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Measurement Risks in Property Markets: The PureProperty® Index Methodology

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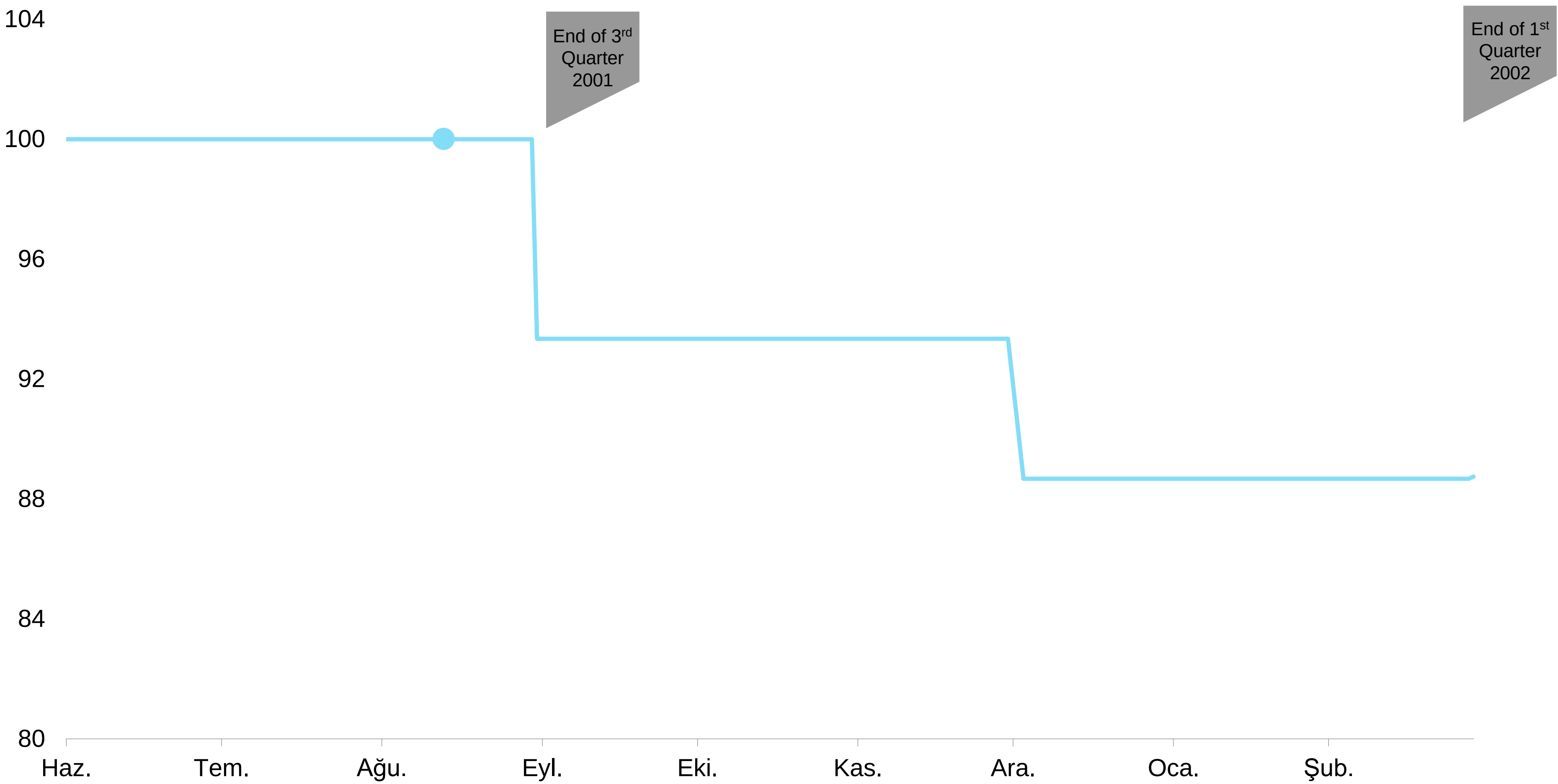
Are Appraisal-Based Measures Timely Enough for Policy-Making Purposes?

