The Price of Housing in the United States, 1890-2006

Ronan C. Lyons (Trinity College Dublin)
Allison Shertzer (Federal Reserve Bank of Philadelphia)
Rowena Gray (UC Merced)
David Agorastos (University of Pittsburgh)

July 2024

Disclaimer

This research does not necessarily reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

Motivation

- Despite the centrality of housing to the American economy, reliable series on the sales price of housing is limited prior to 1975, especially at the city level
- Annual sales price series cannot be had at the city level until 1975
- (National) Shiller house price index disagrees with other historical sources like the census (Fishback and Kollman 2014)
- Rental data is limited to the BLS (1914-), AHS (1973-), and census (1930-) for most of the 20th century
- Very little (city-level) market rental data before 2000

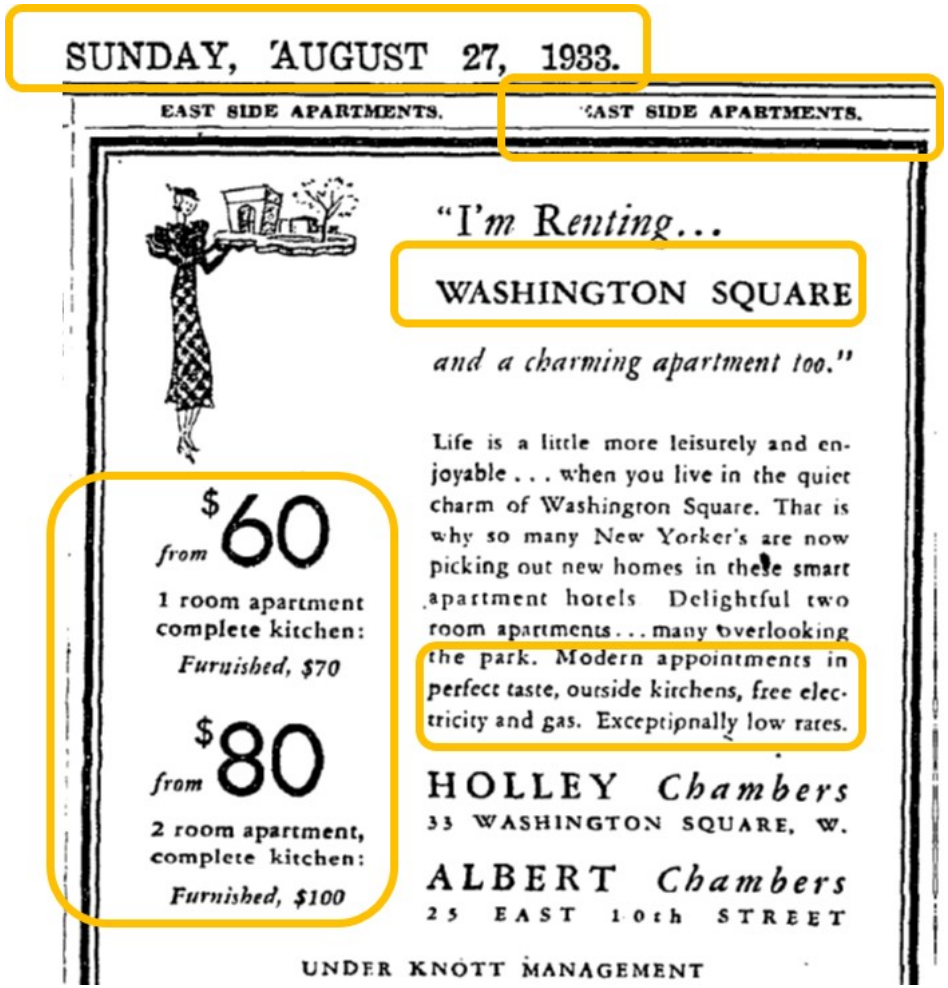
Historical Prices in Housing Project (HHP) Dataset

- We digitized 2.7 million sale and rental listings from historical newspapers to create new series for owned and rented housing
- Series covers 30 cities, chosen to obtain a mix by economic trajectory and region
- Each observation includes the listed price, and measures of location, size (rooms/bedrooms), and type (apartment/house), plus rental frequency for rental listings
- Most comprehensive and consistently collected data on market prices of housing on an annual basis to date for U.S. cities spanning the entire twentieth century

HHP Dataset Cities and Newspapers

City	Newspaper	Start Year	
		Rent	Sales
Atlanta	Constitution	1890	1890
Baltimore	Sun	1890	1908
Boston	Boston Globe	1890	1890
Charleston	Post-Courier	1894	1911
Chicago	Tribune	1890	1890
Cincinnati	Enquirer	1890	1890
Cleveland	Plain Dealer	1894	1890
Dallas	Morning News	1890	1890
Detroit	Free Press	1890	1890
Houston	Post / Chronicle	1896	1901
Las Vegas	Review Journal	1948	1943
Los Angeles	Times	1890	1890
Louisville	Courier-Journal	1890	1890
Memphis	Commercial Appeal	1891	1890
Miami	Herald / News	1915	1910
Minneapolis	Star Tribune	1890	1890
Nashville	Tennessean	1890	1890
New Orleans	Times-Picayune	1890	1893
New York	Times	1890	1890
Philadelphia	Inquirer	1891	1891
Phoenix	Arizona Republican	1910	1910
Pittsburgh	Post Gazette	1892	1890
Portland	Oregonian	1898	1898
Salt Lake City	Tribune	1891	1890
San Diego	Union	1907	1890
San Francisco	Chronicle / Examiner	1890	1890
Seattle	(Daily) Times	1910	1910
St. Louis	Post Dispatch	1890	1890
Tampa	Tribune / Bay Times	1915	1905
Washington D.C.	Post	1890	1890

HHP Sampling Approach



SUNDAY, AUGUST 27, 1933.

EAST SIDE APARTMENTS.

EAST SIDE APARTMENTS.

"I'm Renting...

WASHINGTON SQUARE

and a charming apartment too."

Life is a little more leisurely and enjoyable . . . when you live in the quiet charm of Washington Square. That is why so many New Yorker's are now picking out new homes in these smart apartment hotels Delightful two room apartments . . . many overlooking the park. Modern appointments in perfect taste, outside kitchens, free electricity and gas. Exceptipnally low rates.

$60 *from*

1 room apartment complete kitchen:

Furnished, $70

$80 *from*

2 room apartment, complete kitchen:

Furnished, $100

HOLLEY *Chambers*
33 WASHINGTON SQUARE, W.

