Buy or Rent: Measuring the Distributional Effects of Monetary Policy on the Housing Market

Martin Groiss[1] Nicolas Syrichas[2]

[1]Goethe University Frankfurt [2]Freie Universität Berlin

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Work in progress

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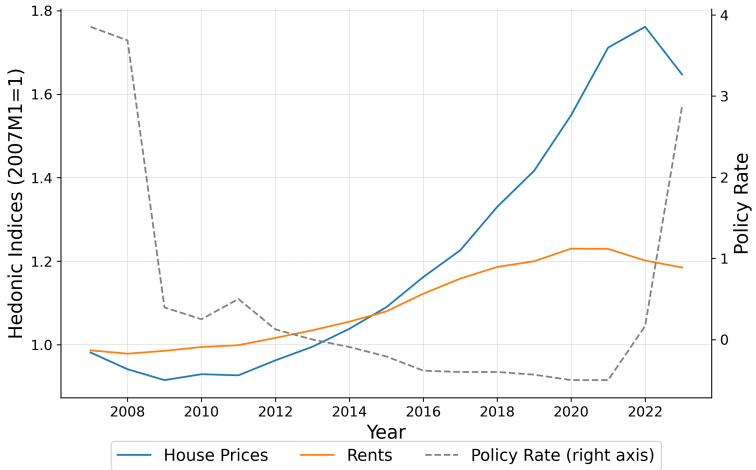
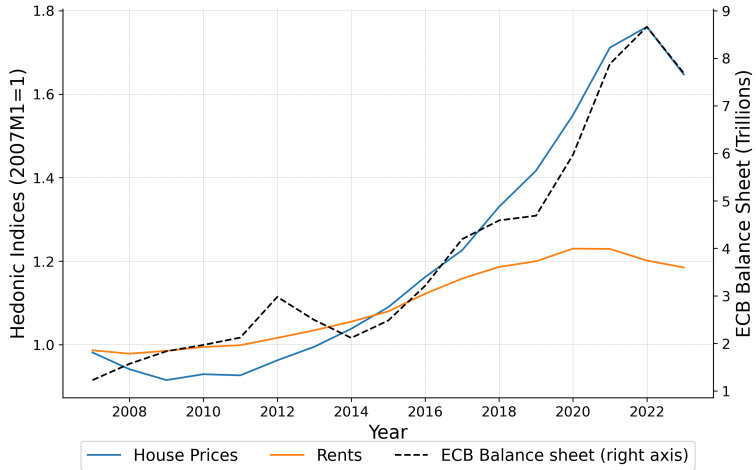
Monetary Policy, House Price and Rent Developments





- Since 2009 large ↑ in house prices and rents in Germany.
- Listed house prices and rents ↑ when i ↓ (vice versa).
- Strong positive correlation between house prices and asset purchases (QE).
- Is monetary policy easing responsible for these facts?
- We aim to establish causality.

What we do (and plan to do)

What we do

1. New monthly inflation and quality-adjusted regional house price and rent indices across Germany.
   - Using 23 million listings data for the period 2007M1-2023M6.
2. Identify exogenous monetary policy (MP) shocks in the spirit of (Altavilla et al., 2019).
   - Using the high-frequency identification approach.
   - Distinguish MP shocks into a) policy rate, b) FQ, and c) QE.
3. Estimate the dynamic causal effects of MP shocks on house prices and rents.
   - Method: IV panel local projections + controls.

What we plan to do

- Heterogeneity: Examine the effect across different subgroups.
- Analyze the mechanisms through which monetary policy surprises pass through to local house prices and rents.
  (% renters switch to buyers?)

Measuring the MP Effects on House Prices/Rents

- We are not the first to study this but...
- We revisit this question using a rich dataset in Germany.
  - High frequency + wide spatial coverage + detailed housing characteristics.
  - Allows us to examine the heterogeneous effects of shocks on house prices/rents.
  - Differentiate between conventional/unconventional MP effects.
- Germany's unique institutional setting:
  - Historically, real house prices were stable, exponential growth since 2010.
  - The majority of the population are renters (51%).

Results Preview (preliminary)

- An expansionary MP shock has strong, positive, and persistent effects on house prices.
  - QE and FG cause stronger and slower responses than the target rate.
- An expansionary MP shock has smaller, positive, and immediate effects on rents.
  - QE causes stronger and slower responses; FG causes immediate and significant responses; the target rate has a negative effect.
- Heterogeneity:
  - Conspicuous especially in West vs East Germany and land constraint areas.
  - No significant differences between urban vs rural regions.