Public and private measures of hotel returns, 2001-2002



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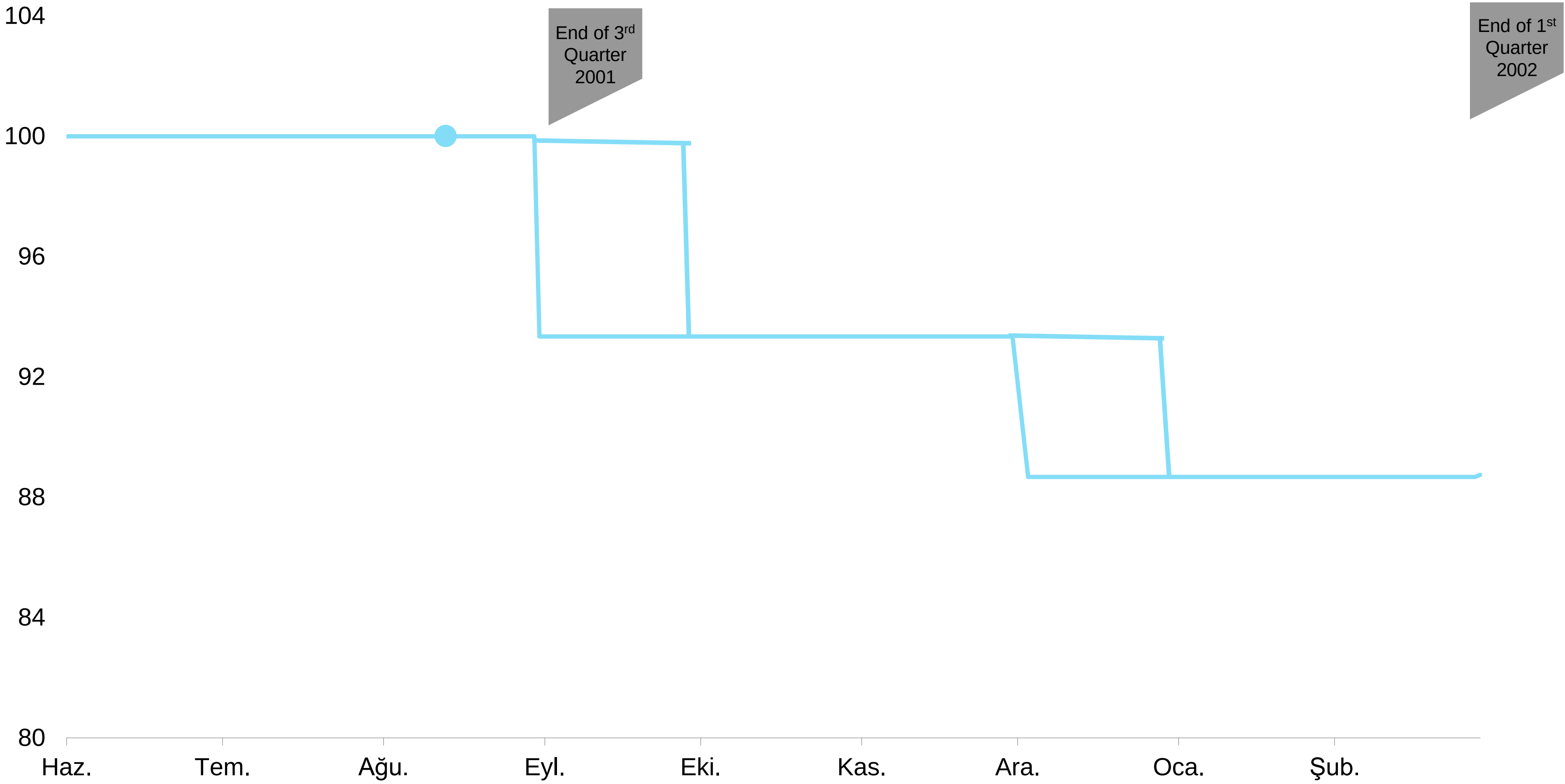

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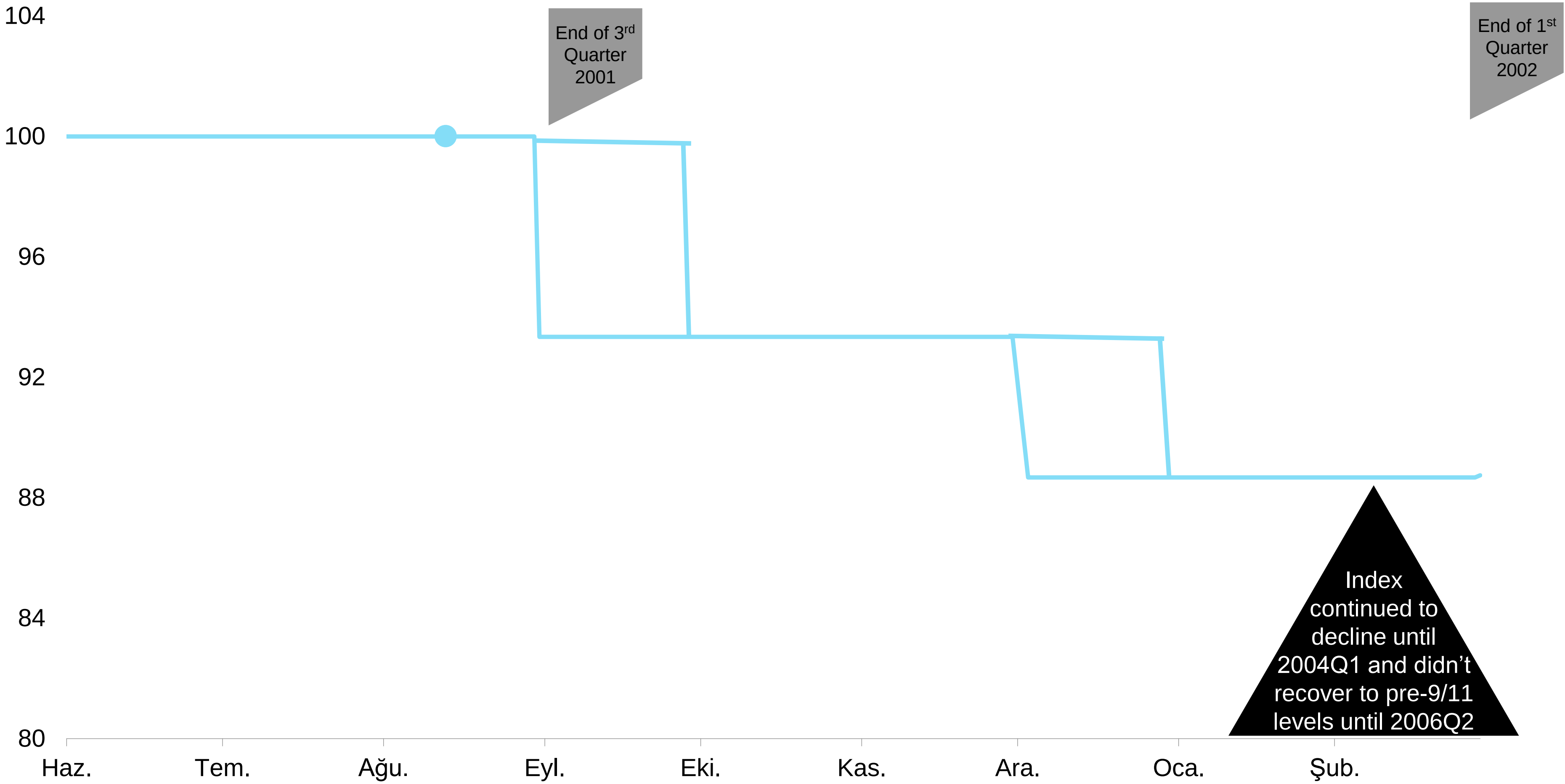

