

Commercial Real Estate Markets and Price Diffusion

Abdullah Yavas
University of Wisconsin-Madison

CBRT Conference on CRE Price Indices
Kapadokya - April 2018



Outline

1

Overview of US CRE market

2

CRE and Recessions in the US

3

Price Dynamics and Diffusion



Overview of the US CRE Market

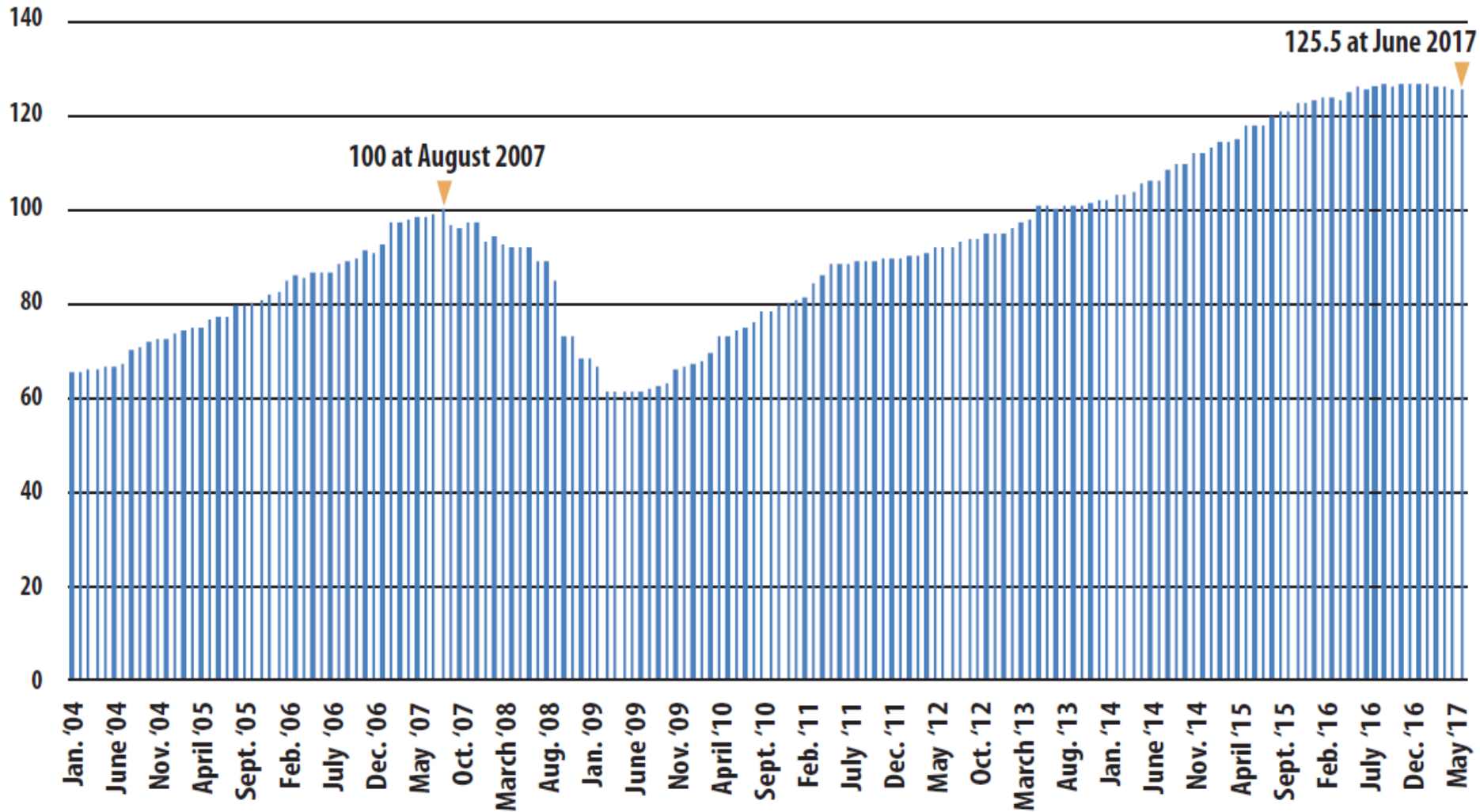


Significance of CRE

- Size & significance of CRE
 - Over 100 billion square feet (100m m²) of space
 - Total value is estimated to exceed \$11 trillion
- Despite its size and significance for the economy and business cycles, relatively little academic research has focused on price dynamics in CRE
 - vs voluminous research on house price dynamics



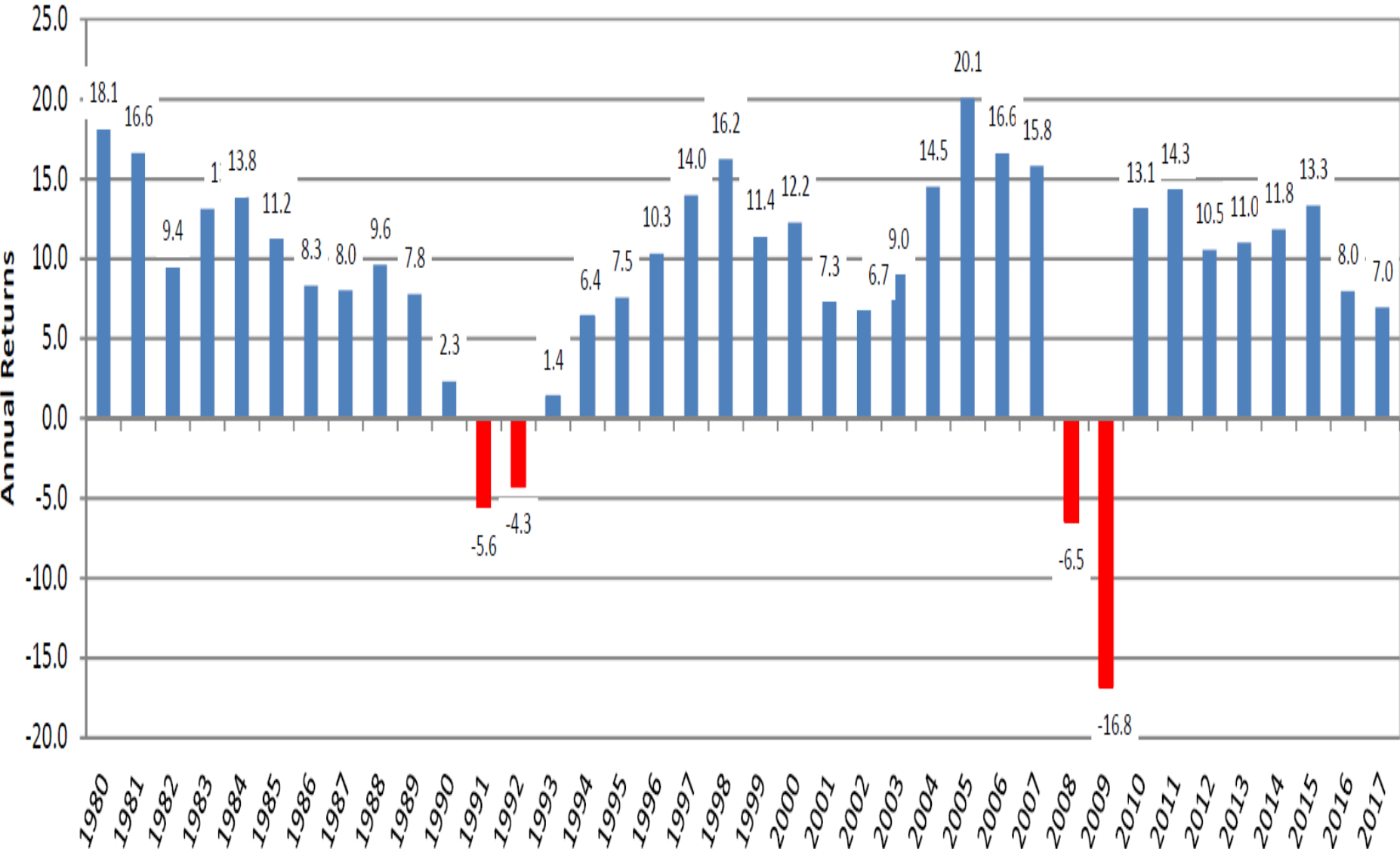
CRE Prices are doing well – Green Street CRE Price Index



Source: Green Street Advisors, Inc.