Institutional Features and Data

Institutional Features

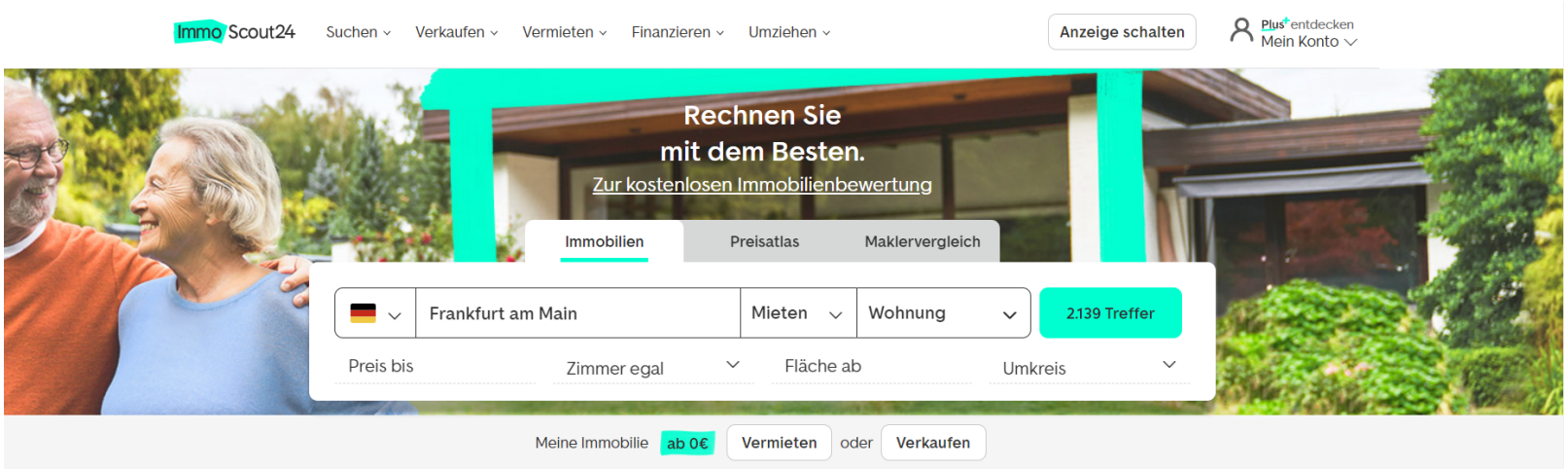
- Germany has unique traits setting it apart from other advanced economies.

1. Homeownership rates are relatively low 49%.
   EU 70%, US 66%, UK 63%
   - Housing policies that incentivize renting (Kaas et al., 2021).
   - Cultural reasons (Huber and Schmidt, 2022).

2. Real house prices have been historically on average stable (Kindermann et al., 2021) $\neq$ US: cumulative growth 115%

3. Rent Regulation:
   - Since 1982, cap on rent increase within an existing contract, max 20%.
   - Mietpreisbremse (rental brake) in 2015. ▸ Regulation history

German Housing Dataset-ImmobilienScout24



- Residential listings from Germany's largest online platform, ImmobilienScout24
- Nationwide coverage:
  - Coverage: January 2007 to July 2023 across 380 regions (Kreis).
  - Rigorous cleaning: 18 (17) million ads for sale (rental)
  - Information: posted price, housing characteristics, location, duration of a listing, # of contact attempts.

▸ Data preparation ▸ Limitations

Hedonic Regression

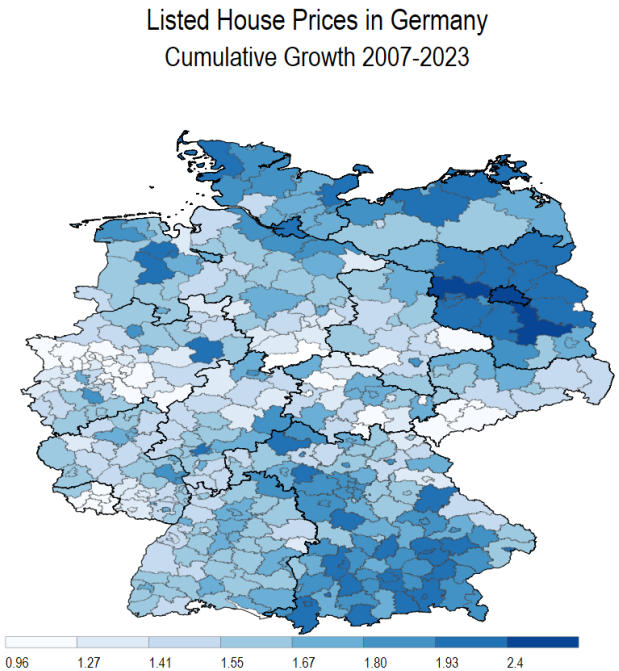
- Goal: Remove variation in prices/rents due to housing characteristics.
- How: Simple hedonic type regression using the time-dummy approach.
- Procedure: For each Kreis l, tenure $\tau \in \{\text{price}, \text{rent}\}$ regress:
  $i =$unit, $t =$ month-year