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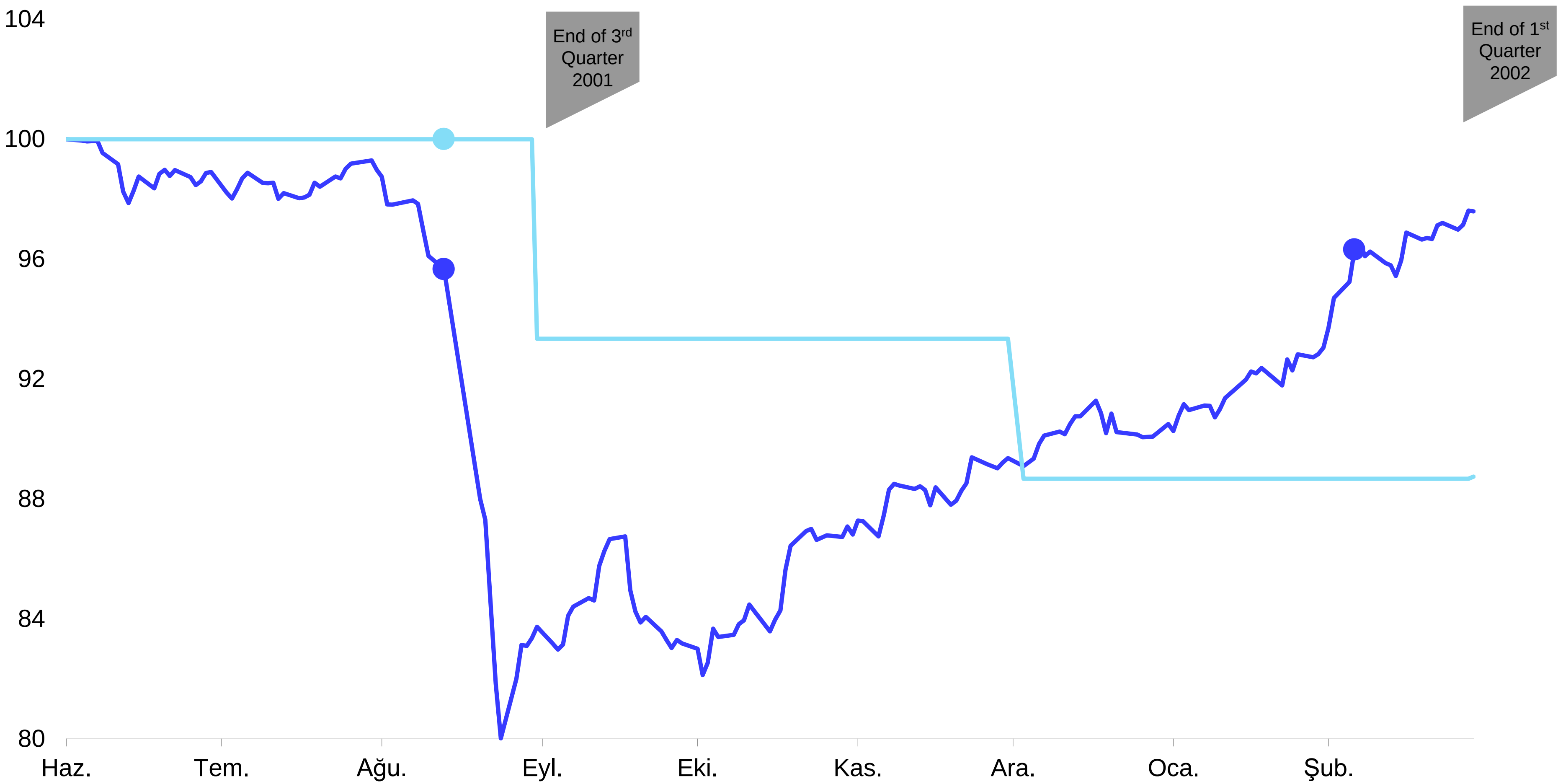
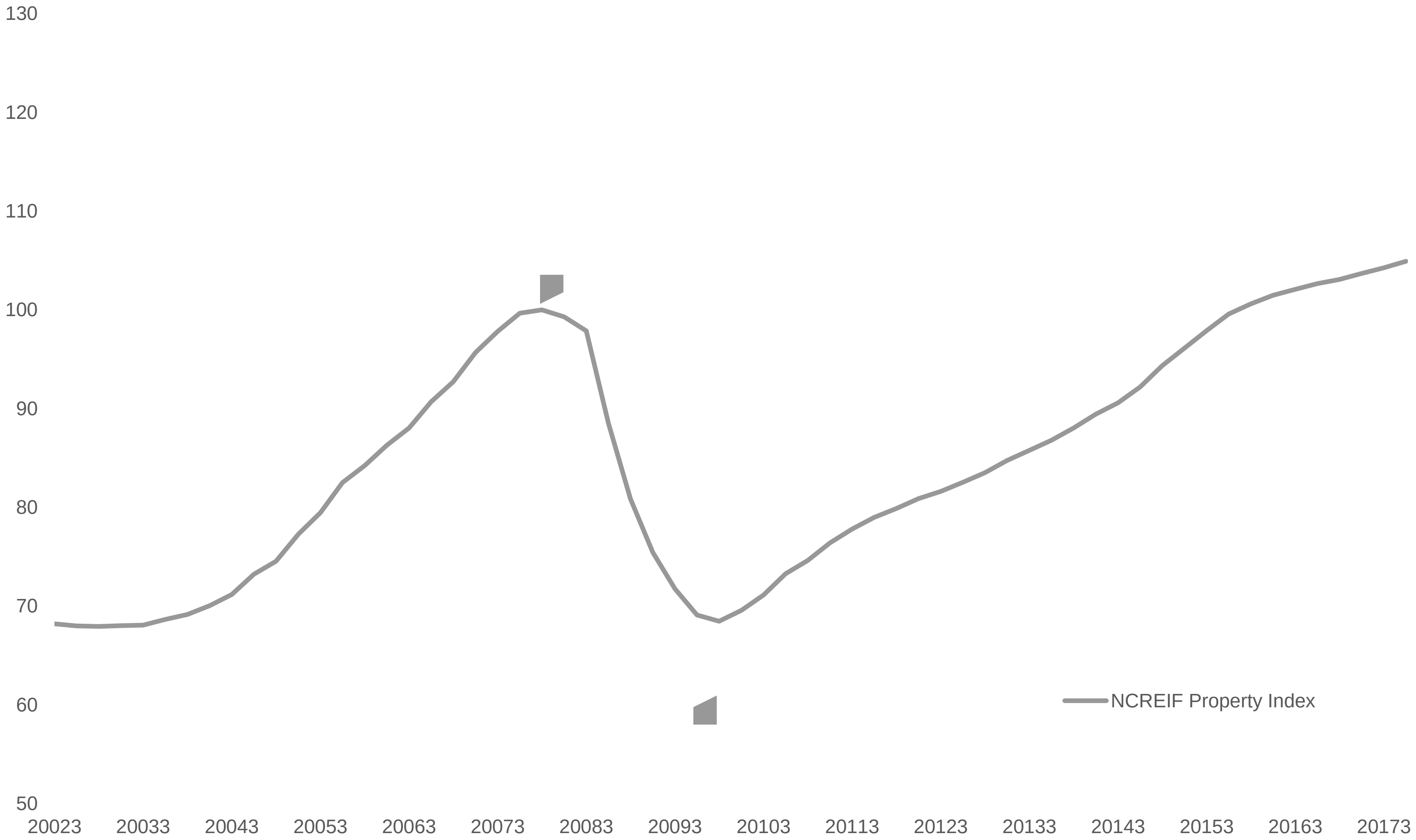