ALBERT *Chambers*
25 EAST 10th STREET

UNDER KNOTT MANAGEMENT

Hedonic Pricing Model

- Regression equation, running one city at a time and aggregating by population:

$$\ln(\text{Price})_{i,t} = \alpha + \underbrace{\sum_{\min(Y),y\neq BY}^{\max(Y)} \beta_y \quad \mathbb{1}_{(y=t)}}_{\text{Coefficients of Interest}} + \underbrace{\mathbf{X\Gamma}}_{\text{Controls}} + \varepsilon_{i,t}$$

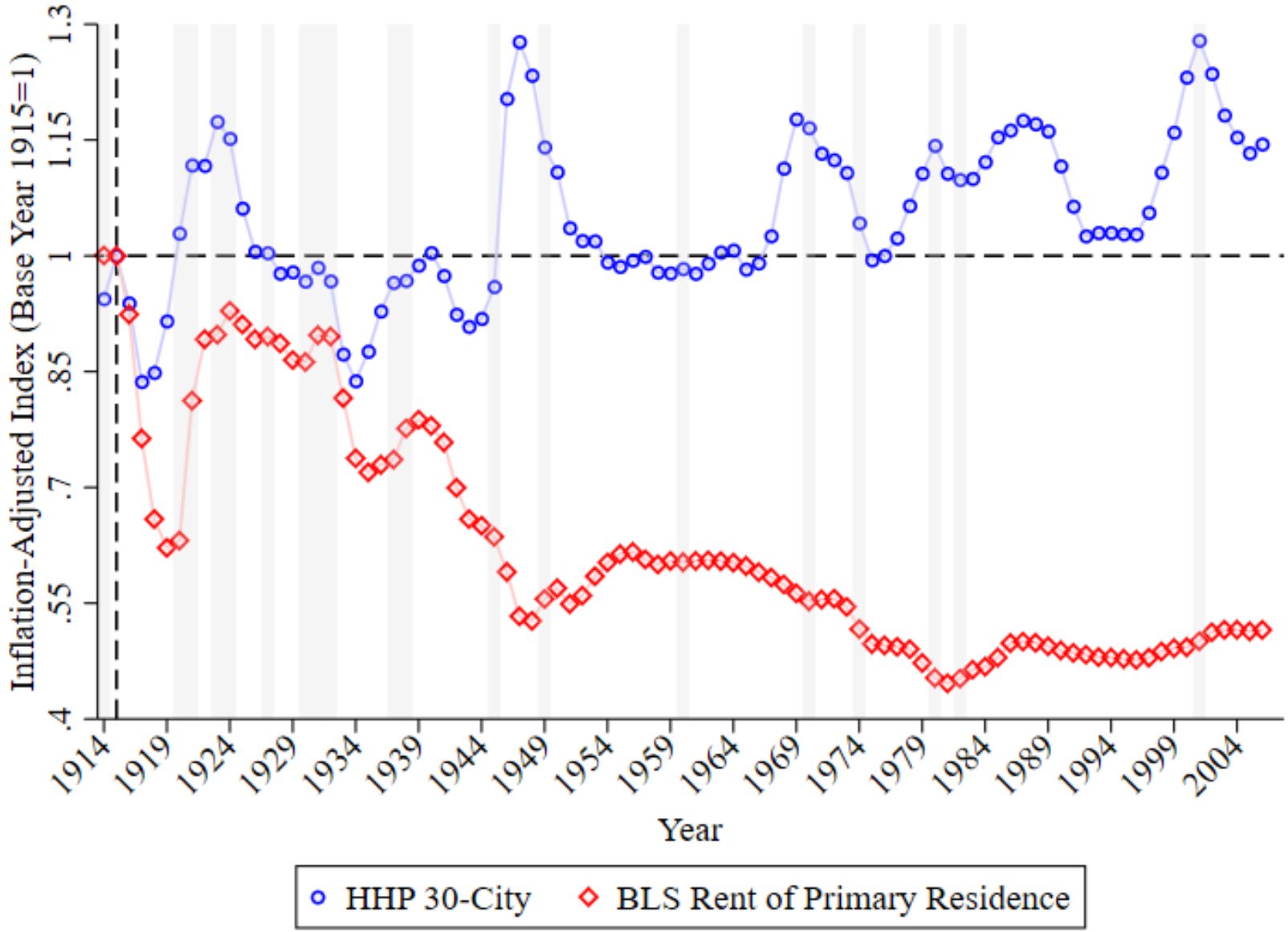
- Controls: location, size, payment frequency, and dwelling type
- Can show 2, 3, and 5 year rolling window
- Transformation and rebasing of estimates:

$$\iota_t = \iota_{t-1} \exp(\beta_t) : t \in \{1891, 2006\}$$

RPI

- Current series from BLS suggest that real rents have fallen in the postwar era
- Many adjustments have been proposed to address downward bias in shelter components of CPI from depreciation, new technologies, and tenant non-response (Gordon and Van Goethem 2003 and Crone et al. 2010), particularly before 1996
- Our series matches adjusted series - real market rents have a remarkably flat trend over the whole twentieth century, fluctuating with a 20% band around 1890 levels
- Also tracks Rees and Jacobs (6-city index based on newspaper listings) well

