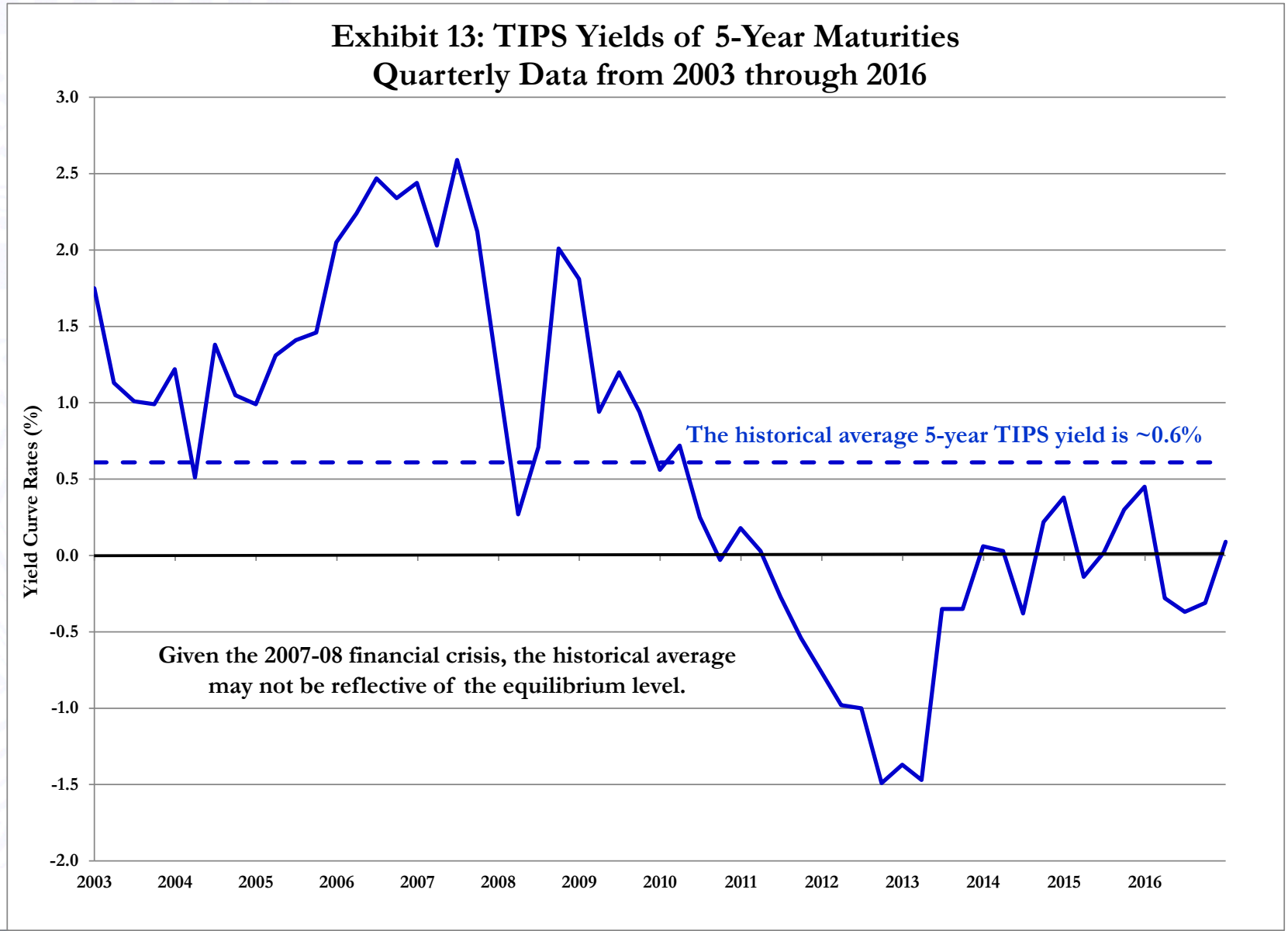
$$P_0 = \frac{CF_0\left(1+\lambda\rho\right)}{\left(1+r_{RE}\right)\left(1+\rho\right)-1-\lambda\rho}$$

- **Take the derivative when in equilibrium and when not:**

	When $\lambda = 1$	When $\lambda \neq 1$	
This is our earlier result; prices are unaffected.	$\frac{\partial P_0}{\partial \rho} = 0$	$\frac{\partial P_0}{\partial \rho} = \frac{-CF_0\left(1+r_{RE}\right)\left(1-\lambda\right)}{\left[\left(1+r_{RE}\right)\left(1+\rho\right)-1-\lambda\rho\right]^2}$	When markets are not in equilibrium (and $\lambda < 1$), property values fall when inflation (ρ) increases.
This is also our earlier result; prices are negatively affected by an increase in real return.	$\frac{\partial P_0}{\partial r_{RE}} = \frac{-CF_0}{r_{RE}^2}$	$\frac{\partial P_0}{\partial r_{RE}} = \frac{-CF_0\left(1+\rho\right)\left(1+\lambda\rho\right)}{\left[\left(1+r_{RE}\right)\left(1+\rho\right)-1-\lambda\rho\right]^2}$	The effect is worse when markets are not in equilibrium (and $\lambda < 1$).
	N.A.	$\frac{\partial P_0}{\partial \lambda} = \frac{CF_0\left(1+r_{RE}\right)\left(1+\rho\right)\rho}{\left[\left(1+r_{RE}\right)\left(1+\rho\right)-1-\lambda\rho\right]^2}$	Property values rise (fall) as λ improves (worsens).

Importance of TIPS Rates: Historical Path

- Given pro-cyclical TIPS yields, will we see those rates move substantially higher?



Schizophrenic Relationship with TIPS Rates?

- **No statistically reliable relationship between RE's real yield and TIPS rates:**

Exhibit 14: A Comparison of Realized Real Returns on U.S. Treasury and the NCREIF Property Index for Various Time Periods

	1978-2016 (Entire History)	1987-2006 (Low Inflation & Pre-Crisis)	2003-2016 (TIPS History)
NCREIF Property Index	5.79%	5.37%	7.36%
U.S. Treasury Bonds	5.70%	5.86%	4.53%
Mean Difference (ϕ_{RE})	0.09%	-0.49%	2.83%
Volatility of Difference	14.70%	12.85%	14.08%
Standard Error	2.35%	2.87%	3.76%

Recall that these spreads ignores fees and illiquidity of CRE.