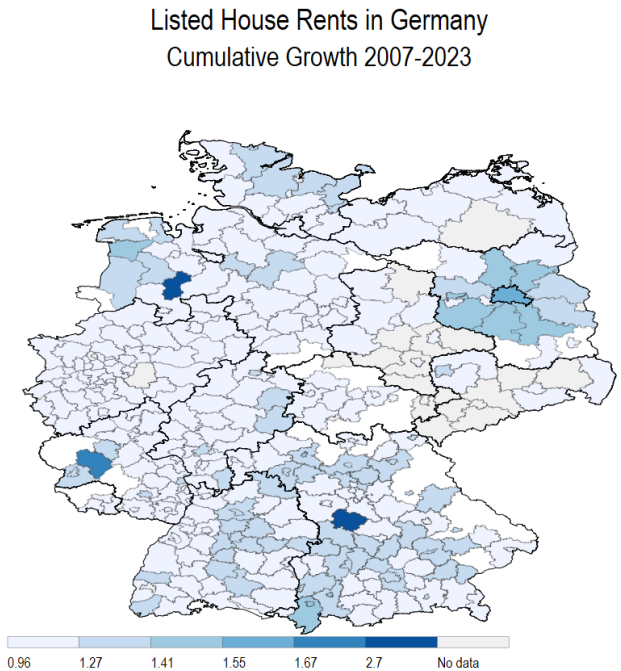
$$ln(p_{i,t}^{l,\tau}) = \alpha^{l,\tau} + \underbrace{\gamma_t^{l,\tau}}_{\text{time dummies}} + \beta^{l,\tau} X_{i,t}^{l,\tau} + \varepsilon_{i,t}^{l,\tau}$$

- $X_{i,t}^{l,\tau}$ includes: size, $size^2$, age, # rooms, post-code dummies, cellar, guest toilet, 22 property type categories, nebenkosten.
- Collect: ($\gamma_t^{l,\tau}$): Missing dummy = reference period 2007M1

▸ Interpretation

Cumulative House Price and Rent Growth Across German





- Wide heterogeneity in real house price/rent growth.
- In Berlin, house prices (rents) have increased by $\times 2.5(1.75)$ since 2007.
- Many regions in central Germany have experienced close to zero growth.

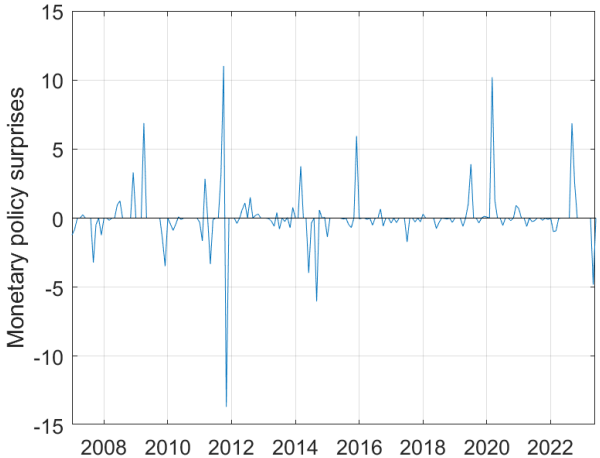
Empirical Strategy

High-frequency Identification

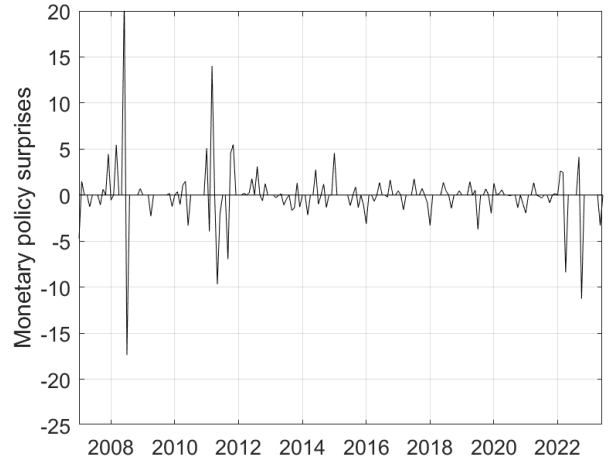
- Updated the MP series compiled by (Altavilla et al., 2019) + control for the information channel (Jarociński and Karadi, 2020)
- Key idea: Capture the variation in risk-free rates $\neq$ to the state of the economy.
  - Movements in OIS rates of various maturities (1-10Y) in a 3h window around ECB announcements . ▸ MP timeline
  - The first 3 principal components + factor rotation $\rightarrow$ economic interpretation.
- 3 MP shocks:
  - 1st factor $\rightarrow$ Policy rate shocks.
  - 2nd factor $\rightarrow$ Forward Guidance (FQ) shocks.
  - 3rd factor $\rightarrow$ Quantitative Easing (QE) shocks.
- We aggregate the daily surprises into monthly series.