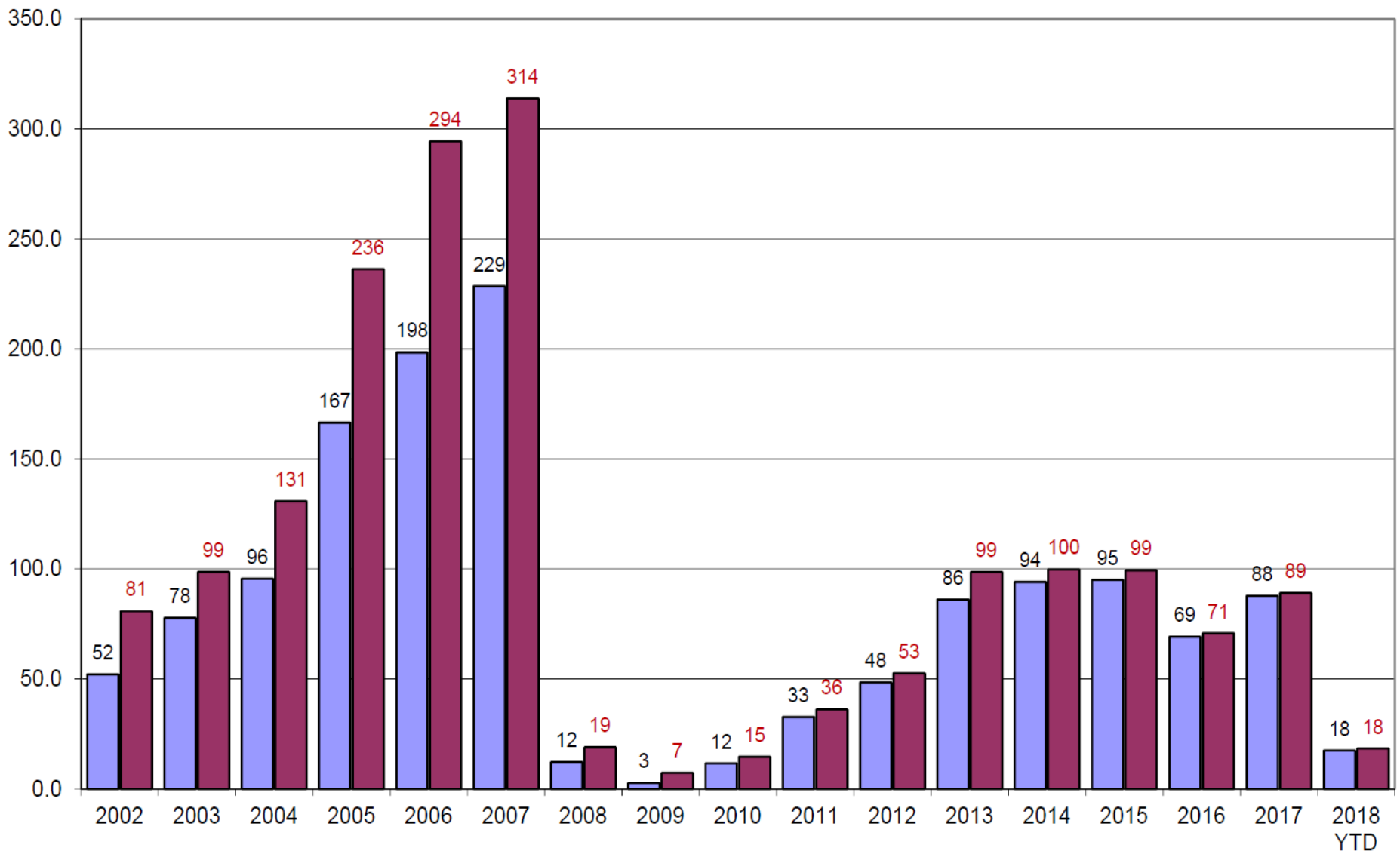
Note: Property indices are indexed to 100 at their peaks.