None of these differences are statistically significant.

∴ History is not much of a guide and we are left with trying to determine *ex ante* as to the appropriate spread (perhaps the most-recent period is the best indication).

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.

Concluding Remarks

- We have looked at two key aspects of real estate pricing:
- First, the spread between interest rates and cap rates was examined:
  - The former represents a riskless, nominal-yield, fixed-rate security,
  - While the latter represents a risky, real-yield, real-yield security.

  } These are very different securities

  - The difference represents the market's consensus view on: $\delta = g - (r_{RE} - r_{TB})$
  - Investors tilt their portfolios, depending on how their views differs from the consensus.
- Second, the appropriate cap rate depends on balancing what and how:

Real return, grossed up for inflation — Uncompensated portion of inflation

$$\frac{NOI_1}{P_0} = \frac{r_{RE}(1+\rho) + \rho(1-\lambda)}{\bar{b}}$$

  - When markets are in equilibrium ($\lambda = 1$), changes in inflation (ρ) have no effect.
  - Regardless of market equilibrium, changes in the real return (r_{RE}) have a large effect.
- The impact (Δ) of cap-rate shifts (∇) can be approximated by:

$$\Delta = f(N, \nabla) \approx \sqrt[N]{\frac{1}{\nabla}} - 1$$

Some Thoughts on Real Estate Pricing: Agenda

- Context:
  - "Bubble" pricing?
  - Past bubbles
  - Greenspan's definition of a bubble
- The Spread between Interest Rates and Cap Rates:
  - Historical perspective – including inflation's role
  - Interest rates *v.* cash-flow yields
  - Tilting your portfolio: bonds *v.* real estate
  - Impacts of shifting capitalization rates
- How Real Estate Ought to be Priced:
  - What do I want *v.* How will it be generated?
  - TIPS market real-return requirements
  - Current capitalization rates *v.* history
- Addendum: Forward (Interest & Inflation) Rates

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:

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

Today's Yield Curve & Future Interest Rates

Consider one more period:

Maturity	Rate
1 year	2.00%
2 years	2.50%
3 years	2.75%

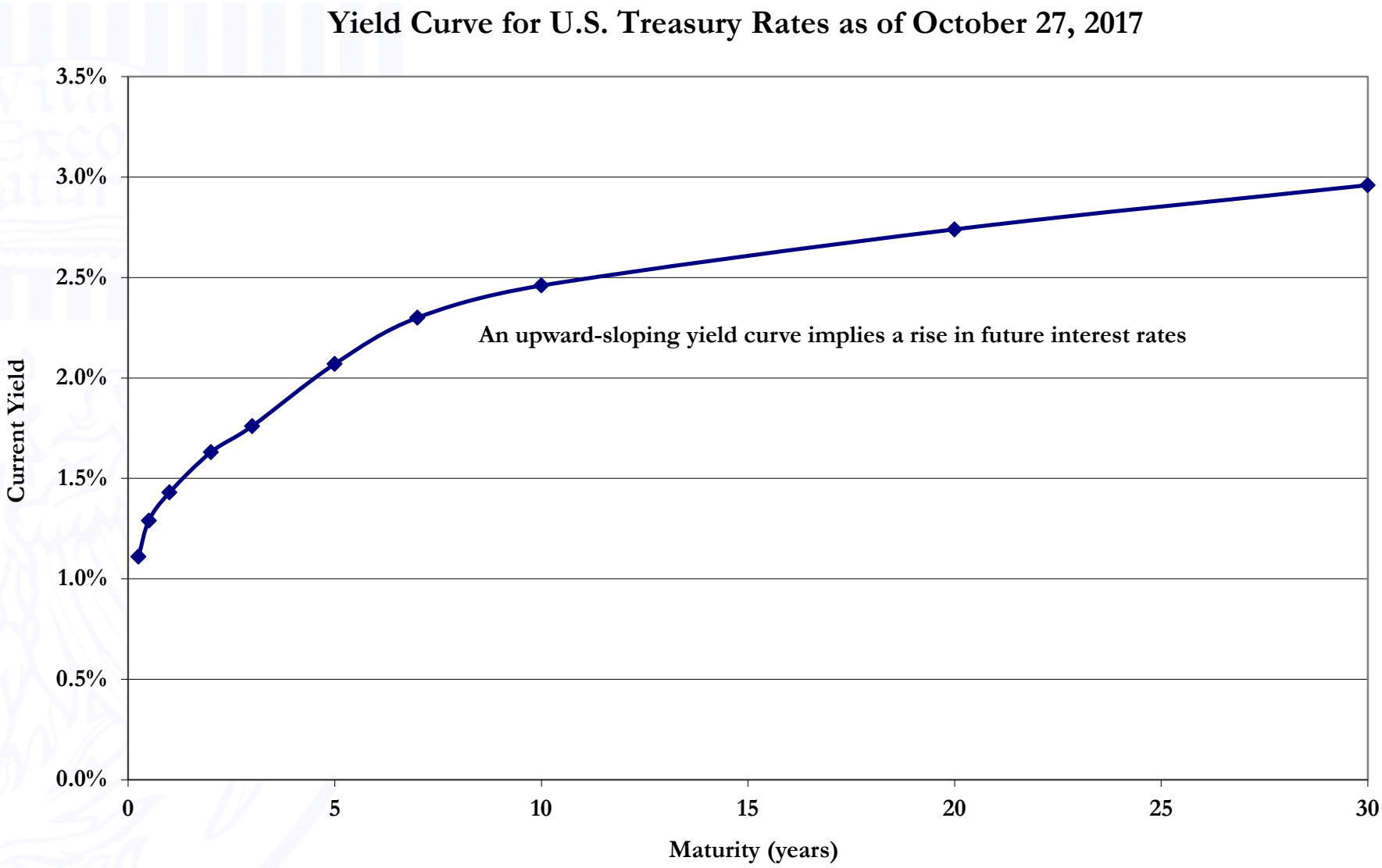
Then:
The implied one-year interest rate in two years is expected to be ~ 3.25%