The Euro Area Monetary Policy Surprise Series

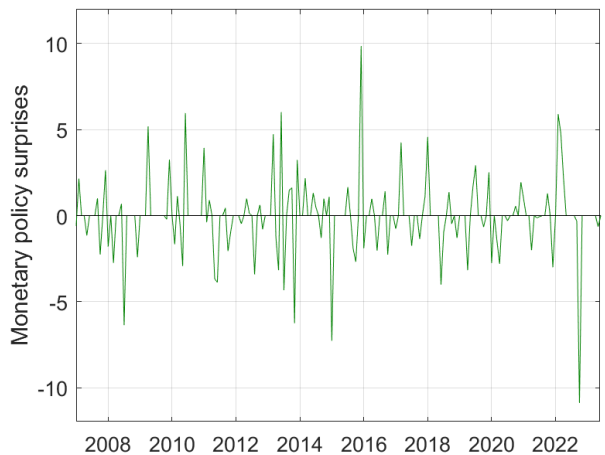
Target Rate



Forward Guidance



Quantitative Easing



Econometric Framework

- The 3 MP series have good properties but are likely contaminated with measurement error. $\Longrightarrow$ Use them as external instruments (Stock and Watson, 2018).
- Two different approaches:
  1. 1 general MP shock: Use 3 instruments on a single endogenous MP variable $\rightarrow$ Shadow rate.
  2. 3 separate MP shocks: Use 1 instrument per endogenous variable:
     - Target Rate shock $\rightarrow$ short-term rate
     - FQ shock $\rightarrow$ 2-year OIS rate change
     - QE shock $\rightarrow$ Balance Sheet change

▸ Details ▸ First Stage

IV Panel Local Projections

- Second Stage: Estimate IRFs via Panel local projections (Jordà, 2005)
- Akin to (DiD) identification procedure.

$$\ln(y_{l,t+h}) - \ln(y_{l,t-1}) = c_l^h + \sum_{k=1}^{K} \alpha_k^h [\ln(y_{l,t-k}) - \ln(y_{l,t-k-1})] + \beta^h \widehat{policy}_t^p + \phi^h X_{l,t}^h + u_{l,t+h}^h$$

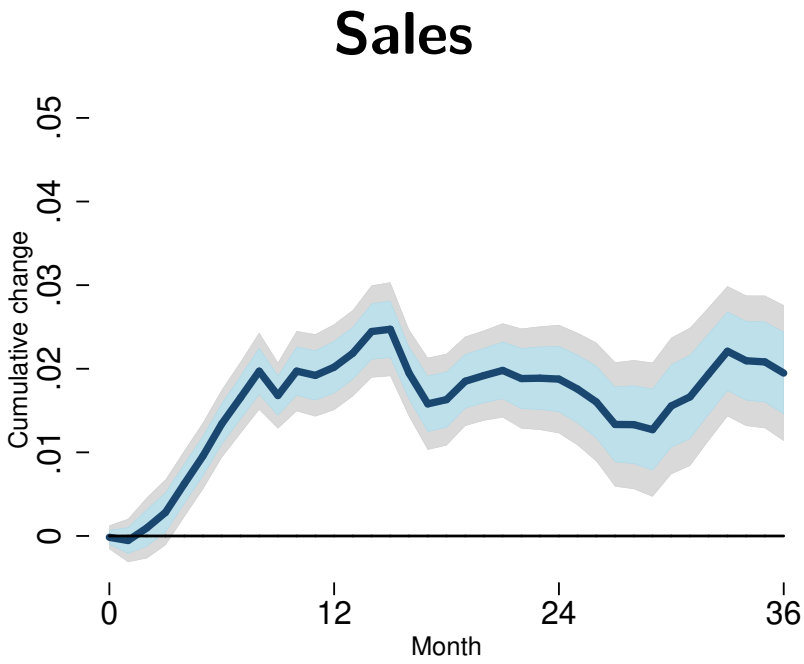
- $y_{l,t+h}$: house price or rent index in horizon h.
- $\widehat{policy}$: either shadow rate or one of {Policy Rate, 2y OIS Rate, Balance Sheet}
- Controls X: lagged CPI_t^l, lagged U_t^l and lagged instruments