Risk Management Failures in Commercial Real Estate

René M. Stulz (“Risk Management Failures: What Are They and When Do They Happen?” Fall 2008) proposed the following taxonomy of risk management failures:

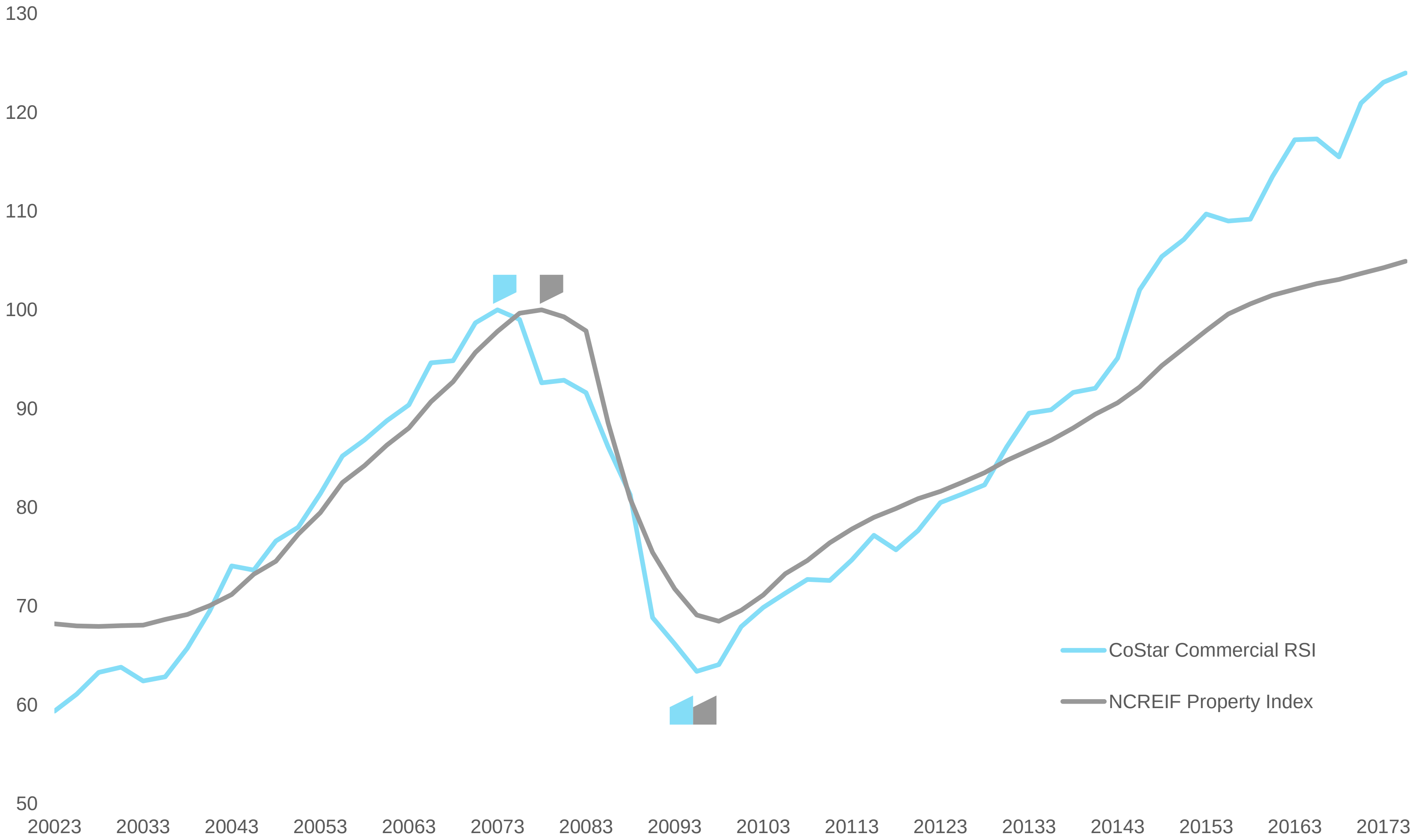
- Failure to use appropriate risk metrics
  - “The choice of risk metrics is the cornerstone of risk management because it determines what top management learns from risk managers about the overall risk position.”
- Failure in communicating risks to top management
- Failure to take known risks into account
- Mismeasurement of known risks
- Failure in monitoring and managing risks

Identifying Turning Points in Commercial Property Markets



Source: Nareit analysis of quarterly appreciation data from NCREIF Property Index, CoStar Commercial Repeat Sales Index, and FTSE Nareit PureProperty Index, 2002Q3-2017Q4.