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

$$\underbrace{(1 + .025)^2 \, (1 + y)}_{\text{Holding the 2-year security and "rolling over" to 1- year security in the third year}} = \underbrace{(1 + .0275)^3}_{\text{Holding the 3-year security to maturity}} \Rightarrow y \approx .0325$$

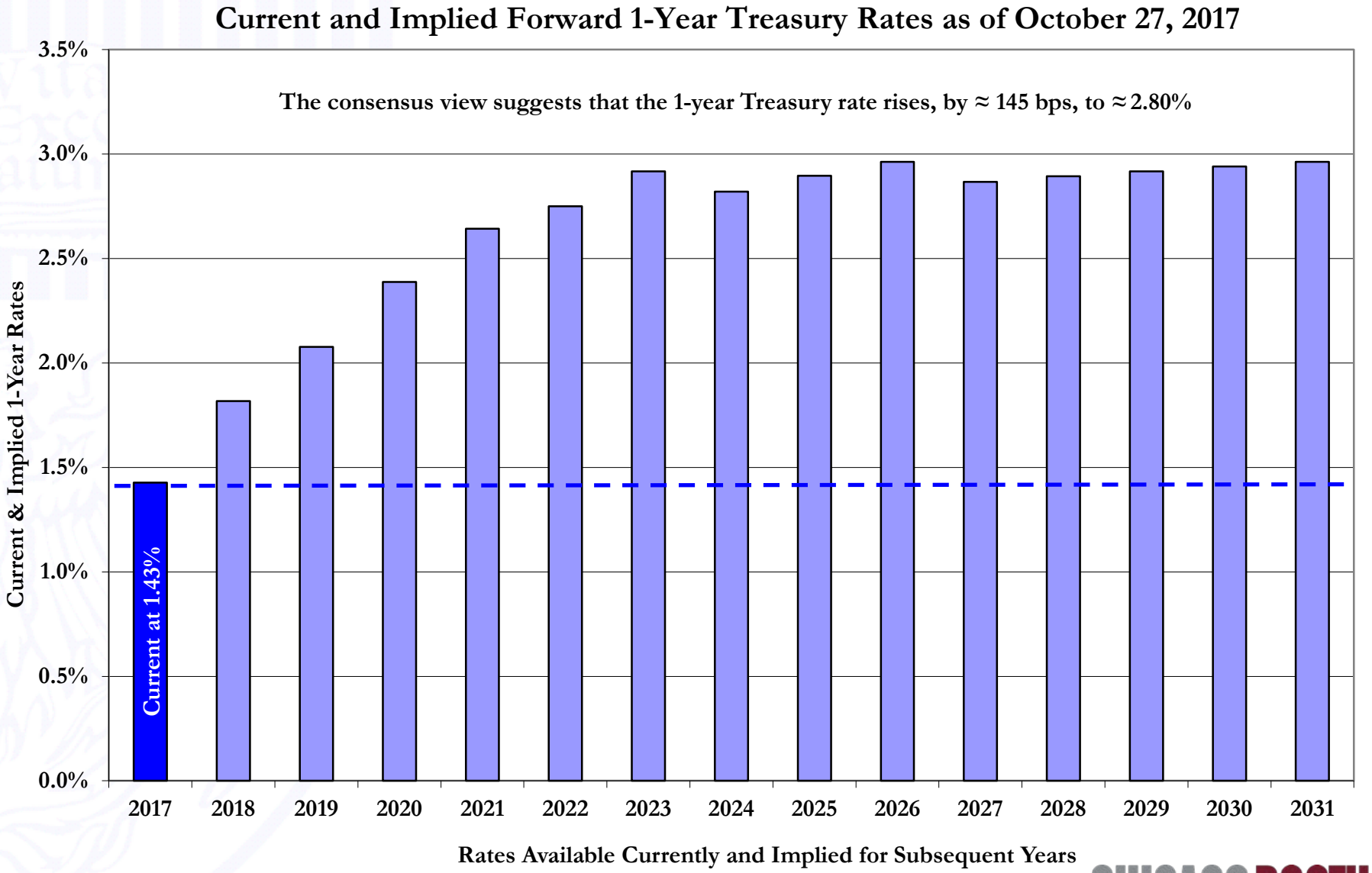
This approach can be extended to the entirety of today's yield curve