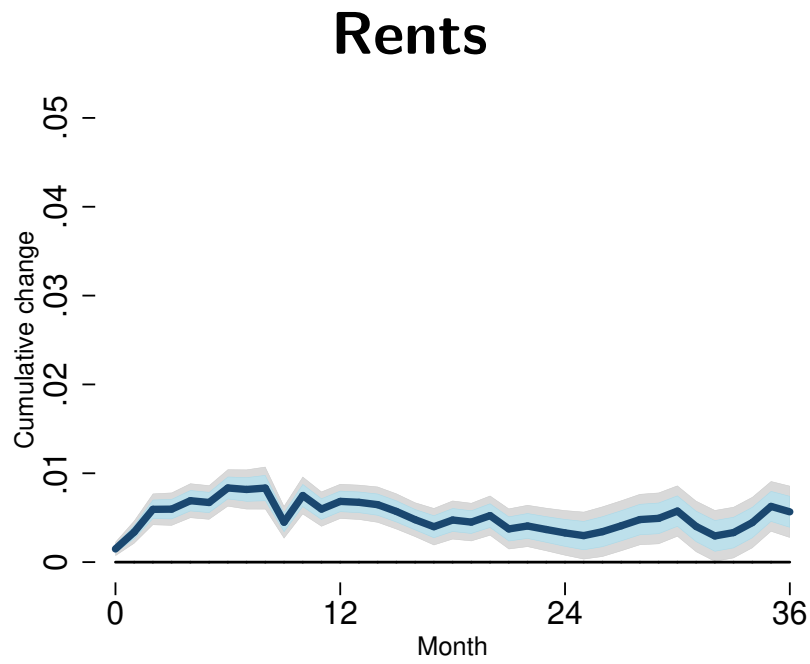
Econometric Specification

- $h = 36 \implies$ IRF up to 3 year ahead.
- $K = 6$ lags. ▸ Different Lags
- Smooth local projections: 3 months backward MA of the house prices and rents series.
- Inference: Heteroskedasticity, spatial and serial correlation consistent standard errors (Conley, 1999)
- Symmetric effects (no-state dependency)

Results -Preliminary

MP impact on house prices vs rents

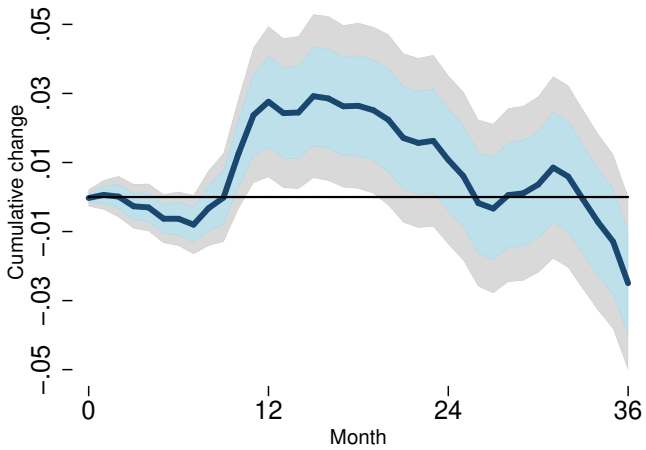




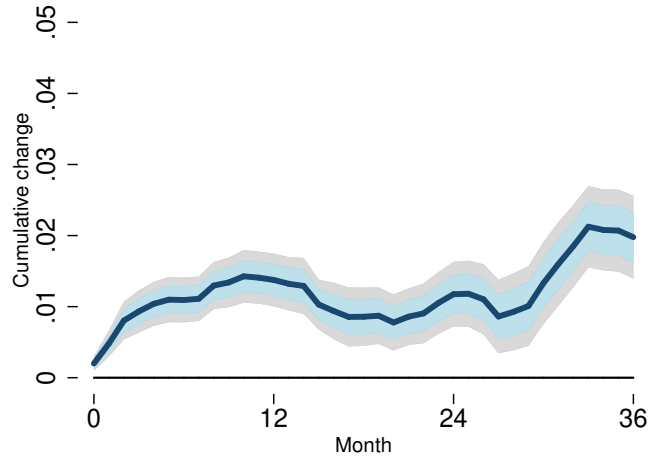
- Endogenous: shadow rate $\rightarrow$ 3 MP shocks as instruments.
- $\downarrow$ 1 std in shadow rate (24bp) $\implies$ 3% $\uparrow$ Prices 3 years ahead.
- $\downarrow$ 1 std in shadow rate (24bp) $\implies$ 1% $\uparrow$ rents 3 years ahead.