CRE Annual Returns source: PREA Quarterly – Winter 2018

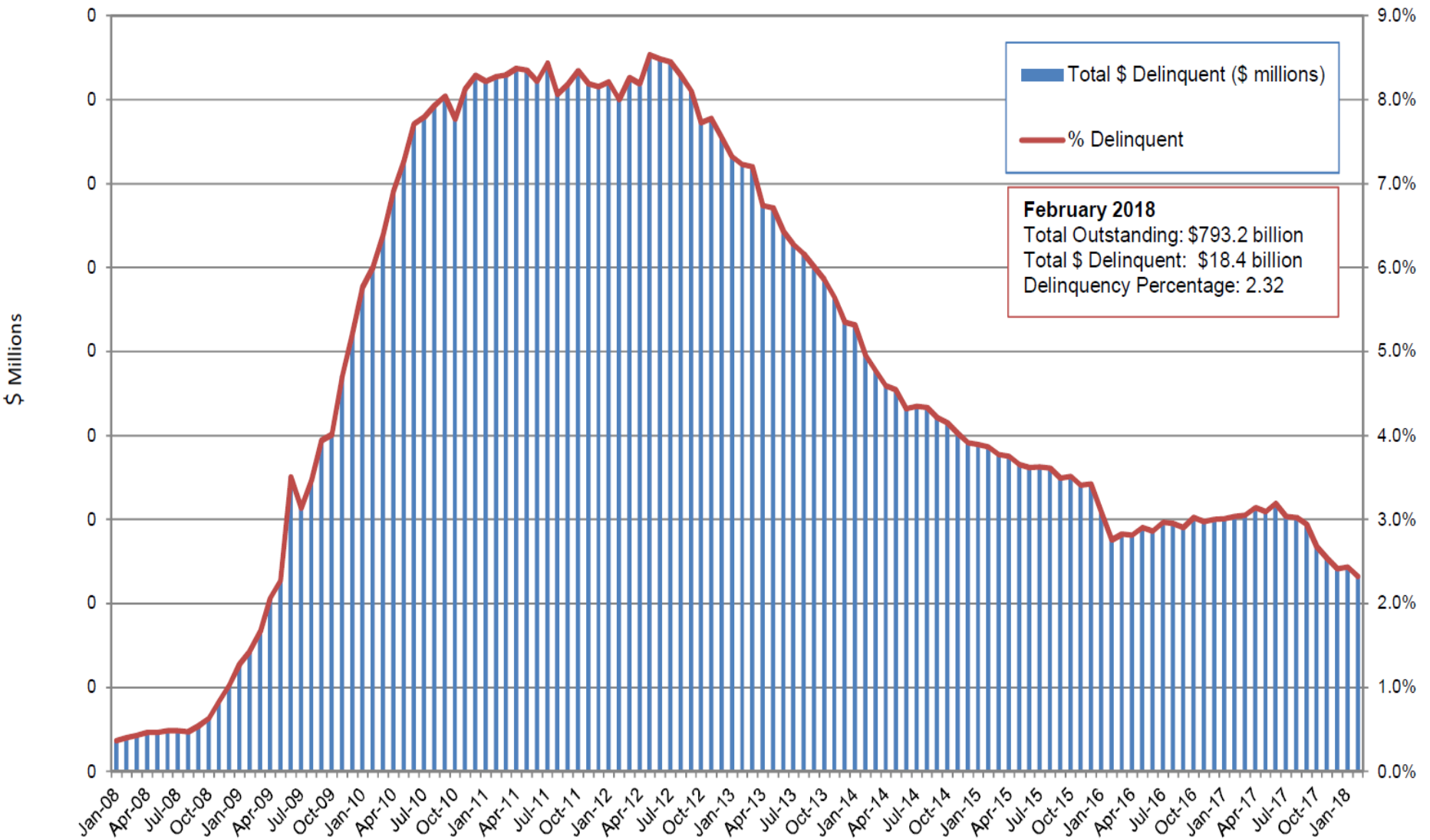


CMBS Issuance back to “pre-bubble” periods (\$b)

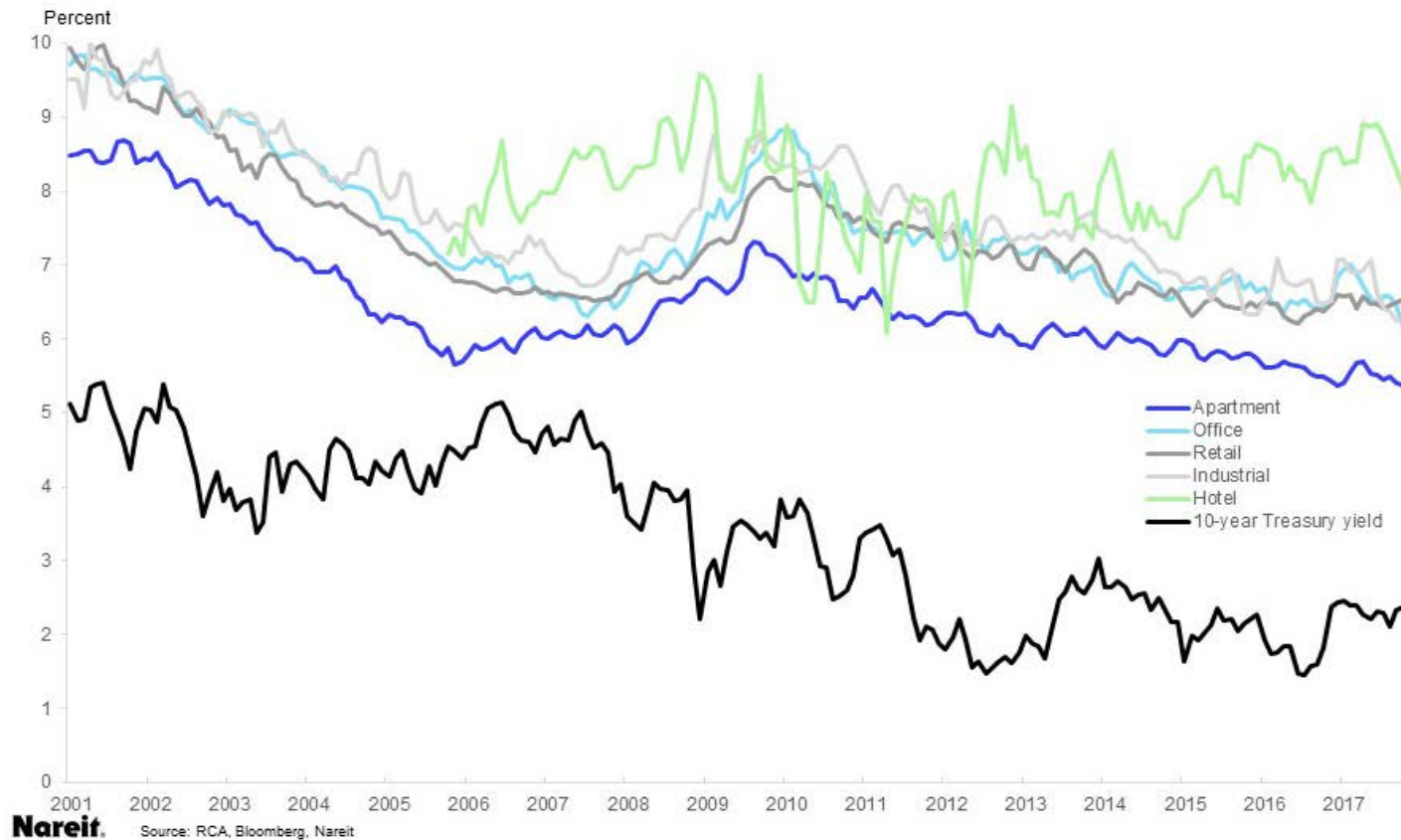
source: PREA Quarterly – Winter 2018



CMBS Delinquencies source: PREA Quarterly – Winter 2018



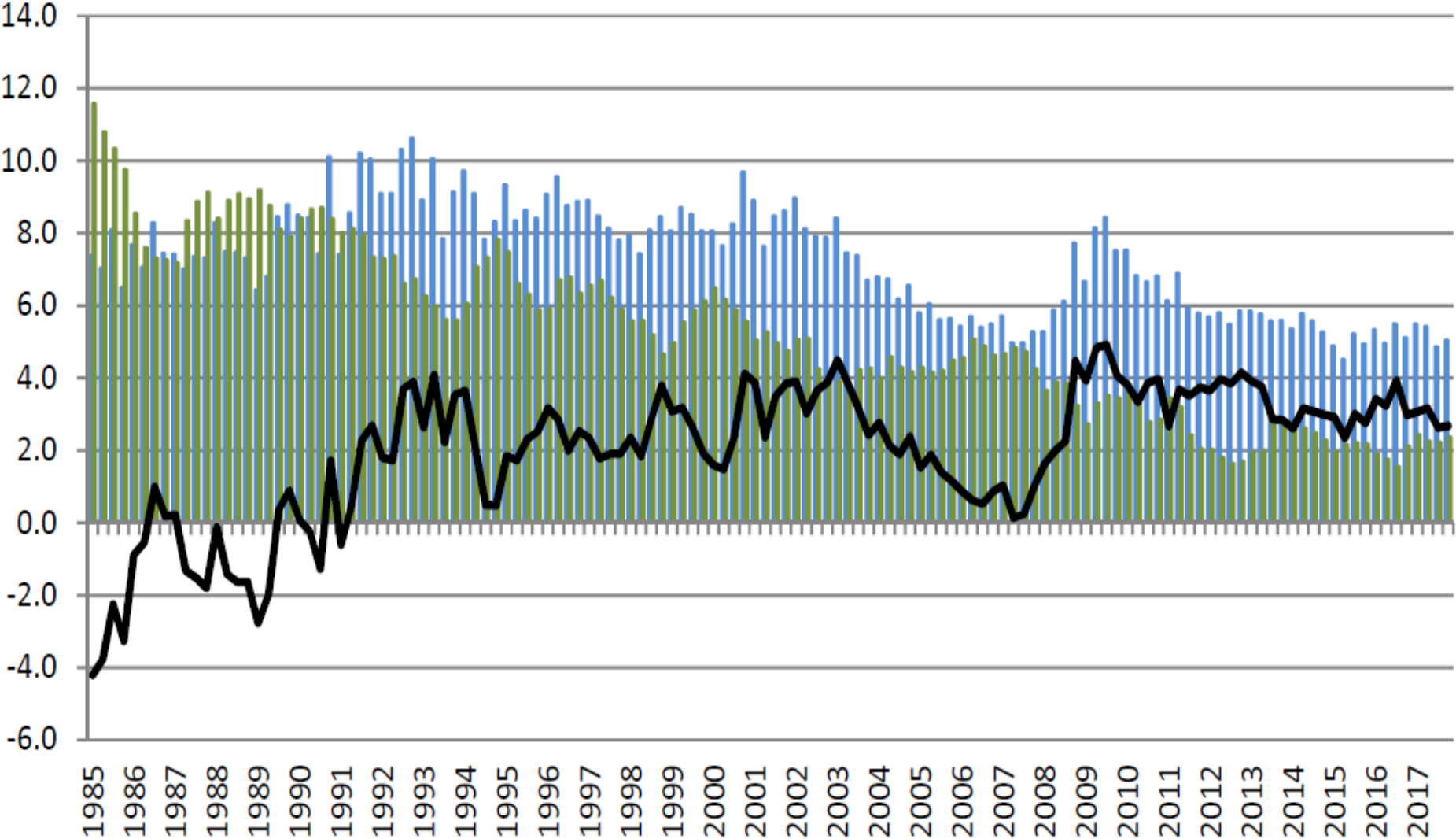
Cap Rates ($R=NOI/P$) are at historically low levels, and are concerning for valuations ($P=NOI/R$).