Today's Yield Curve

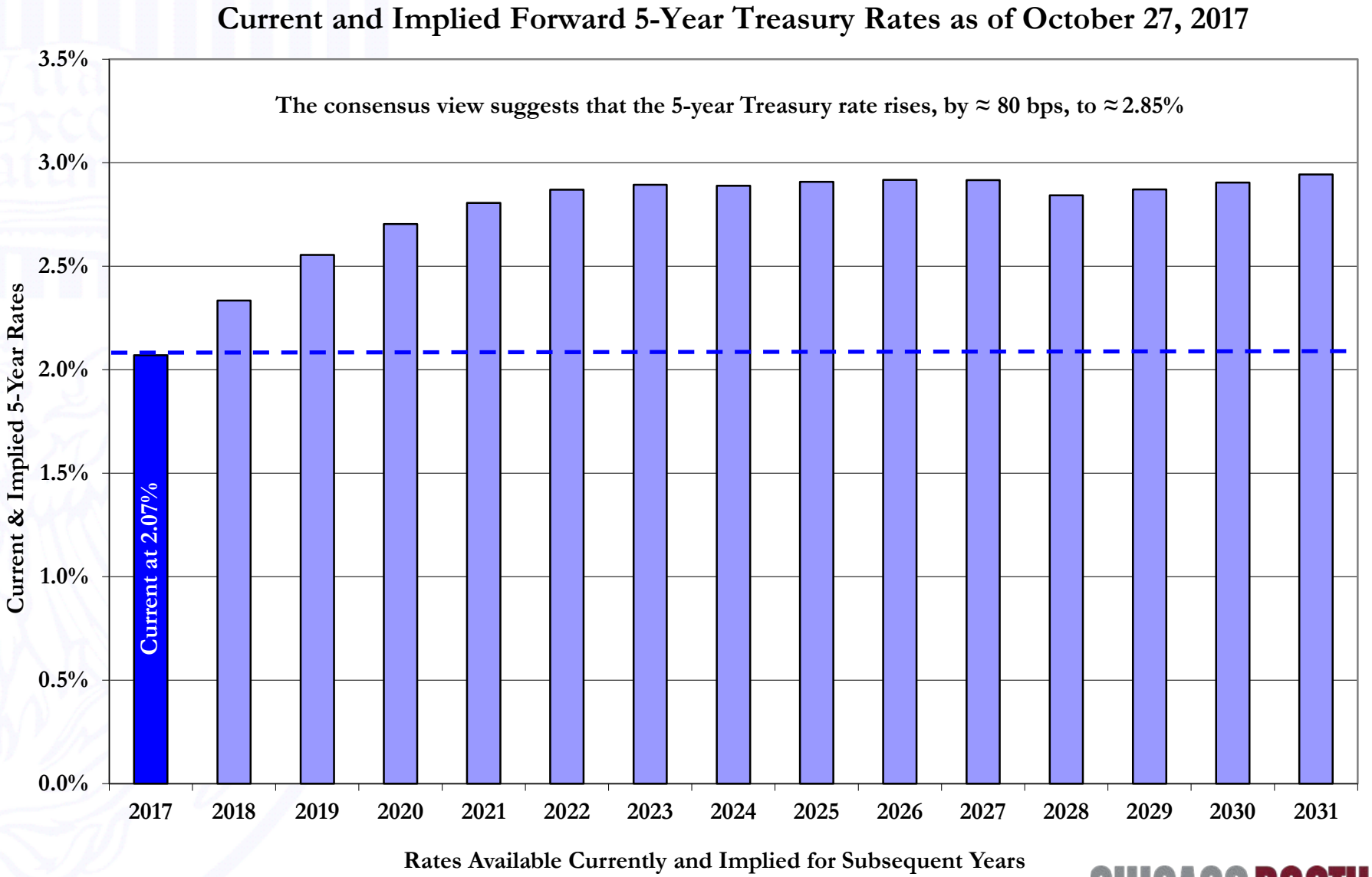


Sources: US Department of the Treasury and Instructor's calculations.

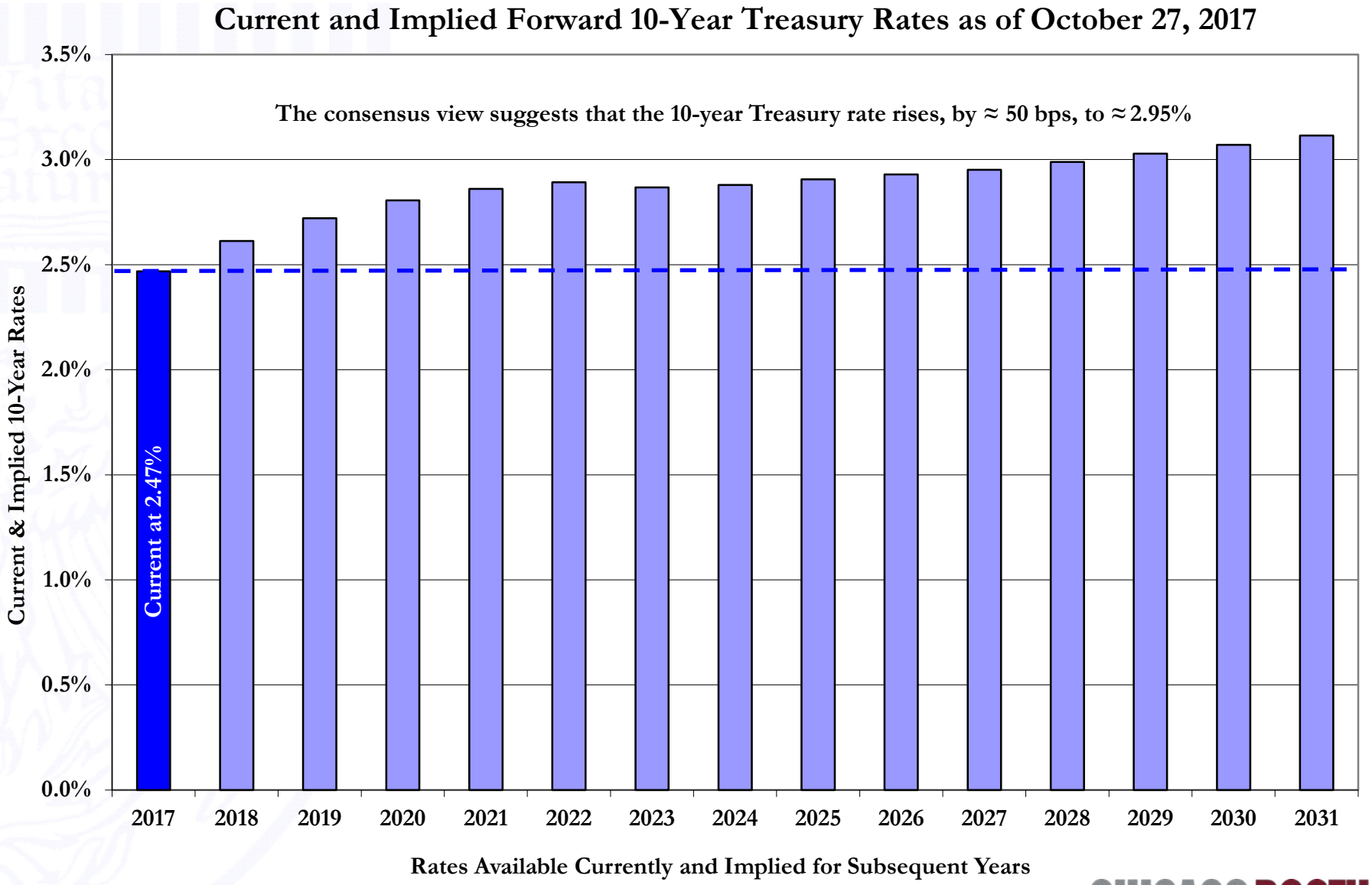
Market's View of Expected Future One-Year Treasury Rates