Expansionary MP → prices: Decomposition

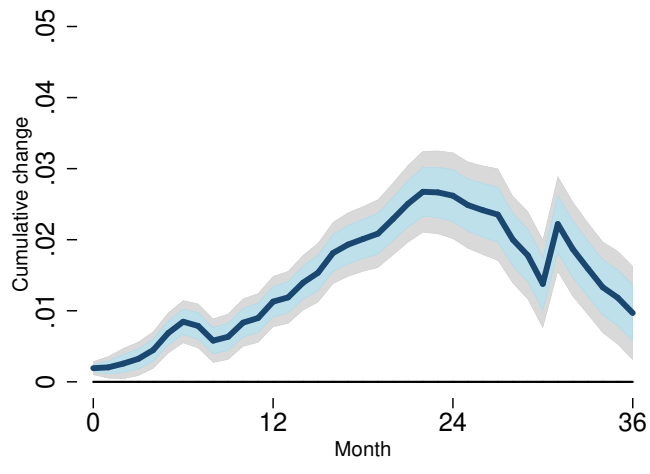
Target Rate



Forward Guidance

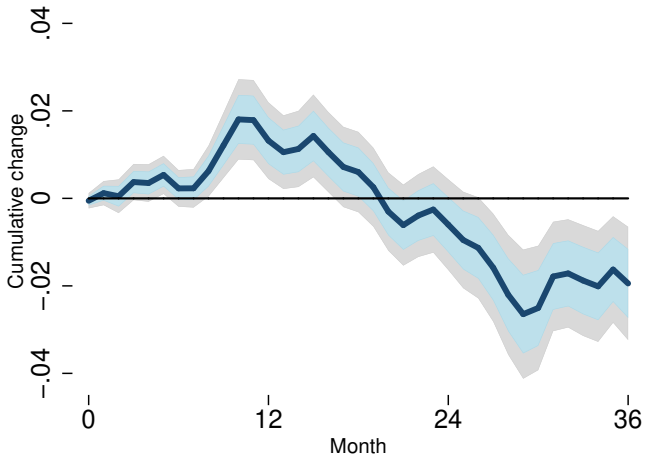


Quantitative Easing

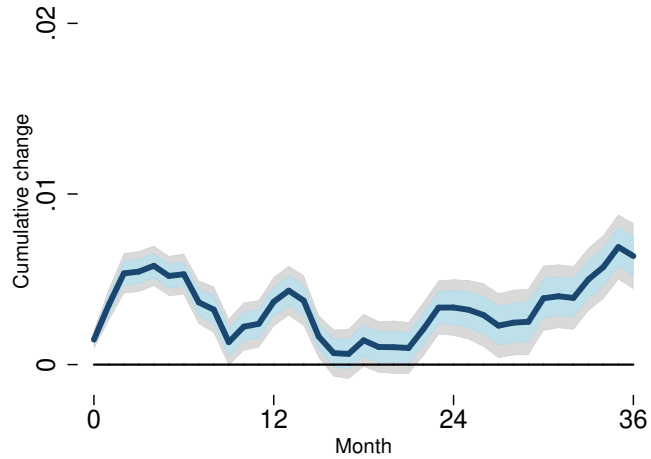


Expansionary MP → rents: Decomposition

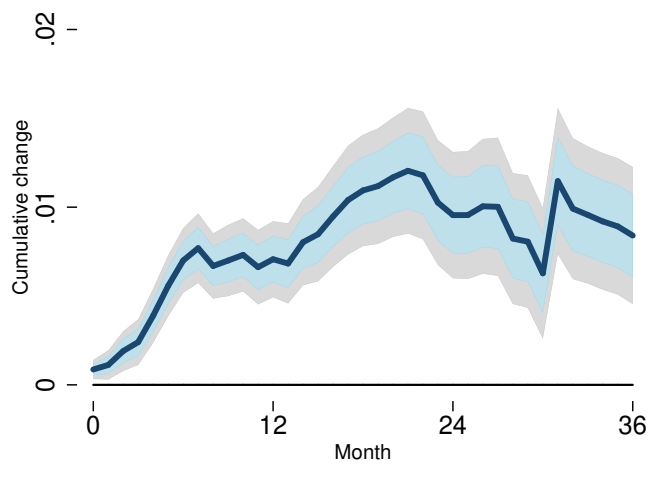
Target Rate



Forward Guidance



Quantitative Easing



Summing UP

- An expansionary MP shock $\Longrightarrow$ strong, positive and persistence effects on house prices.
- An expansionary MP shock $\Longrightarrow$ smaller but positive and immediate effects on rents.
- Prices: Stronger and sluggish responses of QE and FG $>$ Target rate
- Rents: Stronger and sluggish responses of QE, immediate and significant FG and negative contribution of target rate

Conclusion

- An expansionary MP shock has strong, positive, and persistent effects on house prices.
  - QE and FG cause stronger and slower responses than the target rate.
- An expansionary MP shock has smaller, positive, and immediate effects on rents.
  - QE causes stronger and slower responses; FG causes immediate and significant responses; the target rate has a
- Heterogeneity:
  - Conspicuous especially in West vs East Germany and land constraint areas.
  - No significant differences between urban vs rural regions.