1

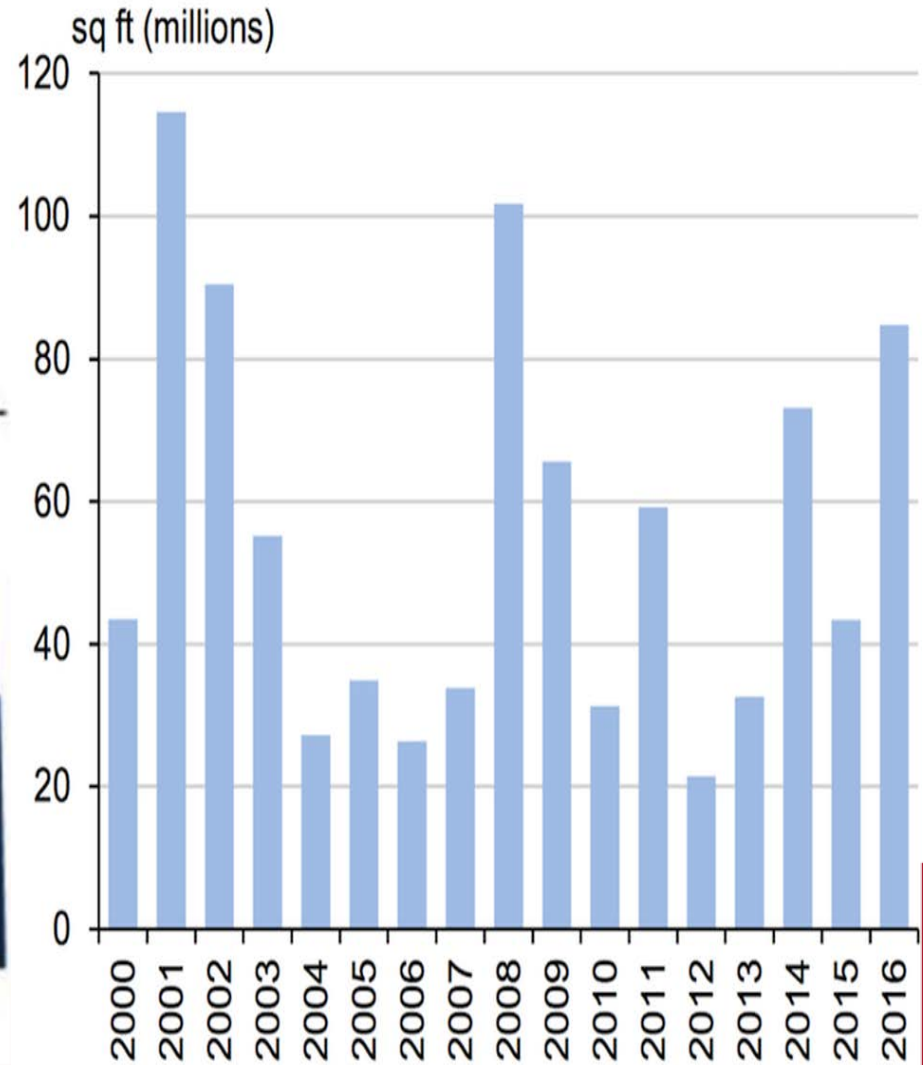


But Cap Rate vs Treasury yield spreads provide ample cushion: NCREIF Cap Rates vs 10-Yr (source: ncreif.org)



Sour spot - Retail: Dept store sales (LHS) and closings (RHS)

source: <https://www.forbes.com/sites/oliviergarret/2017/04/02>



Big Q: Frothy Valuations?

General consensus:

- Given low cap rates and low expected IRRs, valuations are very hard to justify.
 - “All the juice has been squeezed out of this orange”
- On the flip side, interest rates are low and economic fundamentals are looking good.



CRE and Recessions in the US



Current CRE Cycle vs Previous Cycles

- CRE has gone through many boom and bust cycles in the past.
- The current cycle is different:
 - Has been slow to gain momentum, and has already lasted longer
 - We typically see overbuilding at this stage of a cycle. Not this time around.
 - Debt growth has been slower in this cycle
- However, we need to keep in mind that previous cycles often ended rather suddenly (due to unexpected negative developments in CRE markets / national economy / world economy)



CRE and Recessions in the US

- CRE has been blamed for (played a role) in only one of the past 11 recessions: 1990-1991 recession.
 - Not one of the deepest recessions – only 1.4% drop in GDP
 - Was due in part to the so-called “credit crunch” caused by the collapse of the savings and loan industry in the late 1980s
 - which was related to asset price ‘bubble’ in CRE sector.