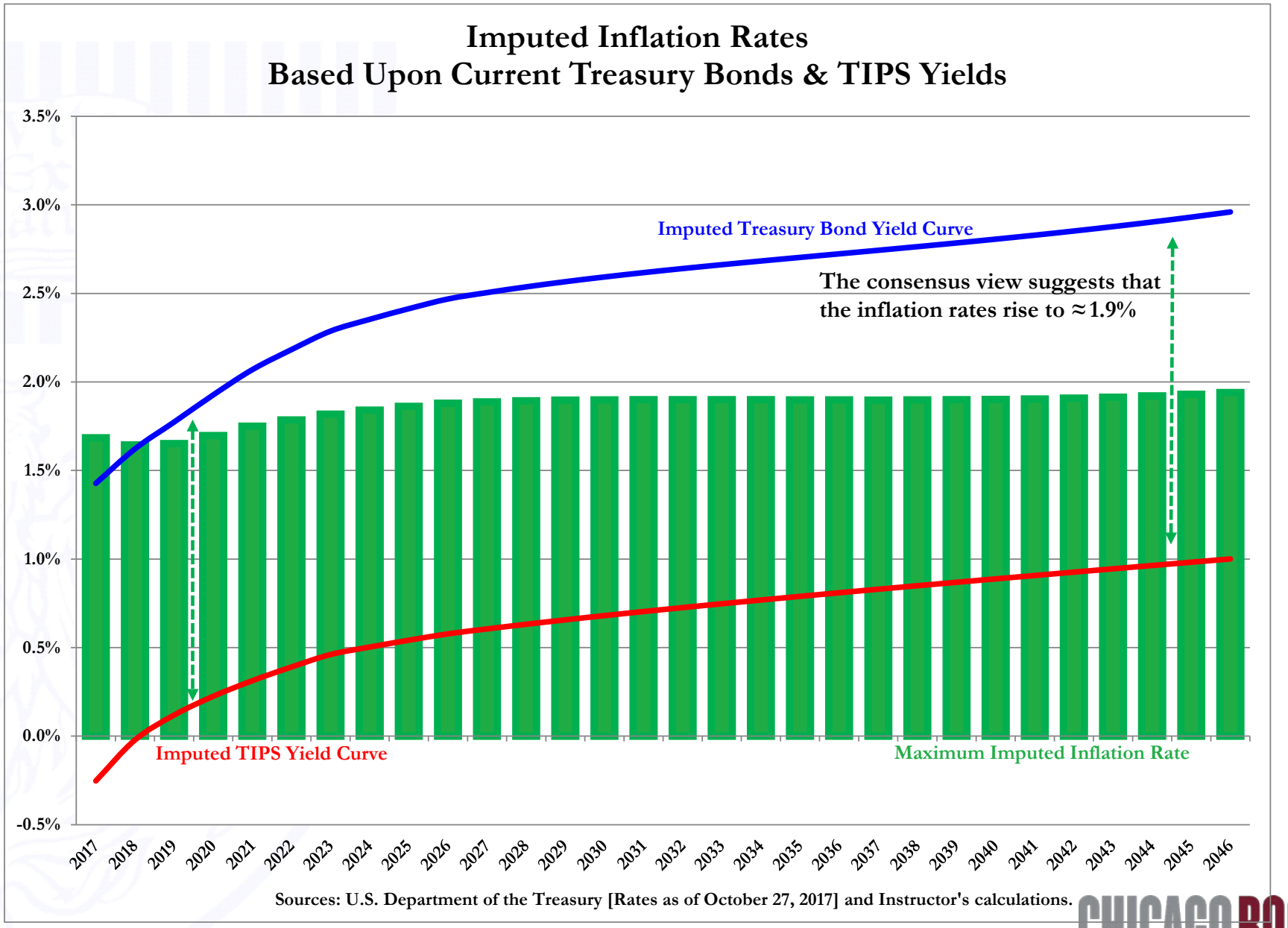
Market's View of Expected Future Five-Year Treasury Rates