Thank You

Appendix

Literature Overview

Monetary policy and house prices:

- Conventional: Fratantoni and Schuh (2003), Del Negro and Otrok (2007), Jorda, Schularik and Taylor (2015), Aastveit and Anundsen (2022), Flor and Klarl (2021),...
- Unconventional: Moulton and Wentland (2018), Huber and Punzi (2020), Hülsewig and Rottmann (2021), Gorea, Kudlyak and Kryvtsov (2023),...
  → **comparison of EA monetary policies at higher frequency (monthly) and more granular (NUTS-3)**

Monetary policy and rents:

- Dias and Duarte (2019), Koeniger, Lennartz, Ramelet (2022), Lazarowicz and Richard (2023)
  → **regional rent price indices**

House price dispersion:

- Van Nieuwerburgh and Weill (2010), Kaas, Kocharov and Syrichas (2024), Amaral, Dohmen, Kohl, and Schularick (2022), La Cava and He (2021)
  → **empirical analysis of the role of monetary policy on house price dispersion**

Data preparation

1. Basic cleaning:
   Remove duplicates - multiple ads ($\rightarrow$ keep last), new data retrieval
   Remove phishing and fraud attempts $\rightarrow$ cheap objects, listed < 14 days
2. Outlier censoring:
   Filter very expensive/cheap housing, very large/small objects
3. Drop sparse regions - at least 10 observations per month and type
4. Deflate house prices and rents by state-specific CPI

back

Limitations

- Listed prices are not transaction prices.
- Are the data sufficiently representative?

Reliability checks:

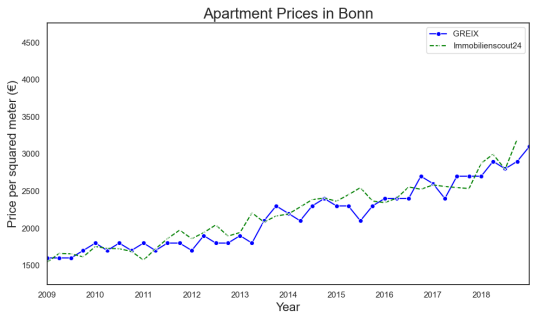
- ImmobilienScout24 is the largest German RE website
  $\rightarrow$ self-reported share of over 50%
- Comparison: Transaction prices for 18 cities from German Real Estate Index GREIX project. (Amaral et al., 2023)

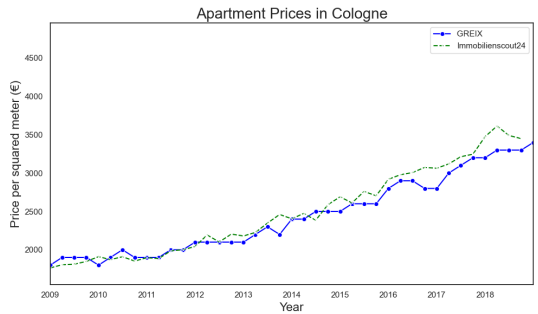
  ▸ Comparison

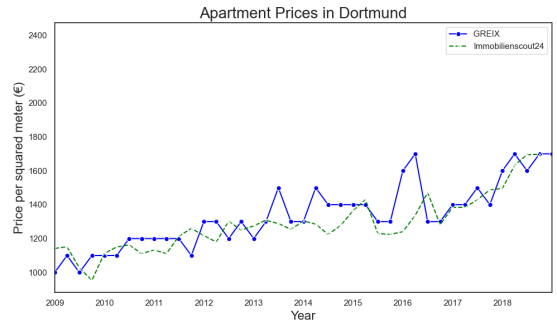
  - Trends are remarkably similar, but there are some level differences. Solution $\rightarrow$ growth rates

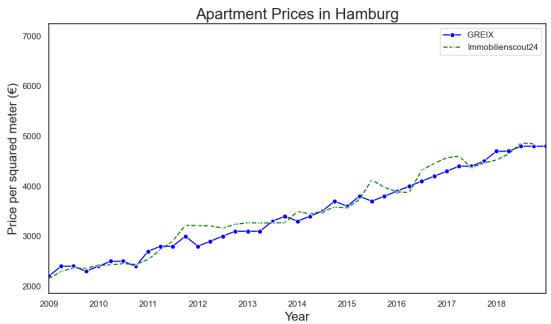
▸ back

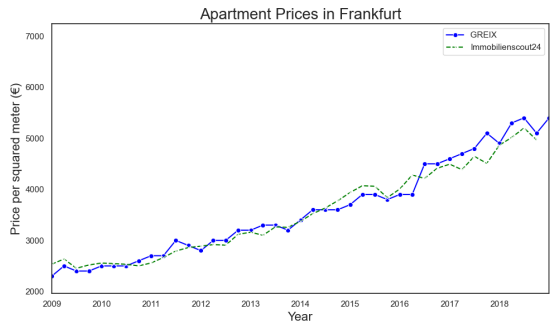
Transaction vs Listing prices - Apartments

