

# Housing Inflation Measurement

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Federal Economic Statistics Advisory Committee  
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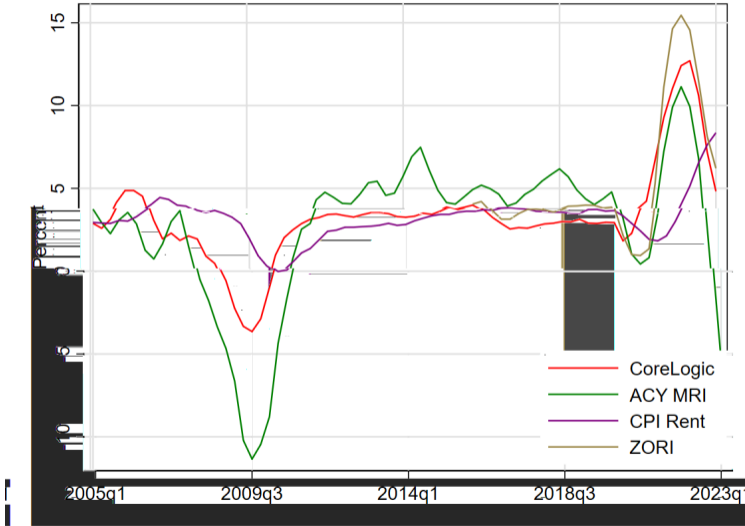


## Disclaimer

This presentation draws heavily on “Disentangling Rent Index Differences: Data, Methods, and Scope”, written with Lara Loewenstein (Federal Reserve Bank of Cleveland), Hugh Montag (BLS), and Randal Verbrugge (Federal Reserve Bank of Cleveland). That working paper and this presentation do not necessarily reflect the opinions of the Federal Reserve Bank of Cleveland or the Federal Reserve System.



# Rent Indices Differ



# Why do these indices differ so much?

## Hypotheses:

### 1. Different data sources

- ▶ Perhaps representative of different parts of the rental market
- ▶ Perhaps some are not representative of anything
- ▶ Recent change in weights for the CPI Owners' Equivalent Rent because of different rent movements by structure type

### 2. Different methods and scope

- ▶ Balanced panel, repeat rents on unbalanced panel, or rescaling of other measures
- ▶ Timing: leasing date, listing date, move-in date, reporting date
- ▶ Objective: rent for new leases or rent for all leases (including renewals)

# Investigating the Hypotheses

- ▶ Construct repeat rent indices with BLS Housing Survey data
  - ▶ all leases
  - ▶ only new tenants
- ▶ Compare indices that use same methods and scope, different data
- ▶ Compare indices that use same data, different methods
- ▶ Compare BLS repeat rent indices to outside indices
  - ▶ timing
  - ▶ scaling



# BLS Data

- ▶ ~40,000 rental units surveyed every 6 months
- ▶ Units divided into 6-month panels (January-July, February-August, ...)
- ▶ Rental units selected from dozens of Census block groups selected from specific metro areas
- ▶ Mostly continuing leases, 18% new leases
- ▶ Unit characteristics
  - ▶ Tenant move-in date
  - ▶ Structure characteristics, field notes
  - ▶ Other variables
- ▶ Several rent measures: contract, “pure”, “economic”



## Repeat Rent Indices with BLS Data

- ▶ Regress rent change between periods  $s < t$  for the same unit on positive indicator for month  $t$  and a negative indicator for month  $s$

$$\ln \text{rent}_{it} - \ln \text{rent}_{is} = \gamma_1 D_{i1} + \gamma_2 D_{i2} + \dots + \gamma_T D_{iT} + u_{ist}$$



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- ▶ Construct two repeat rent indices
  - ▶ With all observations (ATRR)
  - ▶ Only observations with a new tenant (NTRR)





# Rent CPI

- ▶ Price changes calculated from  $\sqrt[6]{rent_t/rent_{t-6}}$
- ▶ Age, vacancy adjustments applied
- ▶ Adjustments for remodels and structural changes



# Timing Adjustment

- ▶ Rent change for a unit may have first occurred at any point between housing survey observations
- ▶ To construct our repeat rent indices, backdate the last rent quote to move-in date or latest n\*6-month
- ▶ BLS is researching how to incorporate rent changes into the CPI more promptly
  - ▶ Survey started collecting leasing duration data
  - ▶ Corporate and admin data sources may allow more frequent observations of some markets