Identifying Turning Points in Commercial Property Markets



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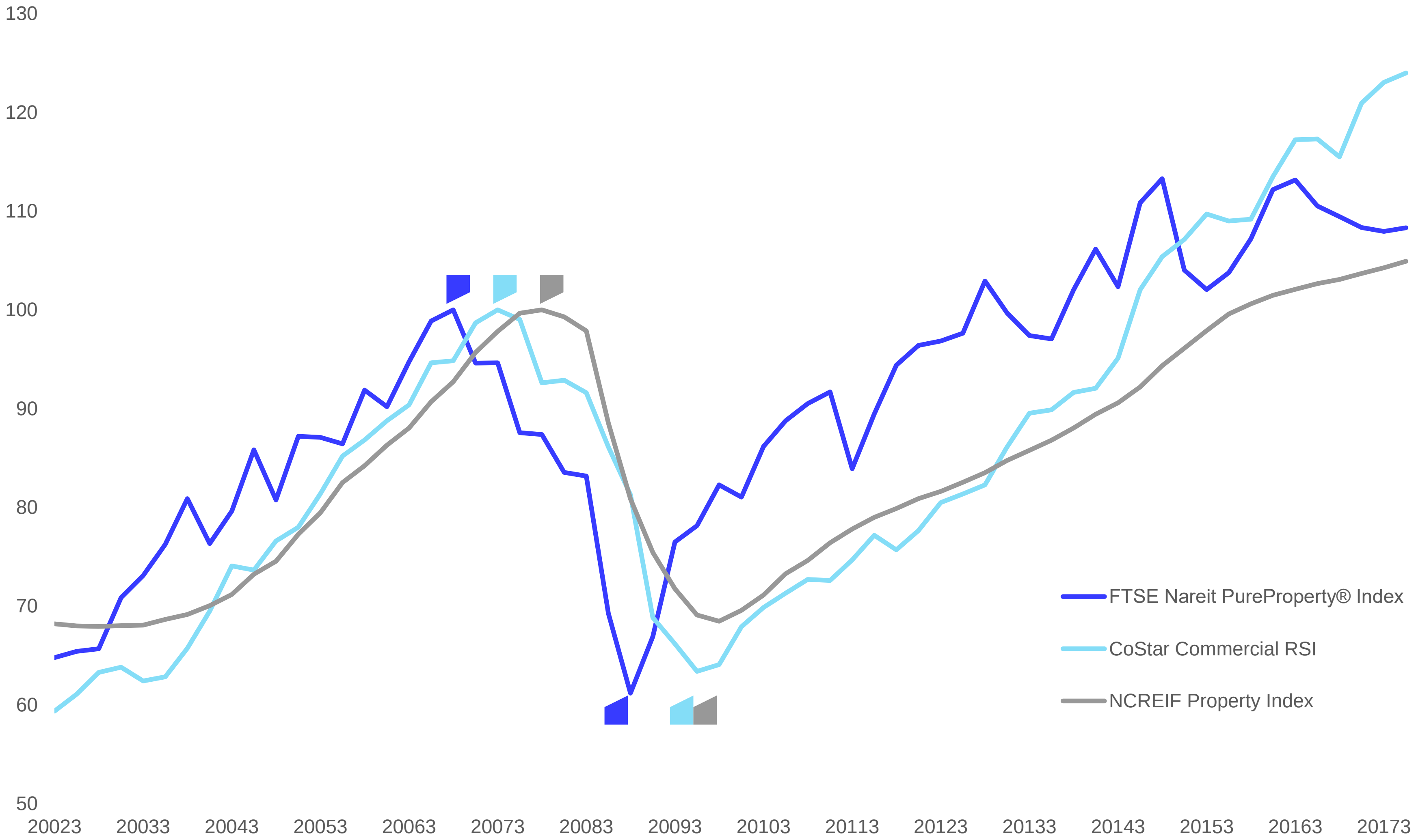

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The Problem of Measuring Illiquid Asset Values

- Market values of all assets are determined in the same way
  - Current expectations of future cash flows, discounted to the present using current expectations of future discount rates
- In liquid markets, market values are revealed through frequent transactions
  - Every transaction price reveals the market value as of the time of transaction
- In illiquid markets, market values are revealed sporadically and imperfectly
  - Transaction price approximates market value as of the time that buyer and seller agreed
  - Transaction price may differ noticeably from market value as of the closing date
  - Transactions are infrequent, so transactions are collected over an extended period
  - Values of most assets are estimated rather than revealed through transactions
    - Appraised property values are wrong by 12% on average (Cannon & Cole 2009)
    - Even on a portfolio basis, appraised property values are wrong by 5% on average
  - Appraisals are expensive, so assets are appraised infrequently
    - Appraisals are collected over an extended period (quarterly)
    - Stale data is used for unappraised assets
- Specifically, values of illiquid assets are measured with lag and smoothing
  - Illiquidity lag (≈2 quarters) and smoothing, even for transaction-based measures
  - Much greater lag (4-5 quarters) and smoothing for appraisal-based measures
- Importantly, *decisions* must be made from market values, *not* reported values

The FTSE Nareit PureProperty® Index Series

- Series of 88 published indices based on exchange-traded U.S. REIT holdings
  - Nationwide all-type aggregate
  - Six property types: Apartment, Industrial, Office, Retail, Health Care, Hotel
  - Four regions: East, Midwest, South, West (same definitions used by NCREIF); 14 sub-regions possible
  - Eleven region/type combinations: East region Apartment, South region Retail, etc.; others possible
  - ≈38,000 properties worth ≈$1 trillion
  - Daily historical data, Sept. 23, 2002 to Feb. 28, 2018
  - Total return and price return
  - Equity and Property (delevered) versions
  - Patented methodology described in Horrigan, Case, Geltner & Pollakowski (2009)

The FTSE Nareit PureProperty® Index Series: Deleveraging

- REIT investment returns combine two main effects:
  - Change in property value
  - Effect of leverage
- The challenge is to separate the *equity* return (with leverage) from the *property* return (no leverage)
- Leverage is *borrowed* capital
  - Total amount borrowed
  - Cost of capital
- Reverse the effect of leverage by *lending* capital
  - Same amount as REIT borrowing
  - Yield equal to REITs' cost of capital
- We can match REITs' cost of capital to the yield on a blend of fixed-income ETFs
  - Government bonds
  - High-yield corporate bonds
- So unlevered property returns are equivalent to the returns on a blended portfolio of REITs and fixed-income ETFs

The FTSE Nareit PureProperty® Index Series: Index Computation

- Stock price changes and total returns are (essentially) regressed on holdings to infer the contribution of each market segment:

$$r_{it} = \beta_{it}^{E} x_{it}^{E} + \beta_{it}^{M} x_{it}^{M} + \beta_{it}^{S} x_{it}^{S} + \beta_{it}^{W} x_{it}^{W} + \varepsilon_{it}$$

where $x_{it}^{E} + x_{it}^{M} + x_{it}^{S} + x_{it}^{W} = 1$

  - To produce the daily index, adjust index weights quarterly and multiply them by daily stock price movements:

$$\boldsymbol{\beta} = (\boldsymbol{X}'\boldsymbol{X})^{-1}\boldsymbol{X}'\boldsymbol{r}$$
$$\boldsymbol{w} = (\boldsymbol{X}'\boldsymbol{X})^{-1}\boldsymbol{X}'$$