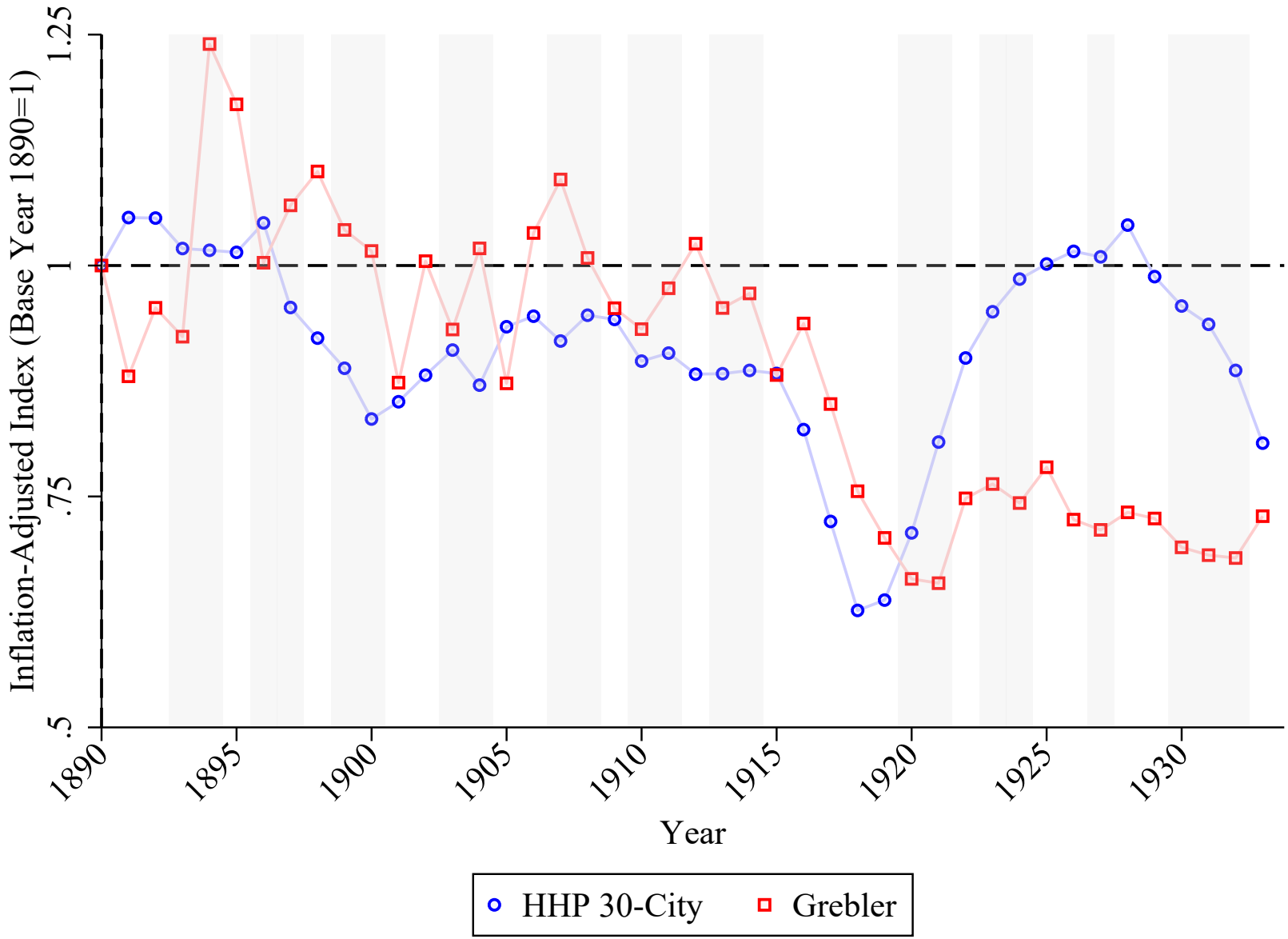
HHP vs. BLS


Inflation-Adjusted Index (Base Year 1915=1)
.4
.55
.7
.85
1
1.15
1.3
1914
1919
1924
1929
1934
1939
1944
1949
1954
1959
1964
1969
1974
1979
1984
1989
1994
1999
2004
Year
HHP 30-City
BLS Rent of Primary Residence

HPI Results by Period

- Let's begin with the pioneering work of Shiller, who constructed the first national, long-run housing price series for the United States.
- Probably impossible to start before 1890 or so except for New York, so we can't do multiple centuries as in Korevaar et al. (2022) for European cities.
- "Irrational Exuberance" finding is that real housing prices have only increased twice since 1890, first after WWII and second since 1997 or so.
- Also that housing prices didn't really boom and bust between the world wars.

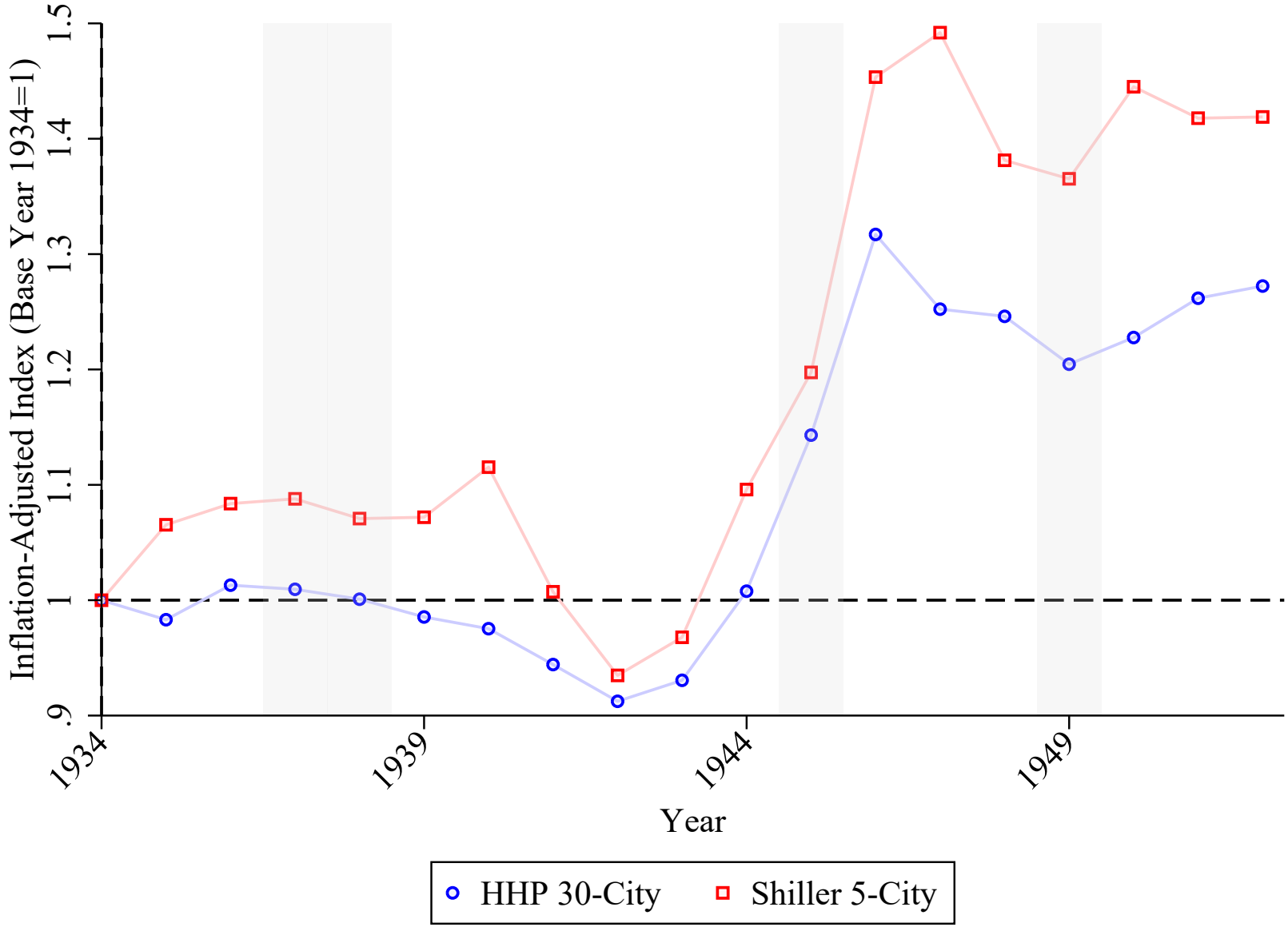
HHP vs. Shiller: 1890-1933



HPI Benchmarking: 1890-1933

- (Lack of) interwar housing cycle in Grebler et al. (1956) survey noted by others, including Fishback and Kollman (2014)
- We find that real prices are lower in 1940 than in 1930, consistent with the census, New Deal data, and Nicholas and Scherbina's (2013) study of NYC housing transactions
- Prices rose by 47% between 1920 and 1928 and then fell by 27% by 1935, prices did not recover to 1928 peak until 1946