## Other Repeat Rent Adjustments

- ▶ Vacancy: drop all observations for a housing unit after last new tenant moves in
- ▶ Remodels: drop where unit characteristics change, “remodel” keyword
- ▶ Heteroskedasticity: perform three-stage procedure to estimate GLS equation
- ▶ Outliers: the top and bottom 1% annualized rent changes are dropped each period
- ▶ Confidence intervals: bootstrap housing units within each PSU, aggregate
- ▶ Frequency: quarterly, so NTRR confidence intervals are narrower



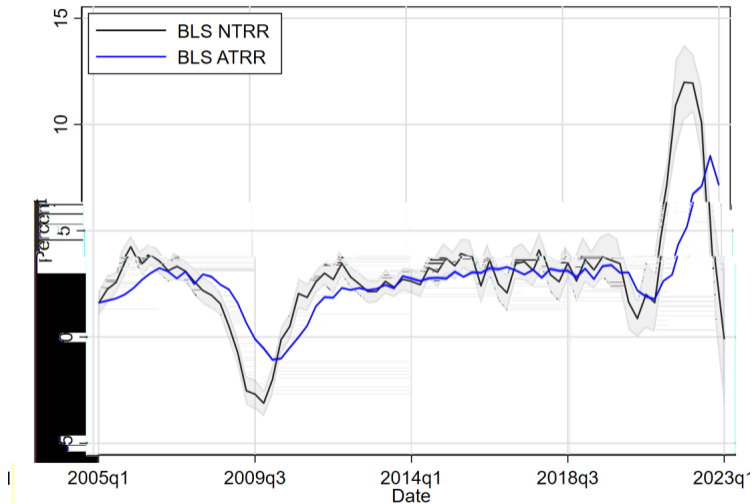
## Other Rent Indices

- ▶ CoreLogic compiles data from Multiple Listing Services maintained by realtors
  - ▶ Coverage varies by time and geography
  - ▶ Mostly single detached houses, which it uses for SFRI calculations
  - ▶ Contract rents
- ▶ Zillow ZORI - repeat rent index from Zillow database, MLS listings
- ▶ ACY Marginal Rent Index (ACY MRI) - scaled projections revenue of apartment buildings sold in RCA data

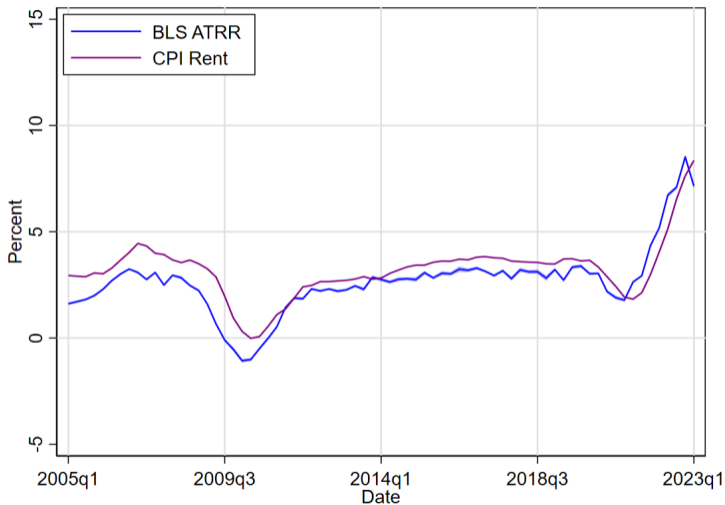
## Same Scope, Different Data



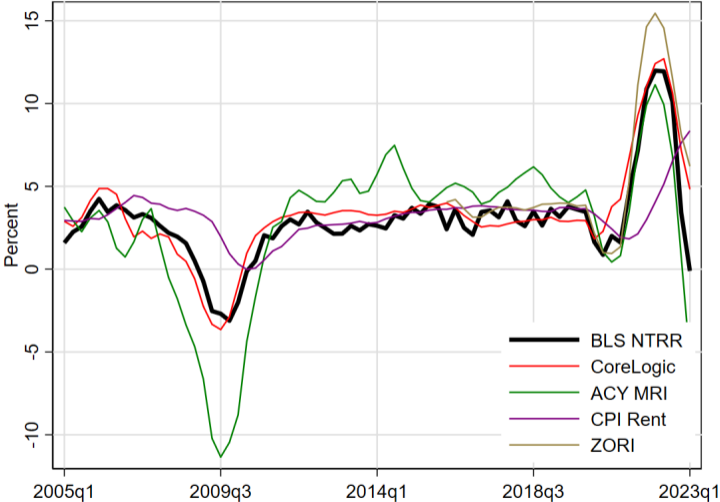
# Same Data and Methods, Different Scope