  - The weights identify a portfolio of positions in REIT constituents
  - The returns to the portfolio are the "pure" returns to the target market segment

Advantages of the PureProperty® Methodology

- Timeliness
  - No lag in measurement or reporting
  - Transaction-based data lag by two quarters
  - Appraisal-based data lag by four to five quarters
  - Private-market measures take several weeks to compile
- Accuracy
  - No appraisal error
  - No strategic reporting behavior
  - No smoothing
  - *Same volatility as transaction-based measures*
- Investable
  - Makes it possible for risk managers to use derivatives to manage and reduce real estate portfolio risks
- Requirement: a robust REIT market

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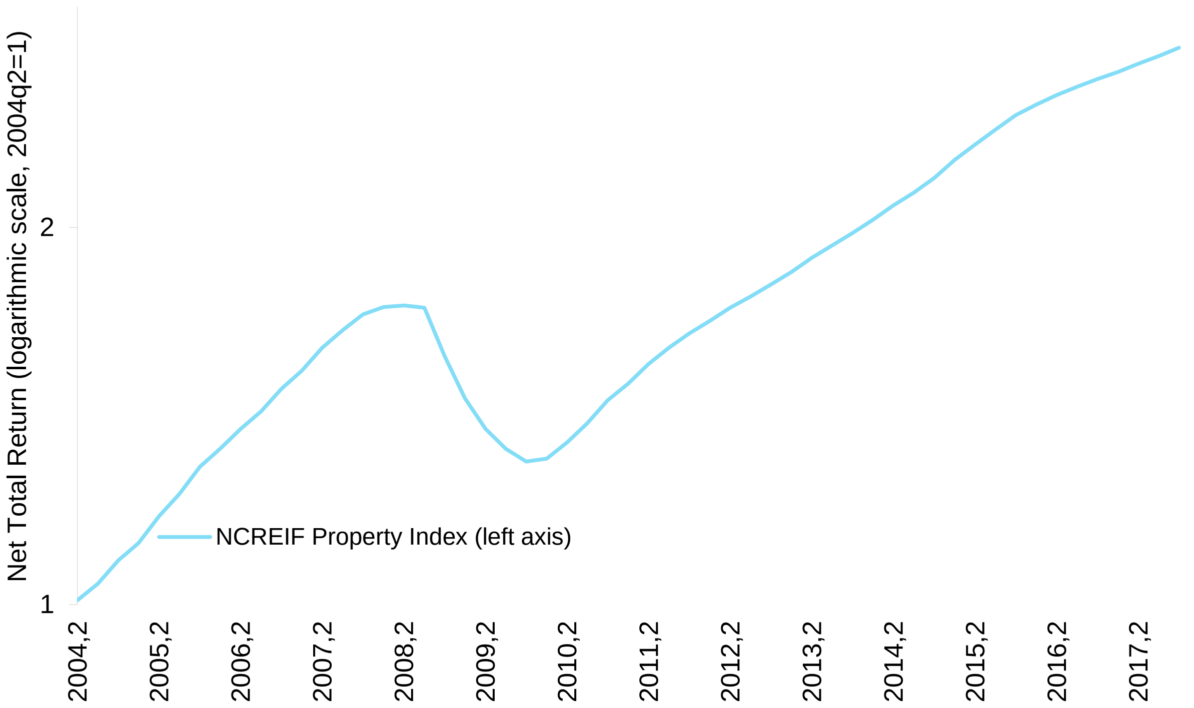
Policy Diagnosis: The NCREIF Property Index and the Lagged Moving Average of the PureProperty Index



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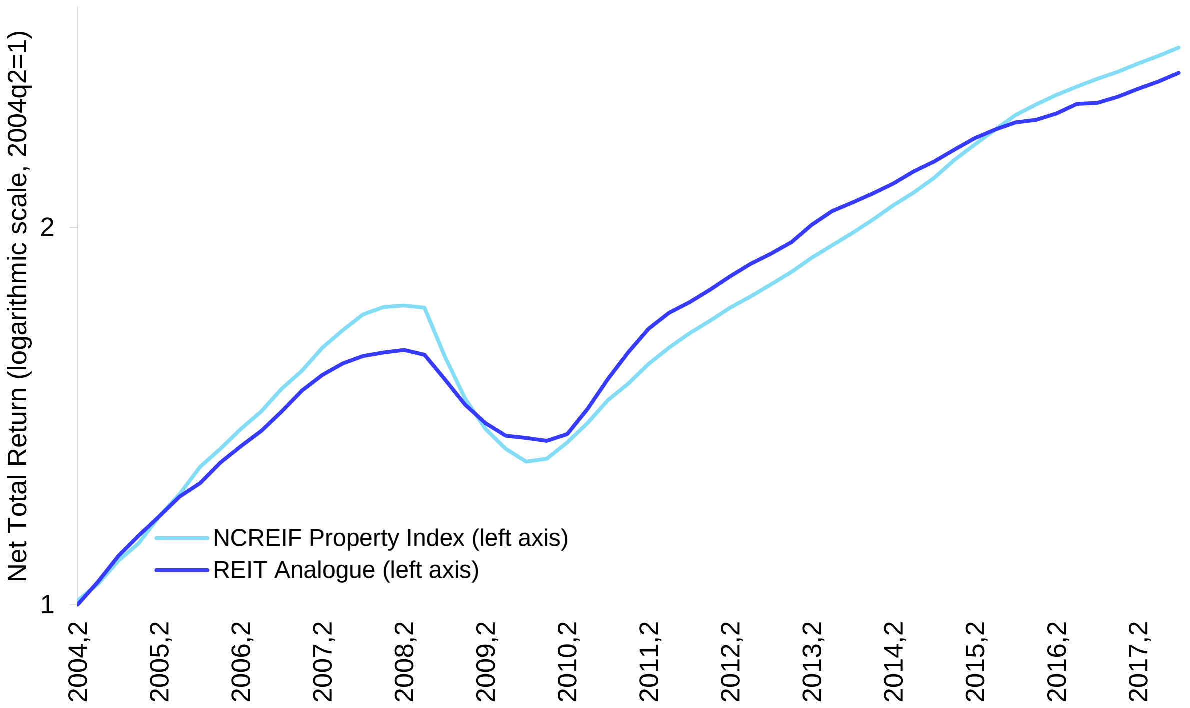