HHP vs. Shiller: 1934-1952

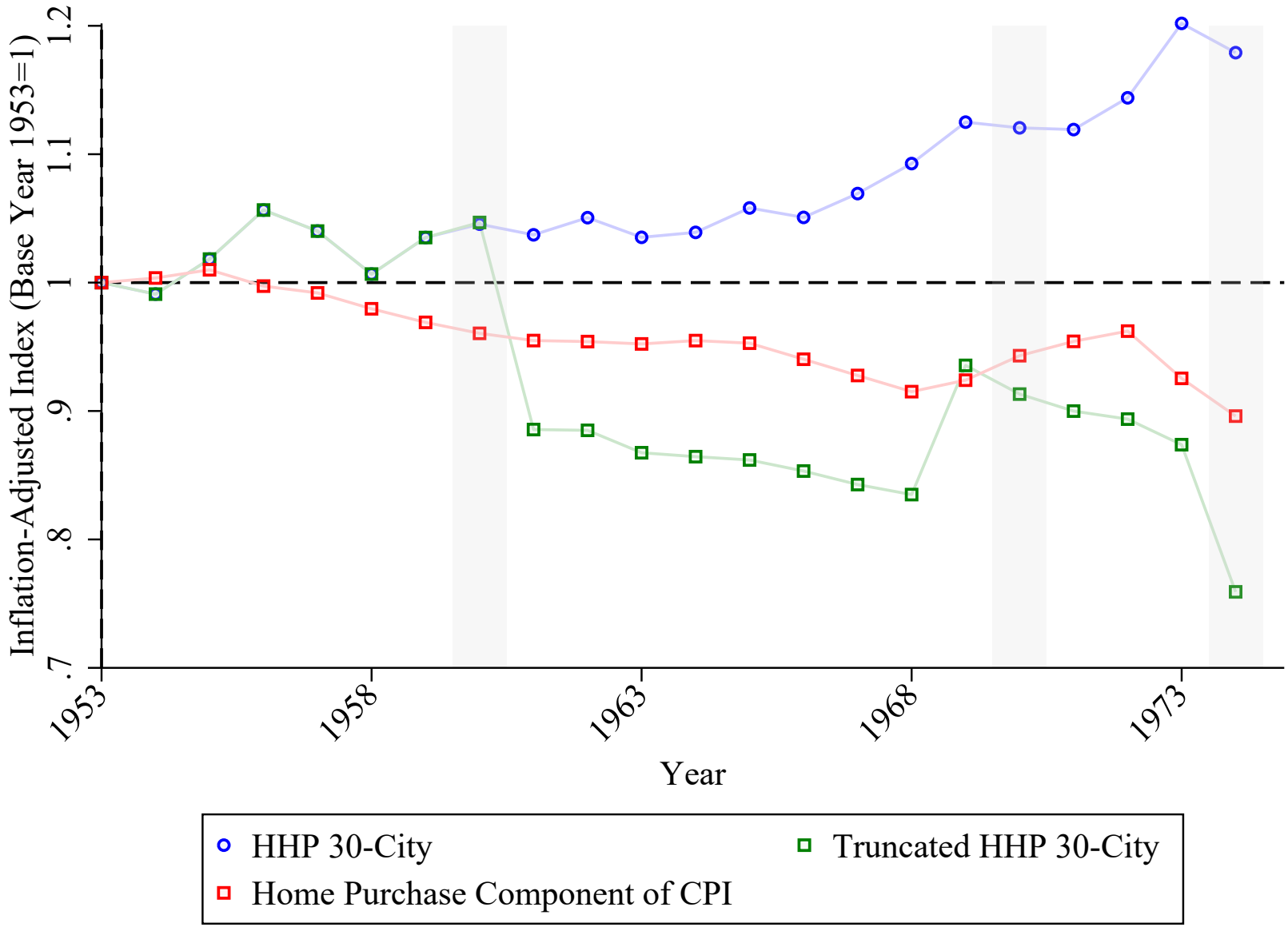


HPI Benchmarking: 1934-1952

- Difference arises because we are making many adjustments (size, location, rolling windows) and different cities (30 vs. 5)
- Hedonic adjustments reduce price inflation

- We find 27% vs. Shiller's 42%

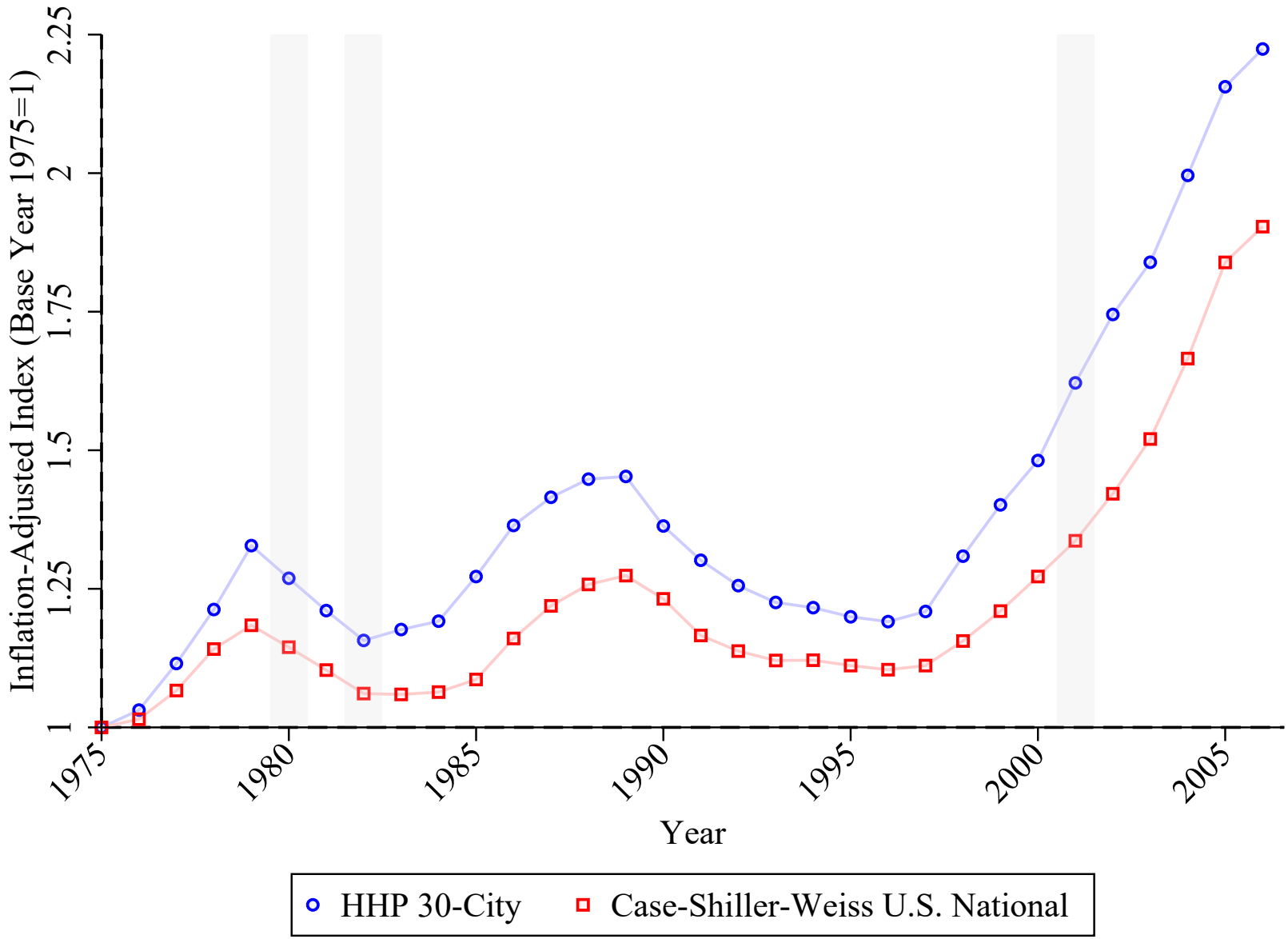
HHP (Truncated like FHA) vs. Shiller: 1953-1974