Market's View of Expected Future Ten-Year Treasury Rates

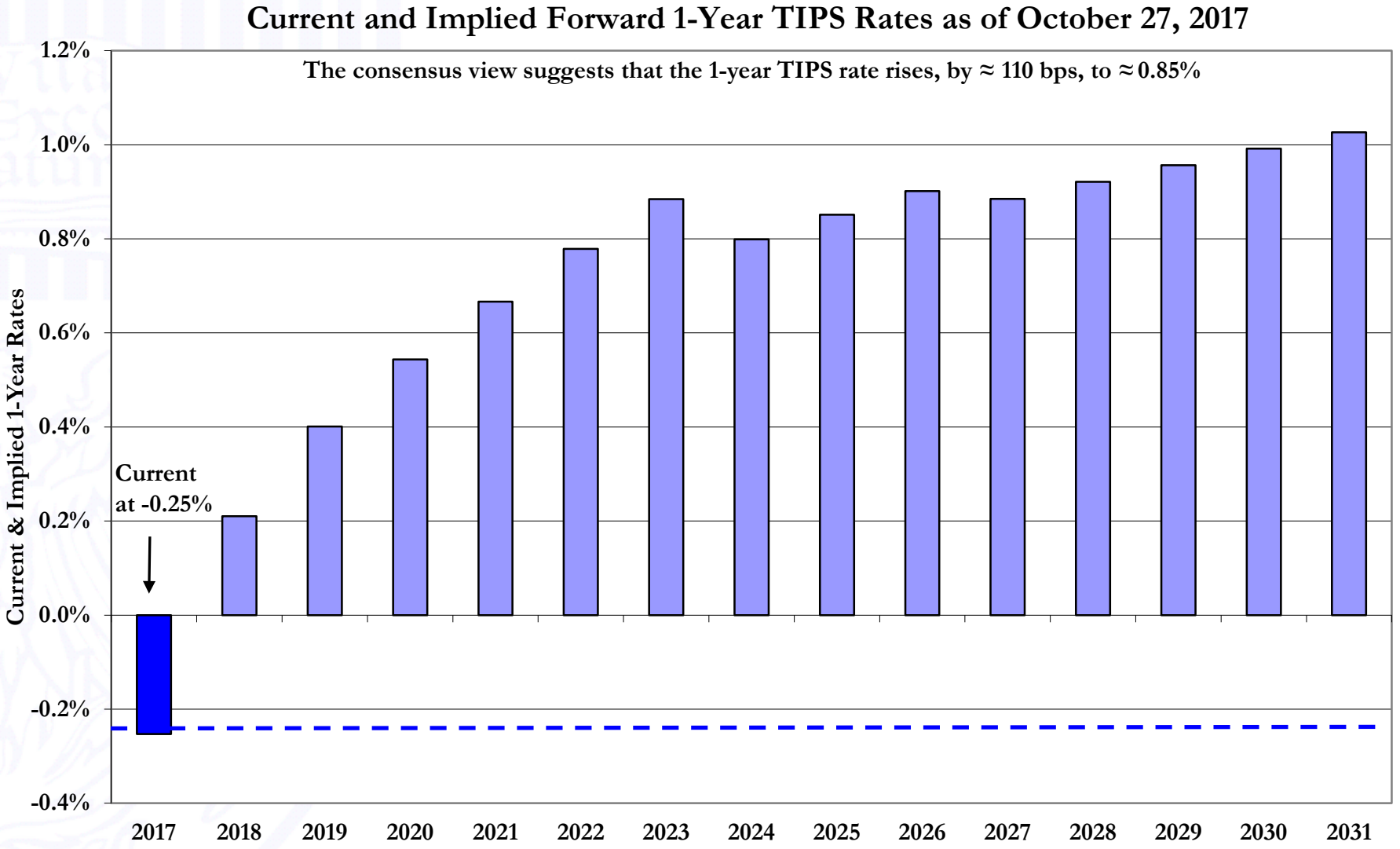


Today's Yield Curve → Expected Inflation

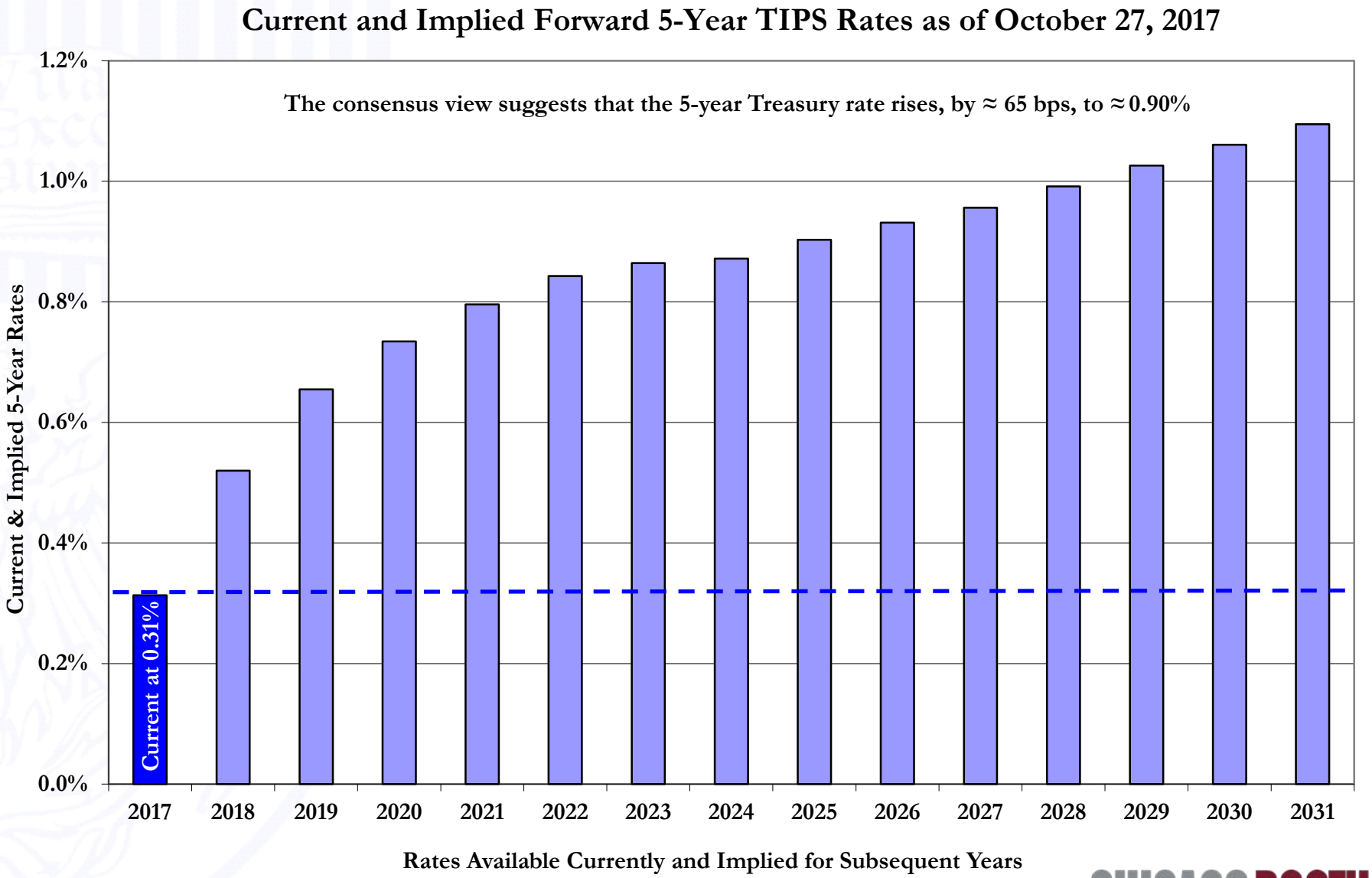


Sources: U.S. Department of the Treasury [Rates as of October 27, 2017] and Instructor's calculations.