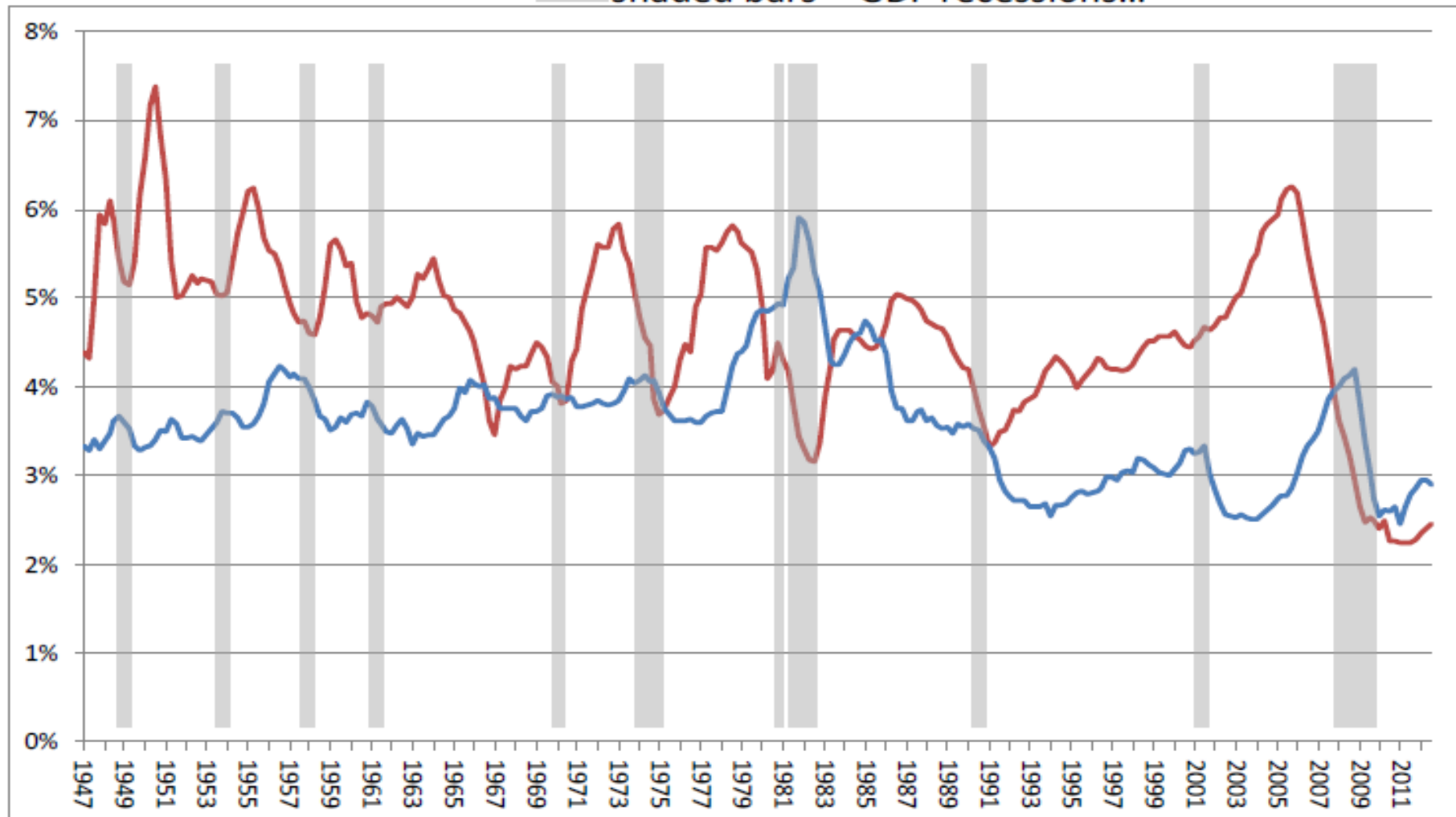


CRE vs Res. Construction and recessions

Geltner (2013)

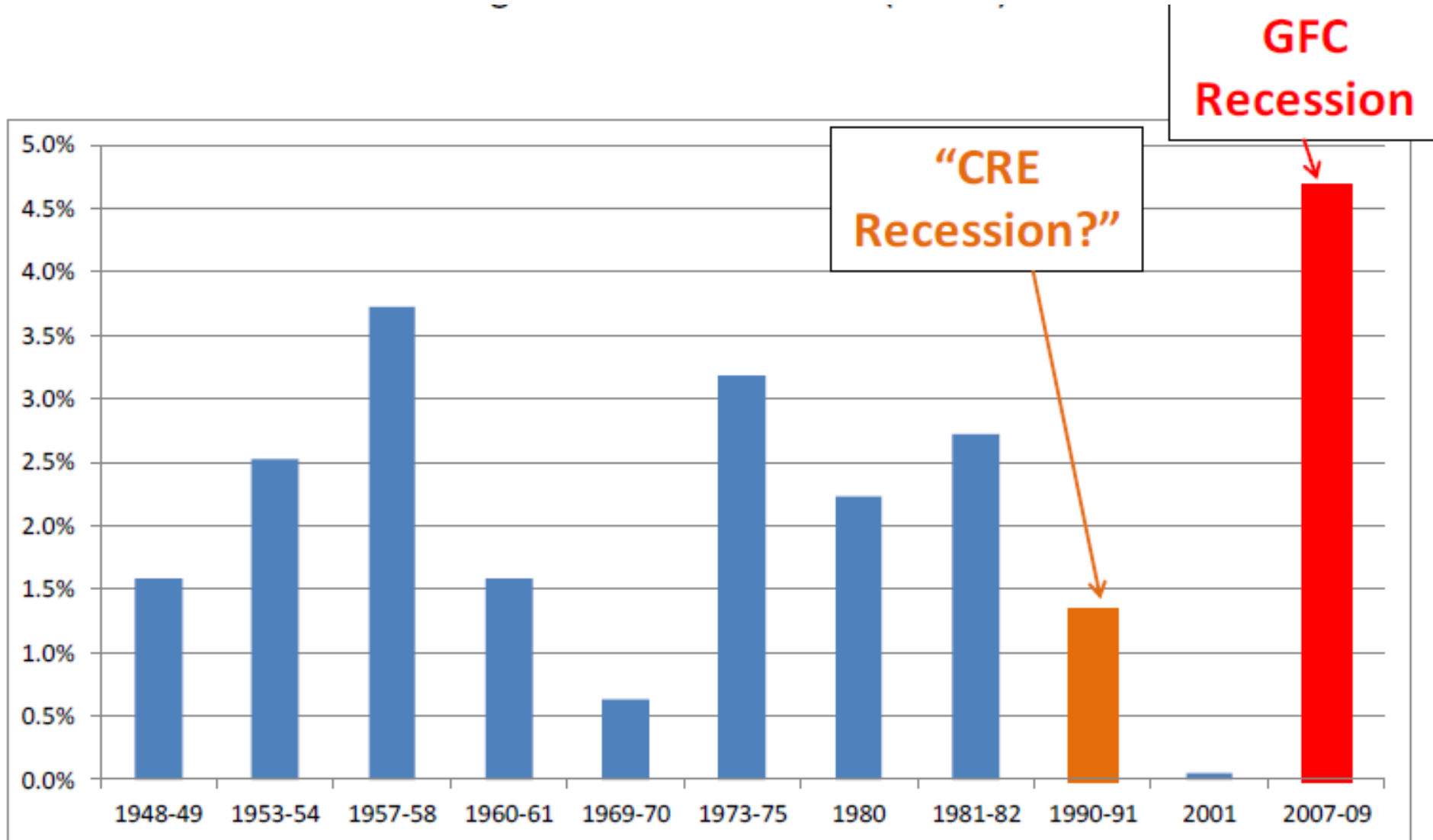
Fixed Investment as Percent of GDP: Non-Residential Structures & Residential

shaded bars = GDP recessions...



US Recessions and CRE - Magnitude of GDP Decline (% real)

(source: Geltner 2013)



Why RRE matters more?