HPI Benchmarking: 1953-1974

- We find evidence in favor of Greenlees' critique: real housing prices increased by 21% between 1953-1974 rather than falling
- Statutory limit was $30,000 in 1973, $45,000 in 1974, and $60,000 in 1977 (Vandell, 1995): approximately half our 1970s dataset would be excluded
- Our evidence consistent with notion that many houses were excluded in major cities, limiting the appearance of housing price growth
- Real housing price growth thus starts much earlier, consistent with the census (Davis and Heathcote, 2007)

HHP vs. Shiller: 1975-2006



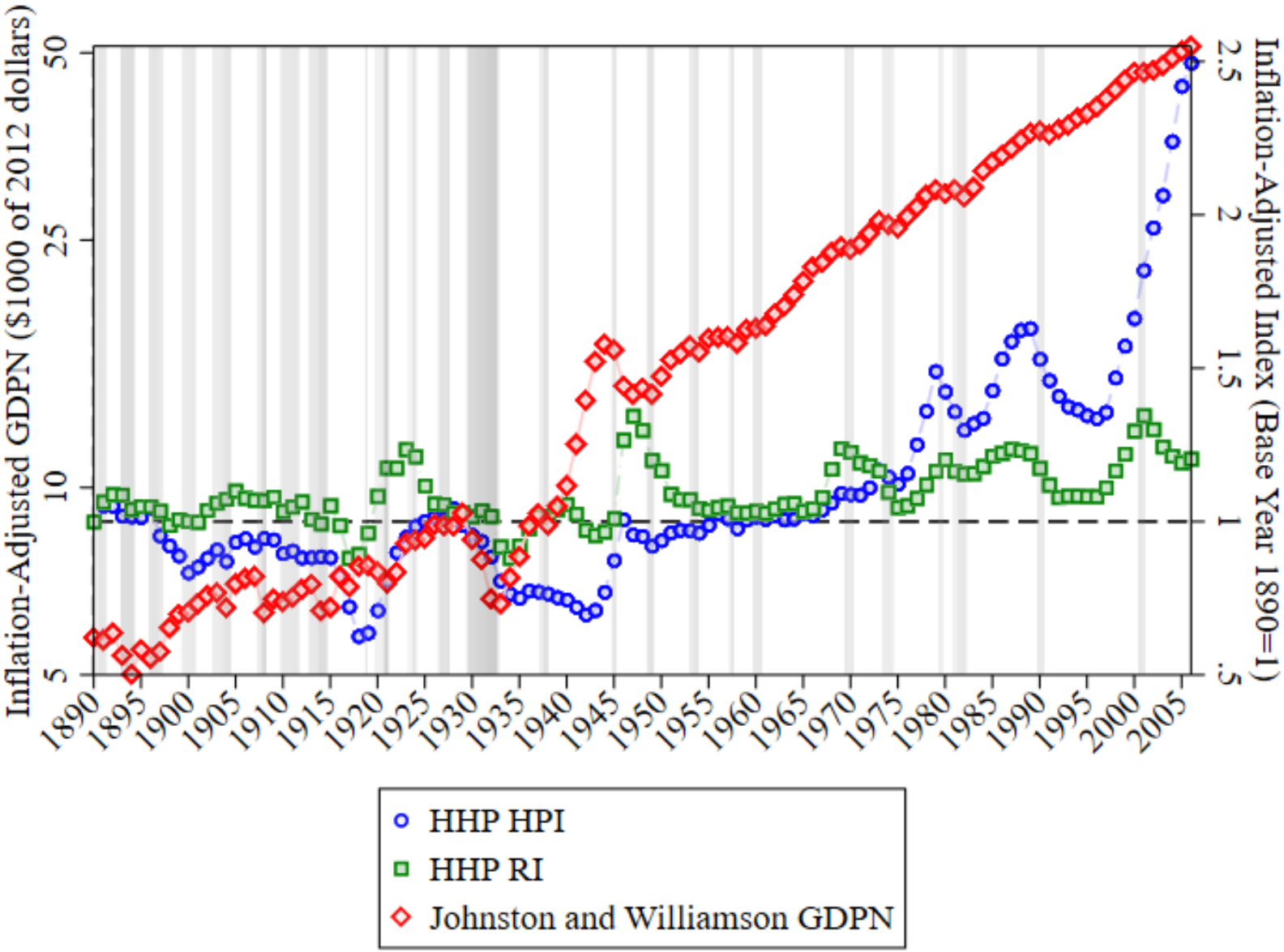
HPI Benchmarking: 1975-2006

- We find real price growth of 117% over the 1975-2006 period compared to the 90% found in the CSW series
- Factor of 1.95 for Shiller versus 2.5 for HiPHoP for the entire 1954-2006 period, driven by differences before 1980
- CSW use OFEO appraisals before 1992, bias on this not clear
- SFH versus entire owned housing market
- Different city coverage

Implications for U.S. Housing Markets

1. Housing prices and the business cycle
2. The total return to owning housing
3. Nominal rental growth and the CPI
4. Why have housing prices grown by more in some cities relative to others?

Housing Cycle and the Business Cycle



Housing Cycle and the Business Cycle

- Housing prices and GDP are strongly linked, moving together in 72 out of 116 years for sales prices and 65 for rents
- Only after both World War I and II do we see economic contractions accompanied by surging housing prices
- Two cycles – Great Depression and late 1980s/early 1990s – in which rents fall, then prices, then GDP
- A similar pattern at the end of our dataset: rents fall from 2002, while prices and GDP will fall after 2006
- After 1970s, rents keep their overall flat trend while housing takes off: suggests joint role of financialization and housing supply

Return on Housing

Total Nominal Annual Return:

$$\underbrace{TY_{c,t}}_{\text{Total Return}} = \underbrace{CGY_{c,t}}_{\text{Capital Gains}} + \underbrace{RY_{c,t}}_{\text{Rental Return}}$$

$$= \frac{\text{HPI}_{c,t} - \text{HPI}_{c,t-1}}{\text{HPI}_{c,t-1}} + \frac{\text{RI}_{c,t}}{\text{HPI}_{c,t-1}}$$

Real Annual Yields:

$$x_{c,t} = \frac{1 + X_{c,t}}{1 + \pi_t} - 1$$

such that $X \in \{TY, CGY, RY\}$ and $\pi_t = \frac{\text{CPI}_t - \text{CPI}_{t-1}}{\text{CPI}_{t-1}}$.
Average Real Annual Yields:

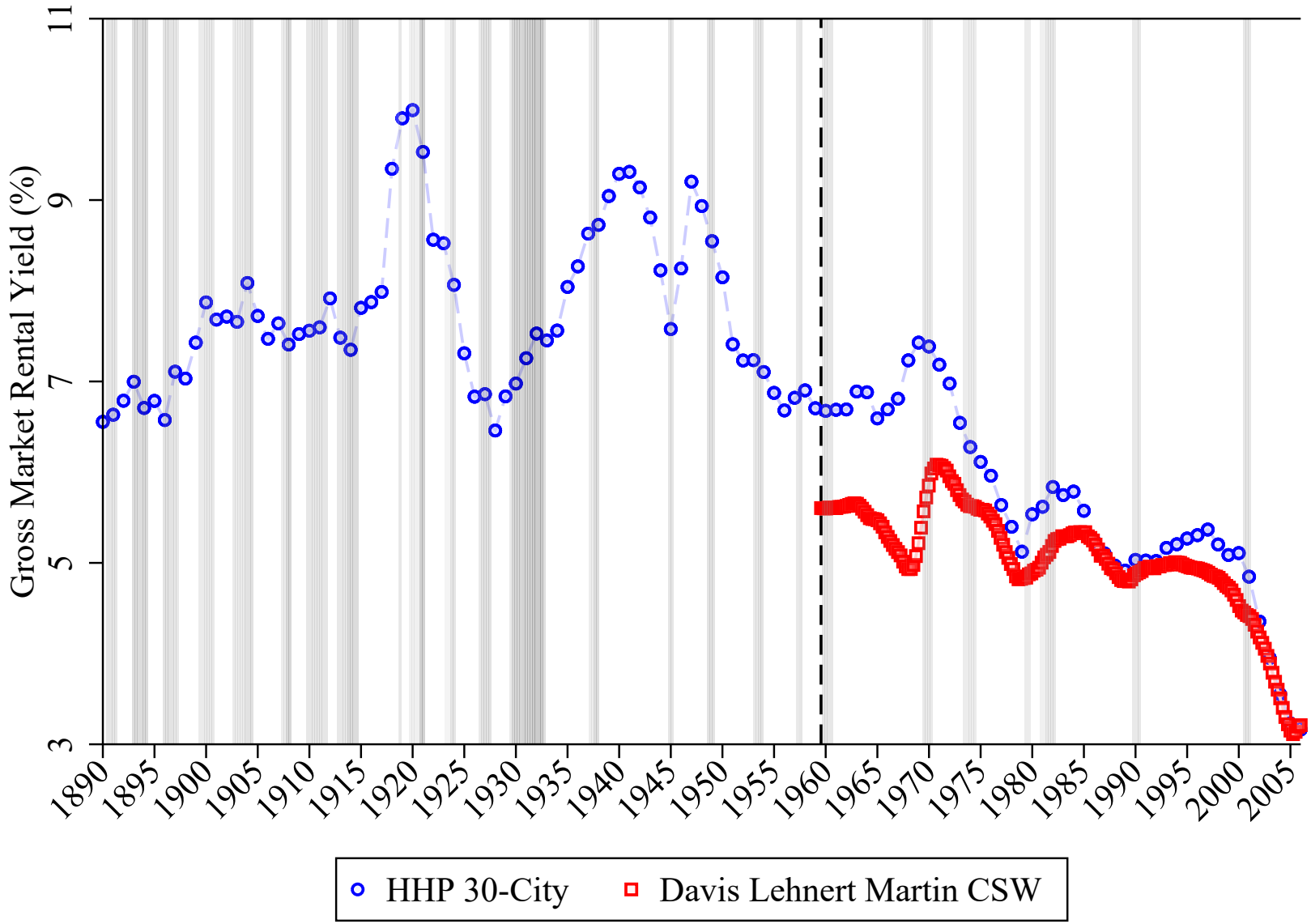
$$\bar{x}_c = \frac{1}{|T|} \sum_{t=1891}^{2006} x_{c,t}$$

such that $t \in T = \{1891, 2006\}$.
National-level yields use the pop-weighted national indices.

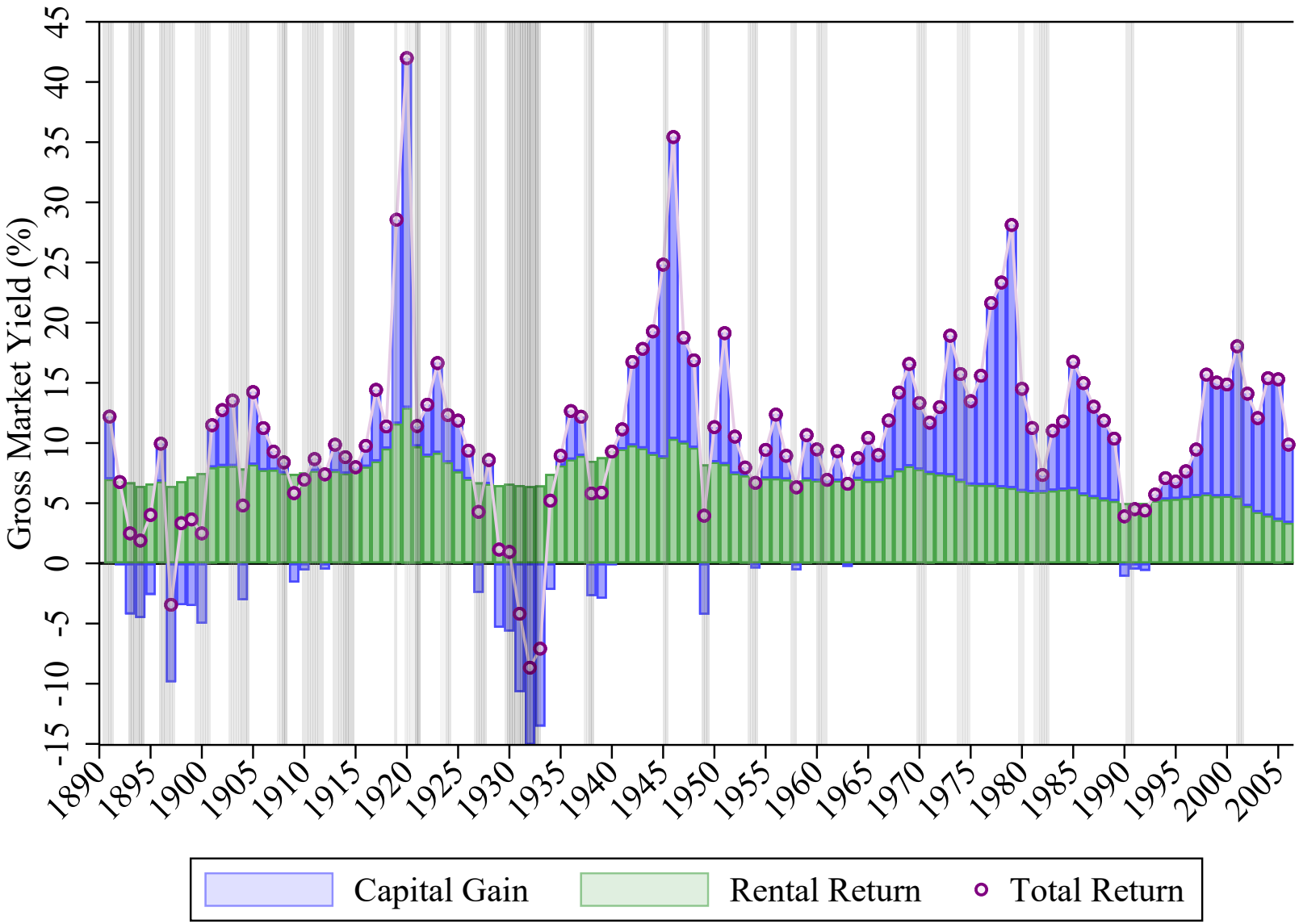
Rental Yields

- Rental yield very volatile but around 7% from 1890-1970, then falls
- Everyone is using Davis et al. for 1960 onward, how do we compare?
- Overall we find greater fall in yields relative to them, driven by differences in rents/sales series from 1960-1975
- Cycles generally line up