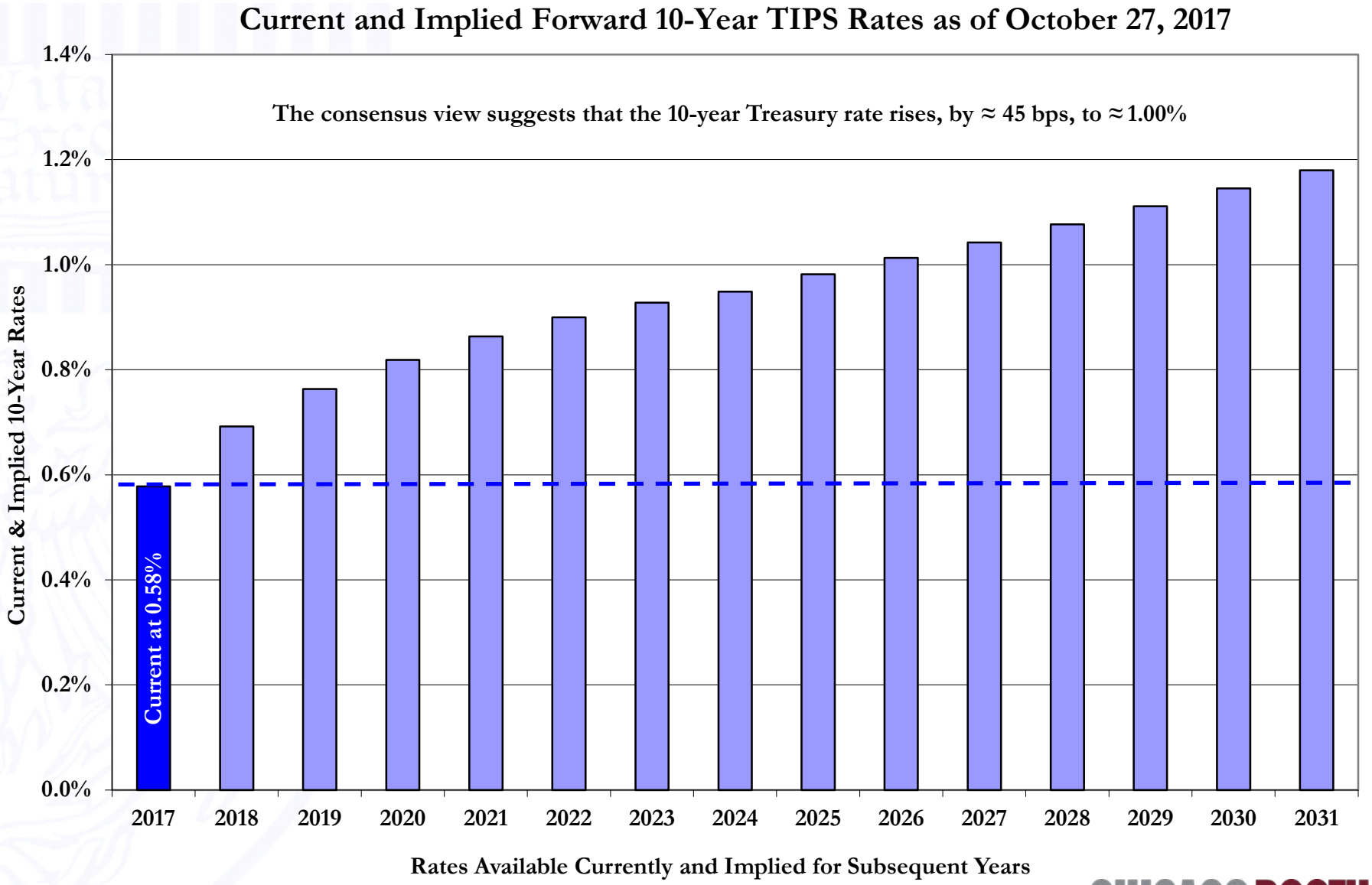
Market's View of Expected Future One-Year TIPS Rates



Market's View of Expected Future Five-Year TIPS Rates



Market's View of Expected Future Ten-Year TIPS Rates



Today's Yield Curve & Future Cap Rates

What if the 5-years TIPS' rate increases by 65 basis point?

Let's assume that cap rates increase by 75 basis points.