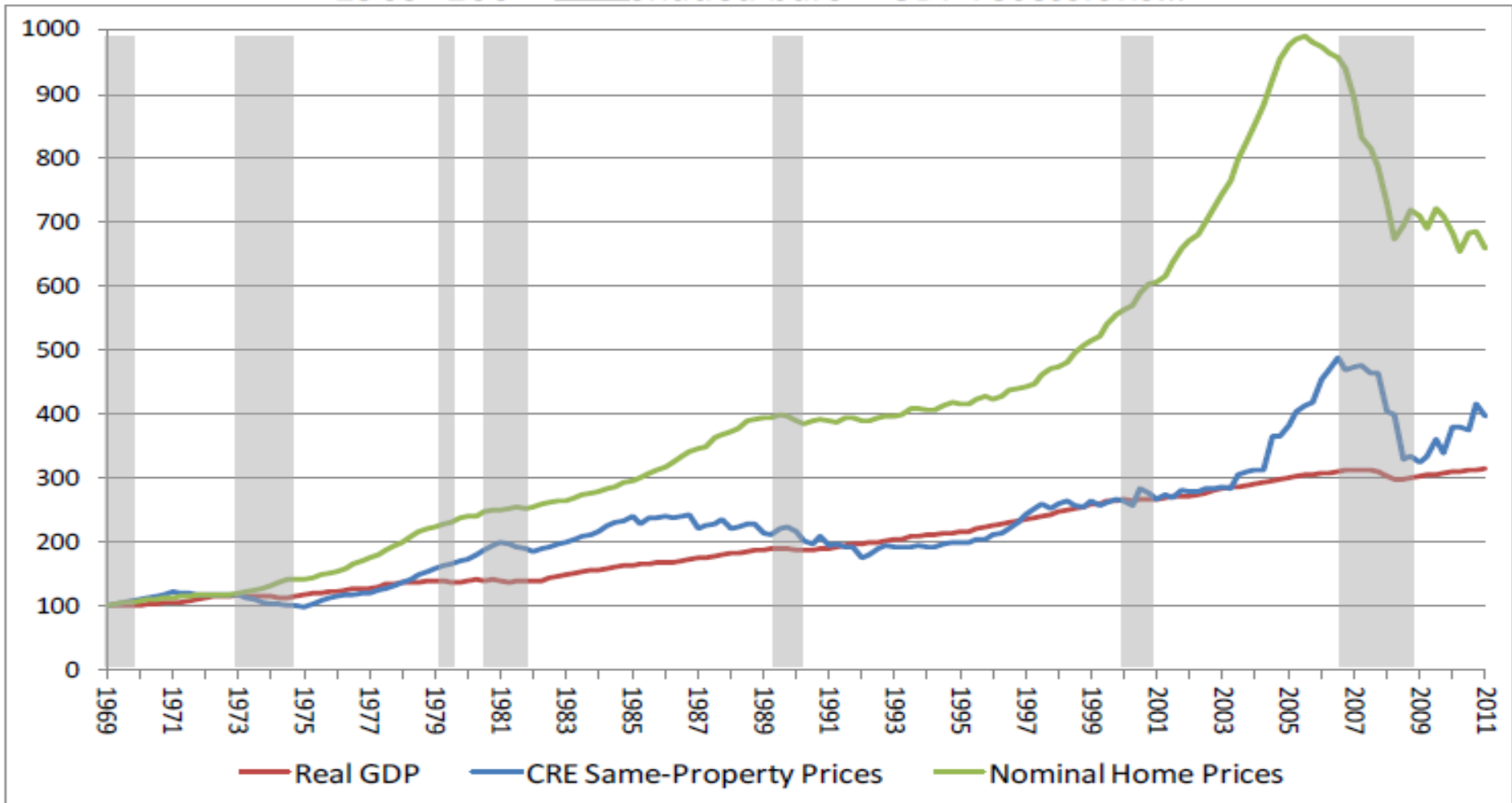
- CRE is a much smaller sector than housing, \$20 trillion vs about \$10 trillion (including rental residential market).
- Housing is a consumption good whereas CRE is generally a factor of production. In an economy dominated by consumer spending, housing has a more direct and bigger economic impact.



Here is another reason why RRE matters more

(source: Geltner 2013)

CRE Same-Property Transaction Prices, Shiller Nominal Home Price Index, GDP
1969=100 shaded bars = GDP recessions...



The Role of Tax Policy in the Early 1990s CRE crisis

- There was a major episode of overbuilding of commercial space in 1980s, partly encouraged by the Economics Recovery Tax Act of 1981 that lowered capital gains tax rate and accelerated cost recovery system.
- The Tax Reform Act of 1986 eliminated the accelerated cost recovery provision of 1981 Act, and contributed to the market crash and slowdown in construction in late 1980s and early 1990s.

Price Dynamics and Diffusion



Price Dynamics in Commercial Real Estate Markets

Ying Fan

Hang Lung Center for Real Estate, Tsinghua University

Abdullah Yavas

Department of Real Estate and Urban Land Economics, University of Wisconsin-Madison

Motivation and Contribution

- We study and compare price dynamics and lead-lag relationships between private and public commercial real estate markets, across commercial property types (Apartment, Industrial, Office, Retail and Hotel),
 - and between CRE and RRE.
- Clearly, understanding co-movements of real estate prices across markets is of crucial importance for policy makers in designing policies to contain diffusion of price boom and busts across markets and to limit their impact on the financial system and the rest of the economy.

Methodology

- To overcome the limitations of earlier approaches, we utilize **wavelet analysis**:
 - It encompasses **both** time-domain and frequency domain analysis.
 - It requires **no prior assumption of stationarity** (Bowden and Zhu, 2008).
 - By capturing both the frequency and the time variations of a time series, Wavelet analysis
 - Enables simultaneous treatment of the high frequency components, Cycles and LT trend.
 - Facilitates a deeper understanding of co-movements in both short and long term horizons across markets.
 - Widely used in physics, electrical and computer engineering, and making inroads in finance, economics and real estate.

Methodology: Wavelet Analysis

- Wavelet Transfer

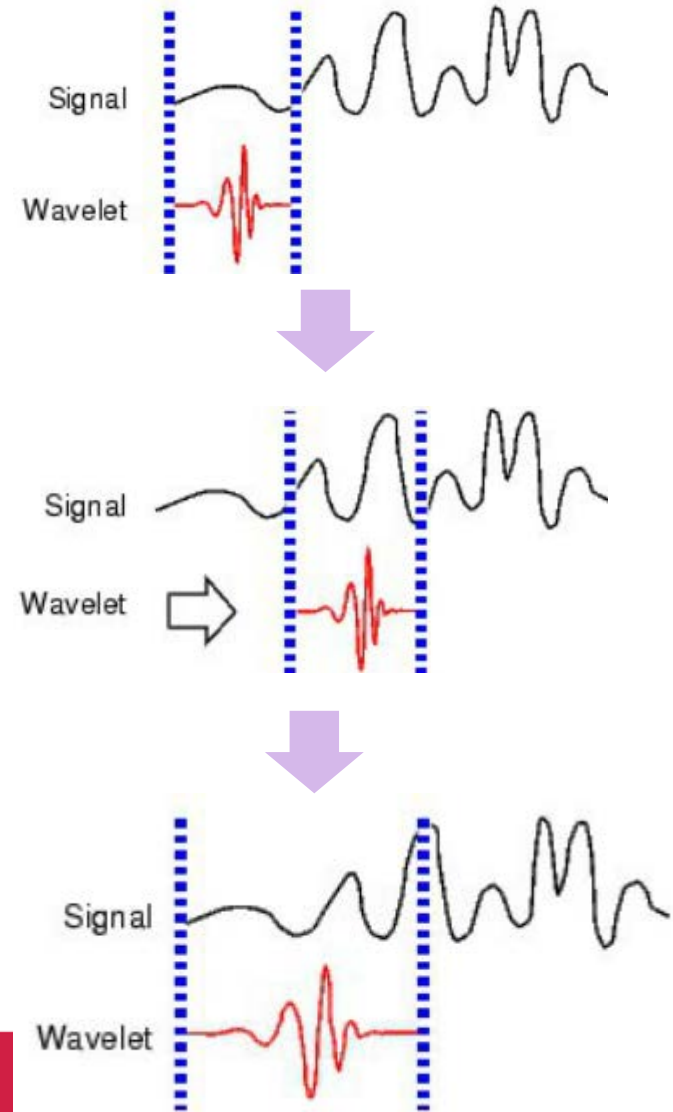
$$\int_{\mathbb{R}} \frac{|\hat{\psi}(\omega)|^2}{|\omega|} d\omega < \infty$$