## Same Data and Scope, Different Methods

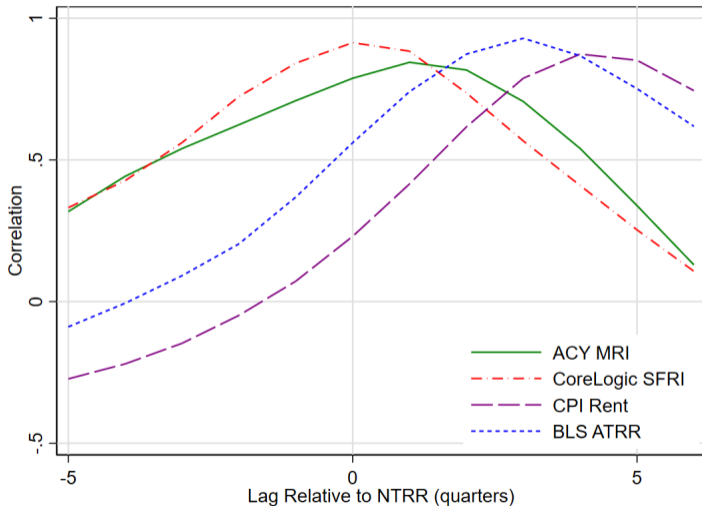


# NTRR Compared to Other Indices





# New Tenants Leads All Leases by 3 quarters



Calculate lead/lag by  $\text{corr}\{NTRR_t, Y_{t+n}\}$  for positive and negative  $n$

## NTRR as a Stand-Alone Index

- ▶ Project meant to explain differences between CPI rent and other rent indices
  - ▶ Methodology decisions for New Tenant and All Tenant Repeat Rent indices made to facilitate decomposition of differences
- ▶ Data user interest in the repeat rent indices for their own sake
  - ▶ BLS interested in maintaining them as research series



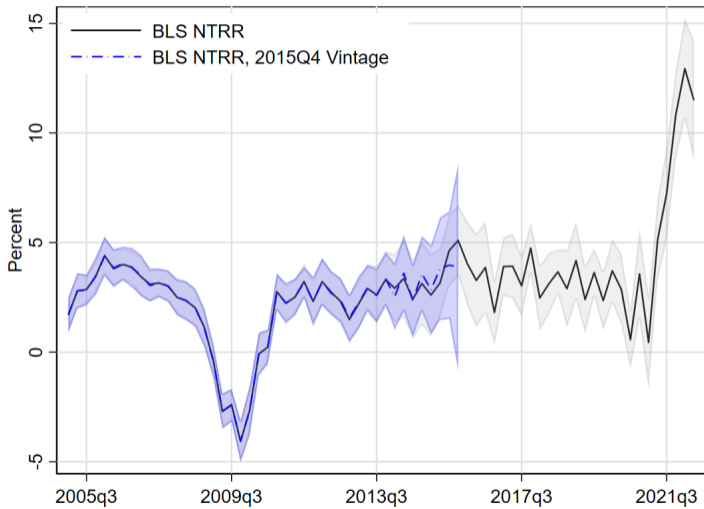
## NTRR Revisions

$$\ln P_{it} - \ln P_{is} = \gamma_2 D_{i2} + \dots + \gamma_T D_{iT} + u_{ist}$$

- ▶ Each observation pair represents a complete tenure for a tenant
- ▶ NTRR index will be continually revised as tenants move out



# Extra Noise in Last Quarters



## Current Questions

- ▶ What methodology changes would improve the New Tenant Repeat Rent Index as a stand-alone product (instead of as a tool for a decomposition exercise)?
- ▶ Is the All Tenant Repeat Rent Index a useful companion product? Would some other research indices or calculations that would be better to release instead?
- ▶ Is a more volatile monthly index preferred to the research paper's quarterly index?
- ▶ Is it more advisable to release repeat rent indices as soon as possible then revise methodology as needed or to first revise its methods before issuing as a maintained research product?