- The REIT analogue to the NCREIF Property Index is a 7-quarter moving average of daily values of the FTSE Nareit PureProperty® Index
- The correlation between the two has been more than 90 percent

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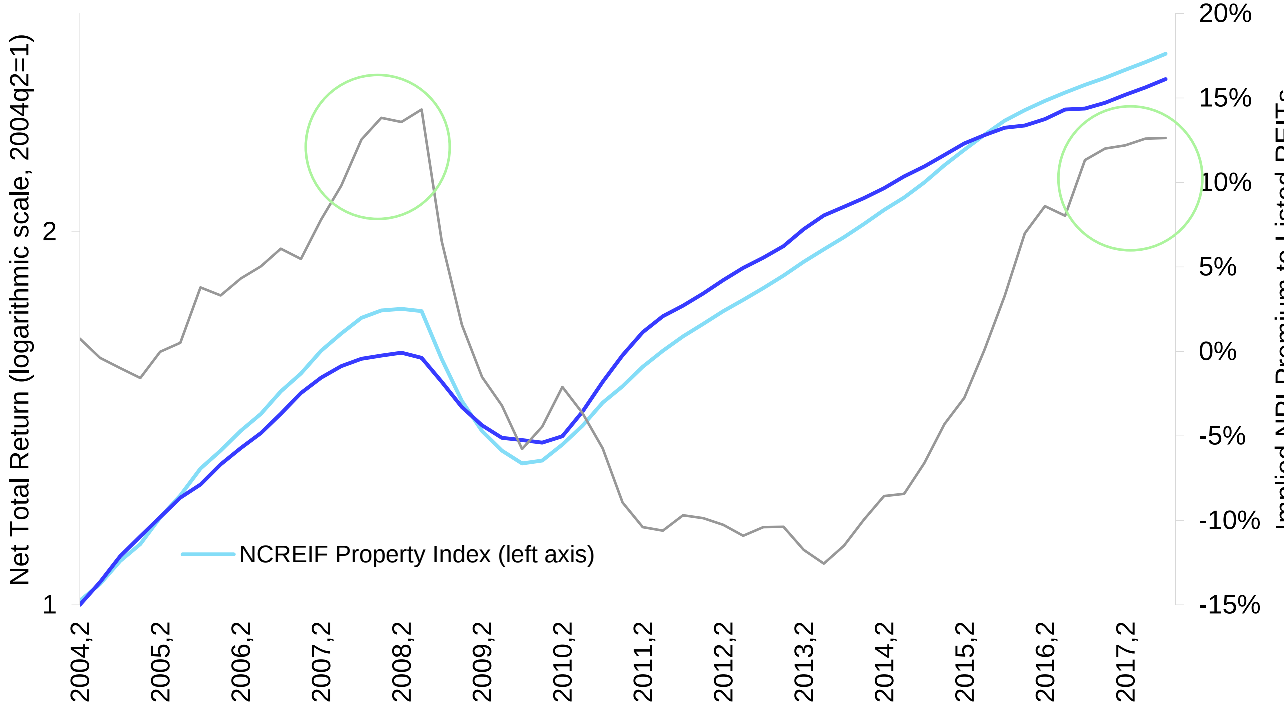

- The REIT analogue to the NCREIF Property Index is a 7-quarter moving average of daily values of the FTSE Nareit PureProperty® Index
- The correlation between the two has been more than 90 percent
- A valuation discrepancy may indicate capital-market problems that may need to be addressed through central bank policy

Summary: Understanding Illiquid Markets Using Liquid-Market Data

- Data from illiquid markets provides imperfect information about asset values and returns
  - Returns are measured with lag
    - True for transaction-based as well as appraisal-based measures
    - Transaction-based lag averages about two quarters, while appraisal-based lag averages 4-5 quarters
  - Measured changes are smoothed relative to actual changes
- When claims on comparable assets are traded in liquid markets, market indices can provide more accurate and more timely information about even those assets not traded in liquid markets

Contact

If you have any questions, please contact us

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