HHP vs Davis Rental Yield



Return on Housing



Returns to Owning Housing

- Can produce any city-level series, in paper we show nominal rental returns, capital gains, and total returns for four time periods
- Consistent with Shiller, capital gains even before maintenance about zero before 1945 for all cities
- Rental returns far more important historically, post-1980 period a bit of an anomaly
- See substantially different trajectories across cities though, for fun my last four cities

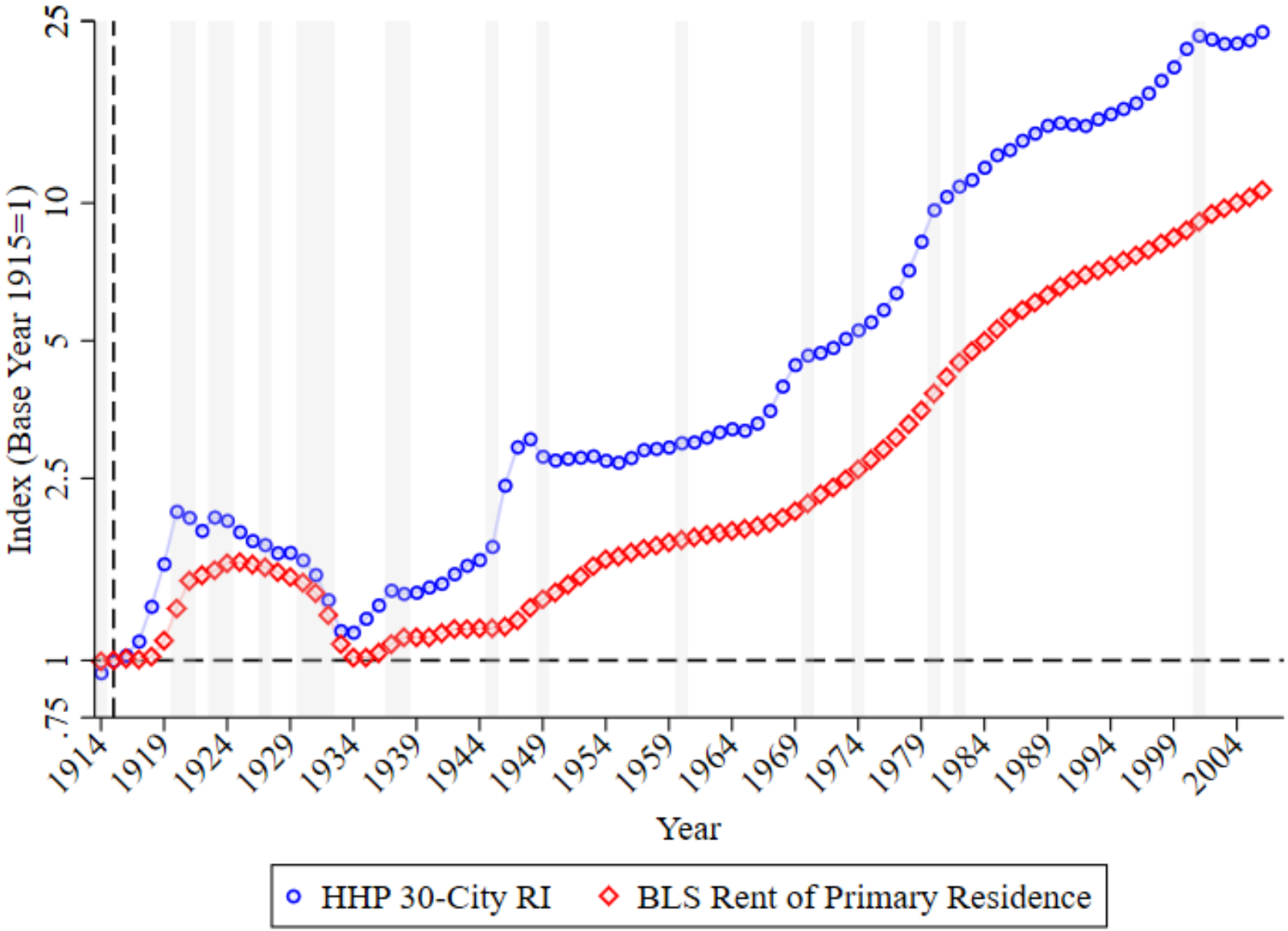
Returns in Places Allison's Lived Part I

	1890-1929			1930-1945		
	Cap. Gain	Rental Ret.	Total Ret.	Cap. Gain	Rental Ret.	Total Ret.
City						
Los Angeles	2.52	4.88	7.39	3.78	6.18	9.96
Philadelphia	1.94	9.19	11.13*	-1.57	10.88	9.31
Phoenix	2.00	15.11	17.11*	3.85	18.38	22.23
Pittsburgh	1.69	7.42	9.02*	-1.02	8.02	6.99

Returns in Places Allison's Lived Part II

	1946-1980			1981-2006		
	Cap. Gain	Rental Ret.	Total Ret.	Cap. Gain	Rental Ret.	Total Ret.
City						
Los Angeles	6.60	5.81	12.41	4.10	4.54	8.64
Philadelphia	5.91	9.17	15.08	5.64	7.47	13.11
Phoenix	6.21	13.35	19.56	6.10	8.99	15.09
Pittsburgh	5.56	8.33	13.89	3.46	6.38	9.84