Recall: $$P_0 = \frac{CF_0(1+\lambda\rho)}{(1+r_{RE})(1+\rho)-1-\lambda\rho}$$

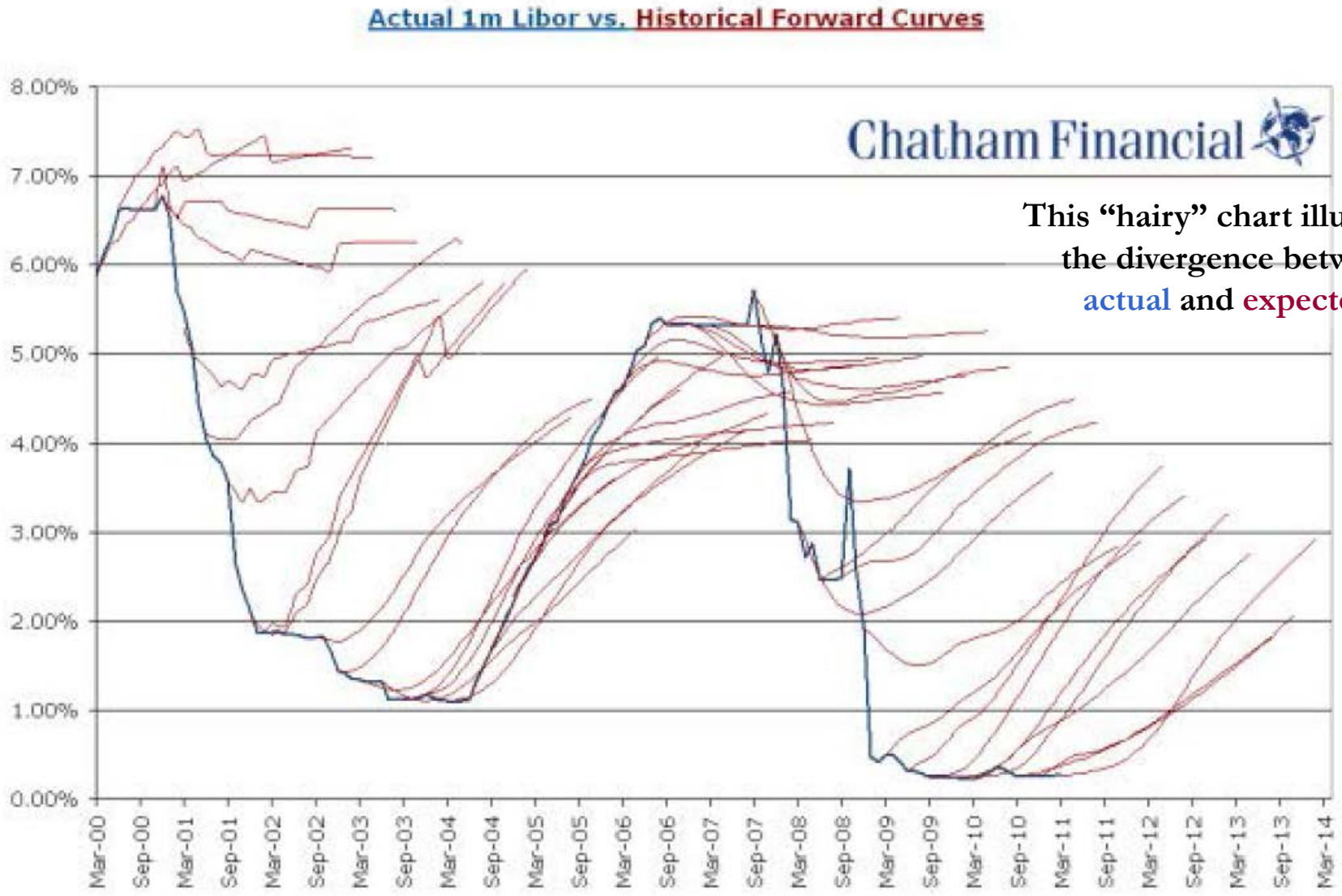
This is our earlier restatement of the cash-flow yield

If and when that repricing occurs, real estate values will fall by 20%!

However: 1) the impact is always difficult to time, and 2) the adverse impact on total returns is a *f*(holding period):

Holding Period	Cap-Rate Shift Effect
1	-20.00%
2	-10.56%
3	-7.17%
4	-5.43%
5	-4.36%
⋮	
10	-2.21%

Caveat: Market's View Is Often Wrong



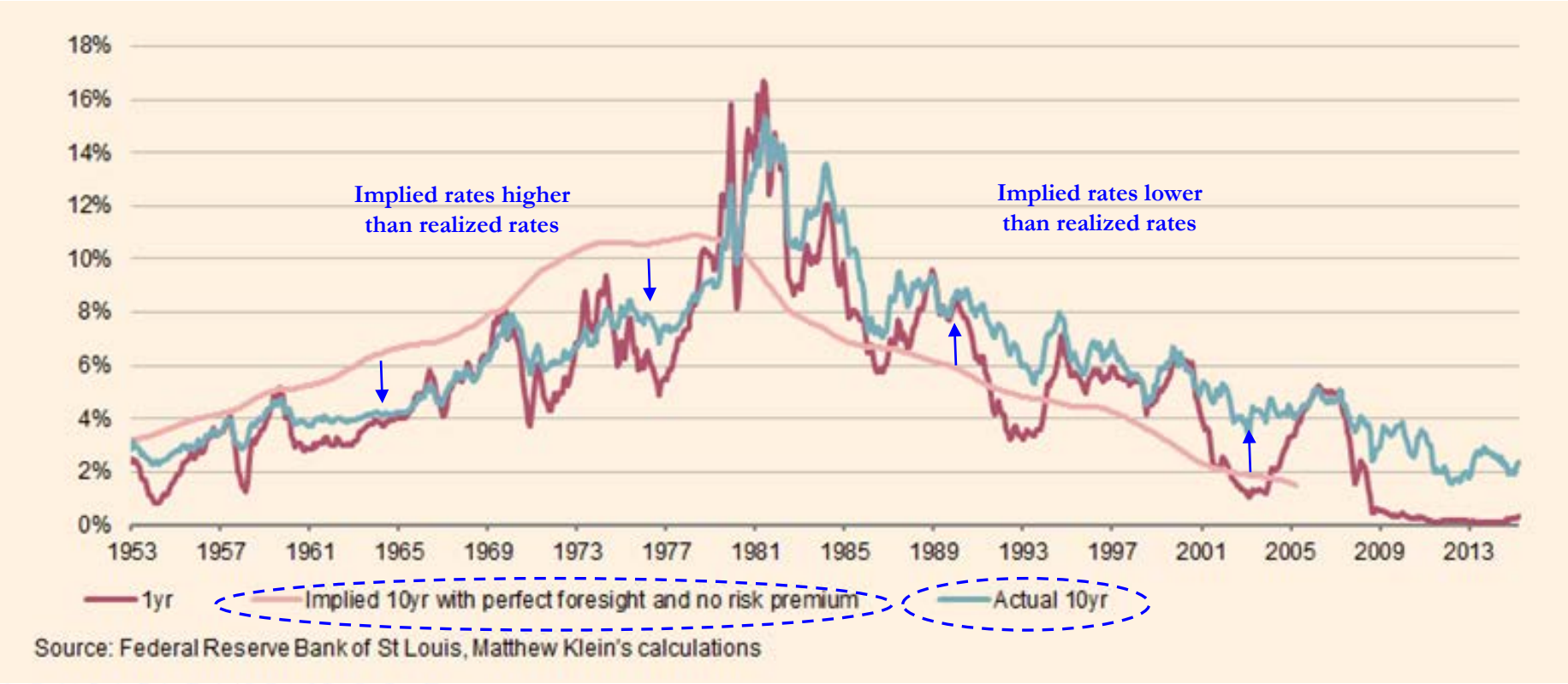
This "hairy" chart illustrates the divergence between actual and expected.

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 *The Grumpy 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:
    - 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!