admissible condition
(Daubechies, 1992)

$$\psi_{a,b}(x) = \frac{1}{\sqrt{a}} \psi\left(\frac{t-b}{a}\right)$$

Wavelet basis
a time interval a
translated over a time b

$$W_x(a, b) = \int_{-\infty}^{\infty} x(t) \cdot \psi_{a,b}^*(t) dt = \frac{1}{\sqrt{a}} \int_{-\infty}^{\infty} x(t) \cdot \psi^*\left(\frac{t-b}{a}\right) dt$$



Wavelet coefficient

Methodology: Wavelet Analysis

• Wavelet Decomposition

$$W_x(a, b) = \int_{-\infty}^{\infty} x(t) \cdot \psi_{a,b}^*(t) dt = \frac{1}{\sqrt{a}} \int_{-\infty}^{\infty} x(t) \cdot \psi^*\left(\frac{t-b}{a}\right) dt$$

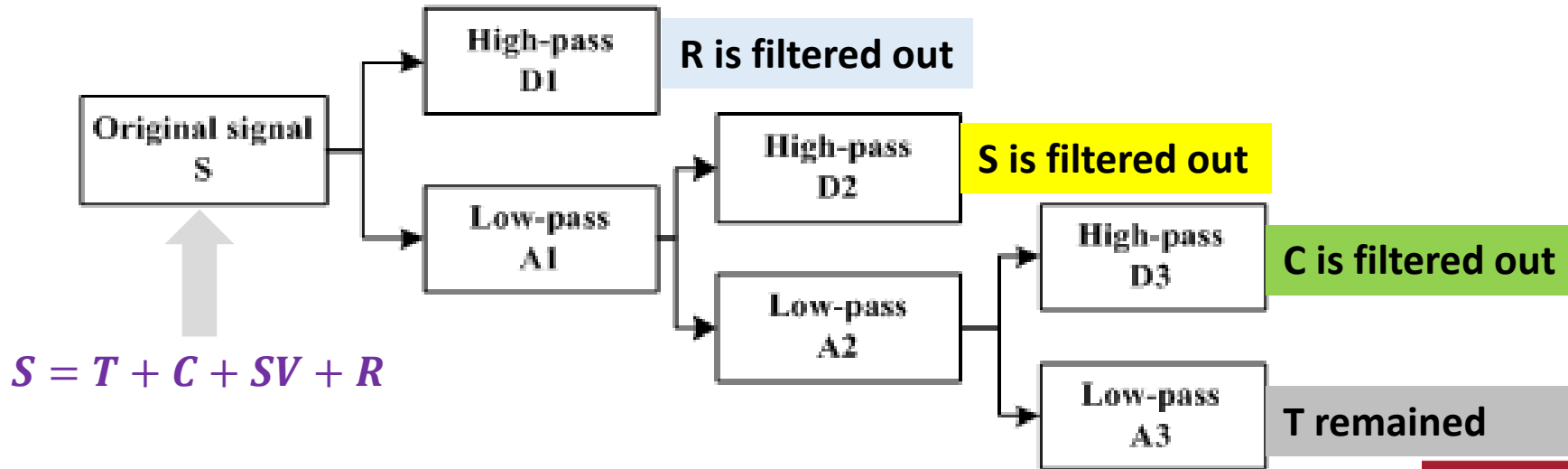
discretize

$$a = 2^{-j}$$

$$b = k2^{-j}$$

filters

low pass filter
 $c^{j+1} = Hc^j$
 High pass filter
 $d^{j+1} = Gc^j$



Research Questions

■ Trend and cycles patterns

- Public vs private CRE vs RRE

■ Market dependence

- Degree of co-movement across markets, in the ST and LT
- Lead-Lag relationships
- How do these interactions evolve over time?

■ Contagion channel

- Fundamentals-based vs excessive or “pure” contagion

Highlights of Findings

■ Market dependence – private vs public

- **public and private** CRE markets exhibit an increasing trend of co-movement from a LT perspective,
- Short term co-movement between **RRE and CRE** markets is weak. In the long run, co-movement is stronger.

Exception: Short term co-movement was strong during the early 1990s recession, early 2000s recession, and around 2008 to 2009 (financial crisis).

Price Dynamics in CRE vs RRE Markets

- Since 2000: RRE market has an average cycle of 5.25 years, public CRE market has an average cycle of 6.50 years, private CRE has an average cycle of 7.75 years.



CRE vs RRE Markets: Lead-Lag Relationship

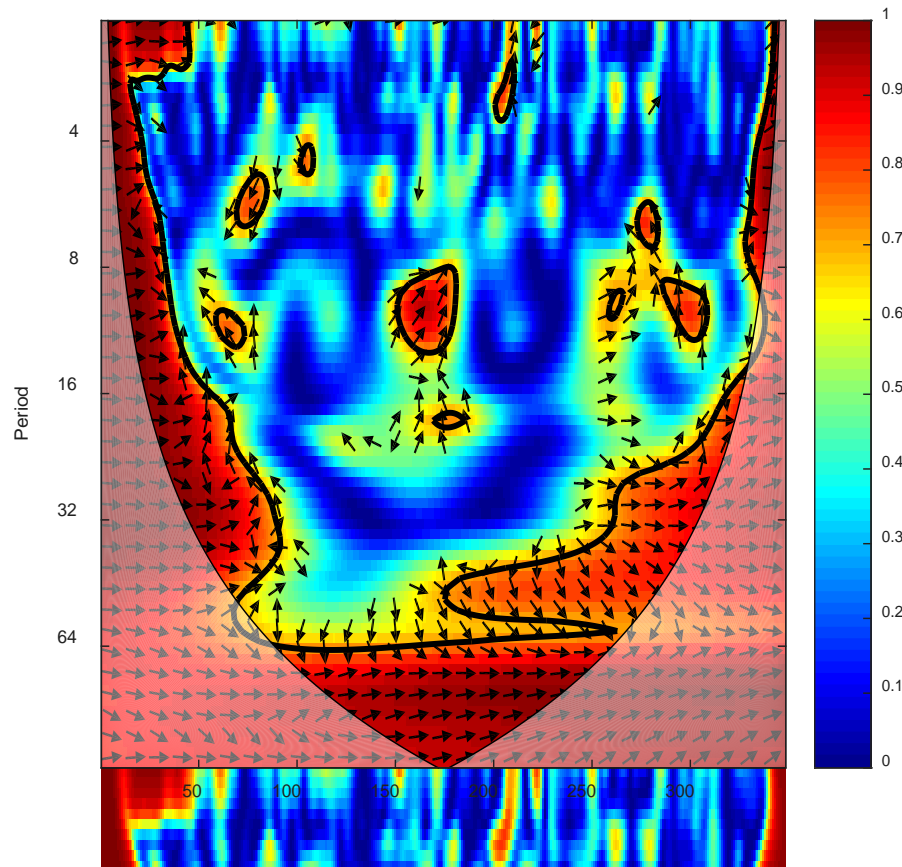
- **Common wisdom:** RRE is a leading indicator while CRE is a lagging indicator.