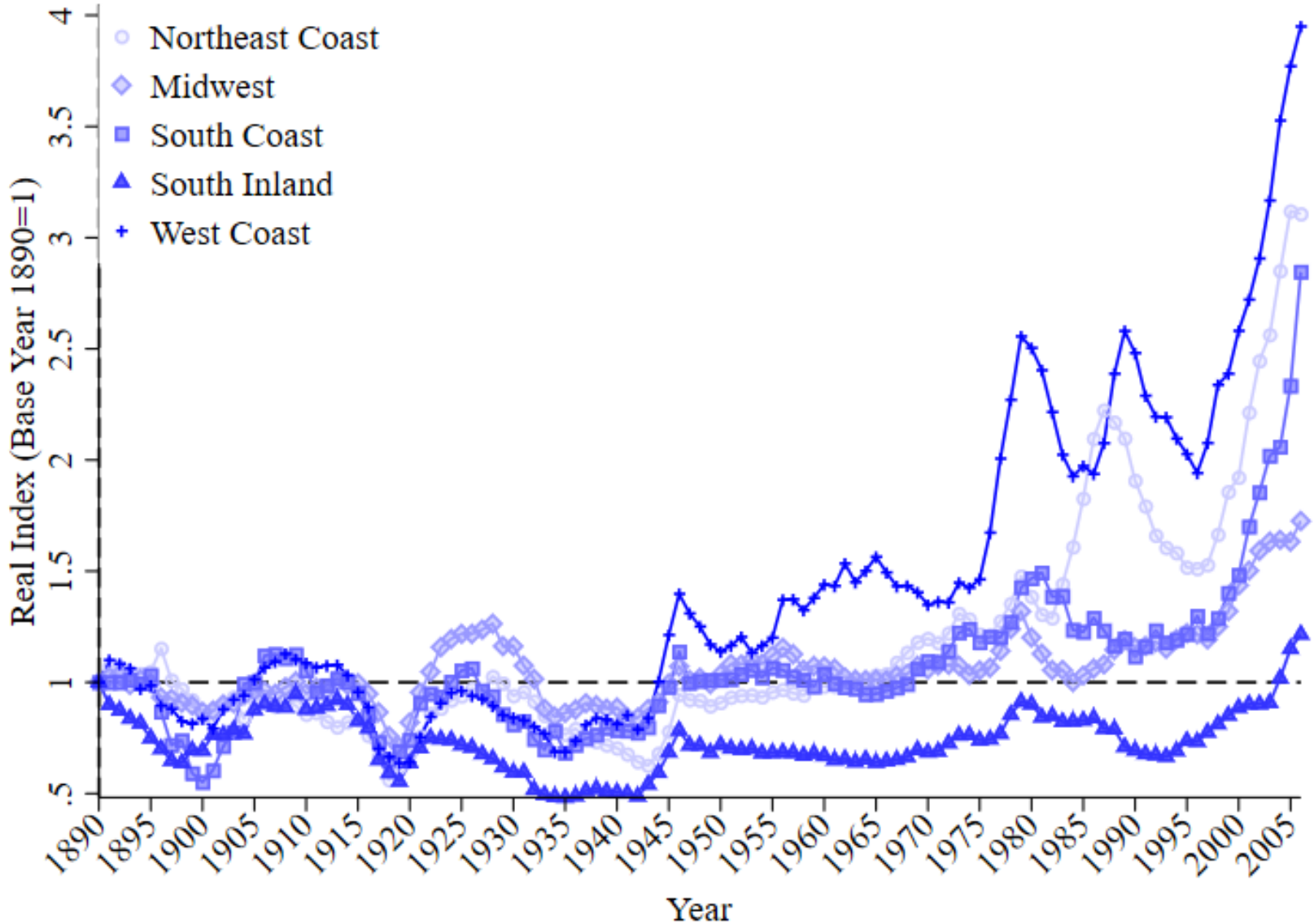
Nominal Rent Growth and the CPI



Nominal Rent Growth and the CPI, 1914-2006

- Our index suggests nominal rents grew 23.5x (3.5% p/yr) - in line with other prices – while the BLS RoPR grew 10.7x (2.6% p/yr)
- Key question: did rents rise by substantially less than other prices?
- A CPI with two components (shelter and not shelter), would grow by 3.3% rather than 3.1% per year, 1914-2006
- Difference driven by two World Wars and 1965-1985 when there were methodological issues with RoPR
- Standard of living rose by less than we thought?

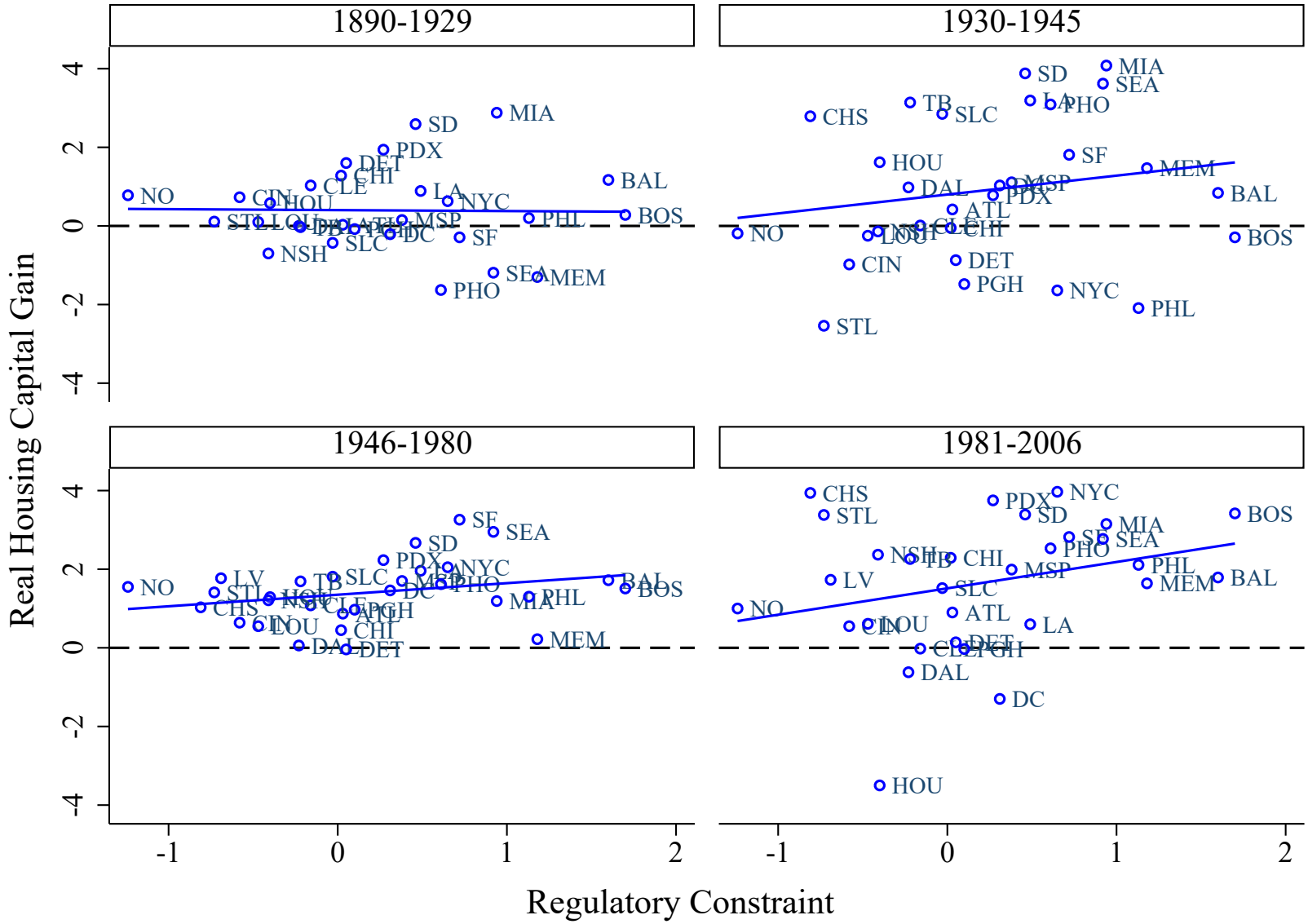
Regional Housing Price Appreciation



Why did housing prices increase more in some cities relative to others?

- We ask how land availability and zoning stringency as measured in 2000 affected housing price growth at the city level using measures from Saiz (2010).
- Zoning was introduced in the 1920s. WRLURI survey done around 2006. Fundamental endogeneity problem, but still interesting.
- Land availability price gradient steepest in 1930-1945 period but again steep after 1980.
- Zoning price gradient is always positive but becomes steeper by 1980-2006.

Zoning Stringency in 2006



Conclusion

- HiPHoP has rent and price indices for 30 cities for 1890-2006
- Confirms many limitations of existing series, plus provides consistently-collected, city-level series for the first time for both owned and rented housing
- Provides new insight into the history of U.S. housing markets and many opportunities for future research