Our findings:

- From long term perspective
 - Before early 1990s recession: private CRE leads RRE, which then leads public CRE.
 - After 1995: public CRE leads RRE, which then leads private CRE.
- From cyclical perspective
 - Before early 1990s recession: private CRE leads RRE, which then leads public CRE.
 - 1995-2008: RRE leads public CRE, which then leads private CRE.
 - Since 2008: a weak lead-lag relationship where public CRE leads private CRE, which then leads RRE.



Coherency in residential and commercial index



Note:

The color code on the right of each graph, ranges from dark corresponding to low coherency (close to zero) to light corresponding to high coherency (close to one).

The thick black lines of frontier designate the 5% significance level for wavelet coherencies. The phase arrows points right, it denotes the price in city A and city B is in-phase; while if phase arrows point left, the price in city A and city B is anti-phase.

Another Concern for policy makers: Increased Capital Flows

- Increased capital flows increase price diffusion in RE markets across borders (in addition to other effects of capital flows)
 - Price bubble in one market is now more likely to be followed by a price bubble in other market(s)
- Securitization of mortgage debt (CMBS and RMBS) contributes to this as well
- As CRE is more integrated with capital markets, new potential sources of market volatility emerges even when RE market conditions are good. E.g. Russian bond default (Long Term Capital Management) in 1998 increased CMBS spreads by almost 100 bp and dried up liquidity overnight.
- As an example, in top 5-6 cities in the US, foreign capital share in core office market went from 10 to 25% in the past few years.



Diffusion across CREs globally (Zhu and Lizieri, 2018)

- Document a rise of global private real estate investment since the turn of the century
 - In 2013, 21% of US private CRE investments were foreign investments
 - In London, foreign ownership rose from around 4% in the mid-1980s to 45% in 2006 and over 65% by 2014
 - In 2015, 50% of the properties held by TIAA Real Estate were located outside the U.S
- On the other hand, dramatic concentration in a small number of major cities: 67% of the value of major global office transactions in 2007-2014 occurred in just 20 cities
 - As a result, the real estate in different cities and countries can be owned by the same investor(s),
 - And shocks between markets will be transmitted more easily; investors in the market where the crisis initiates may (have to) liquidate their investments in other markets, possibly causing crisis there via contagion effects.
- They report
 - A significant co-movement in office market performance between cities across the globe
 - An office price shock in London will generate significant impact on the remaining 57 cities one quarter after that shock



Diffusion of RRE Bubbles

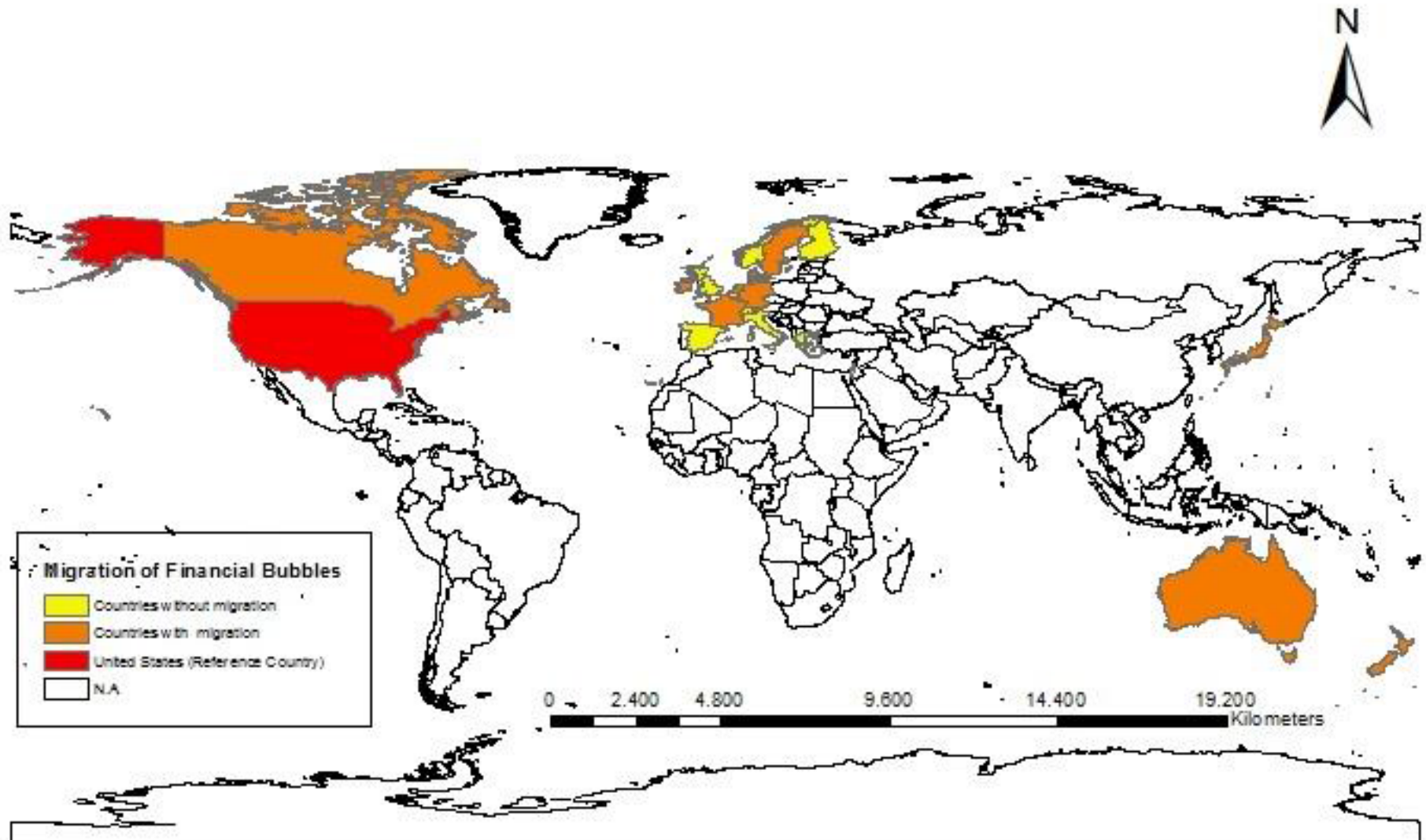
(Gomez-Gonzalez et al, JREFE 2018)

- They consider international migrations of housing bubbles originated in the US or in the UK.
- Data for a set of 20 OECD countries for between 1970 and 2015.
- Able to identify ten episodes of bubble migration.
 - Another evidence of the increasing importance of international financial linkages and their relation with worldwide financial fragility
- Suggest controls for limiting the effects that capital flow cycles may have on housing price bubbles.



Capital Markets seem to play the key role

(Gomez-Gonzalez et al, JREFE 2018)



Conclusion

- CRE is not as critical as RRE, but should not be totally overlooked by policy makers
- Contagion between CRE markets across the globe, and between CRE and RRE is likely to get stronger due to securitization and increasing global capital movements,
 - and should be watched carefully by policy makers.