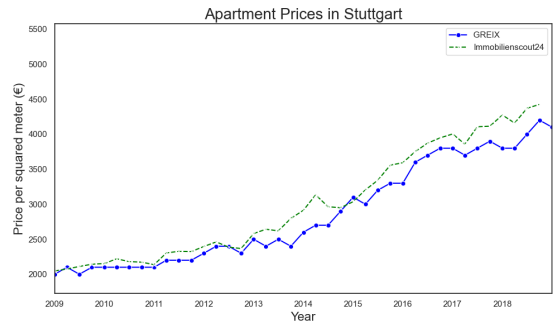




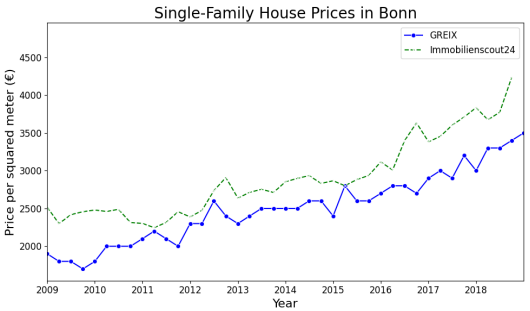


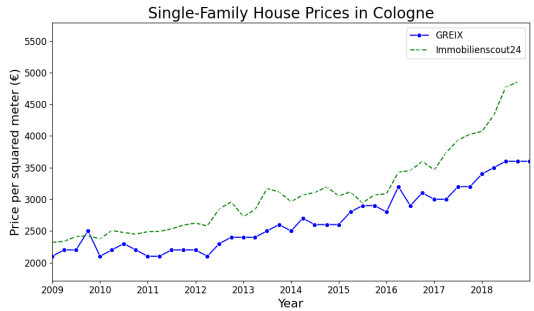


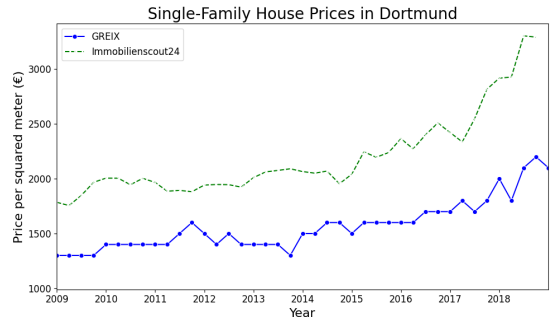


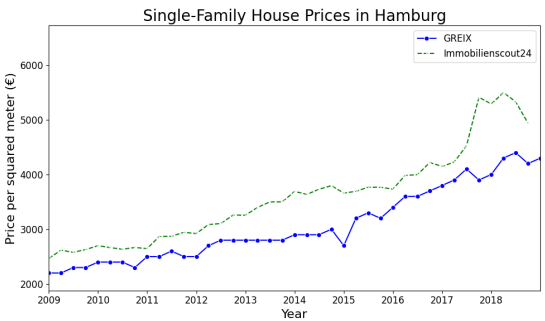


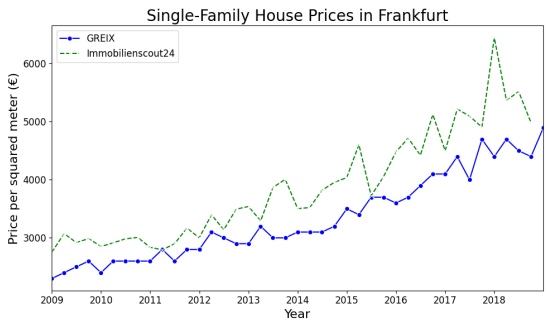
Transaction vs Listing prices - Family Houses

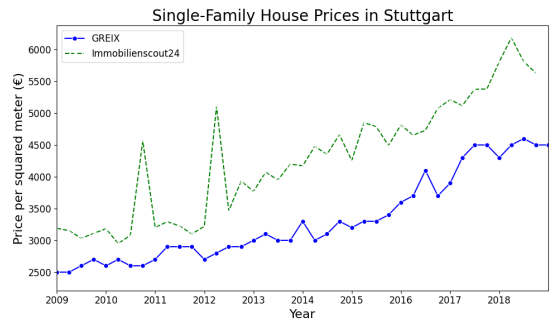












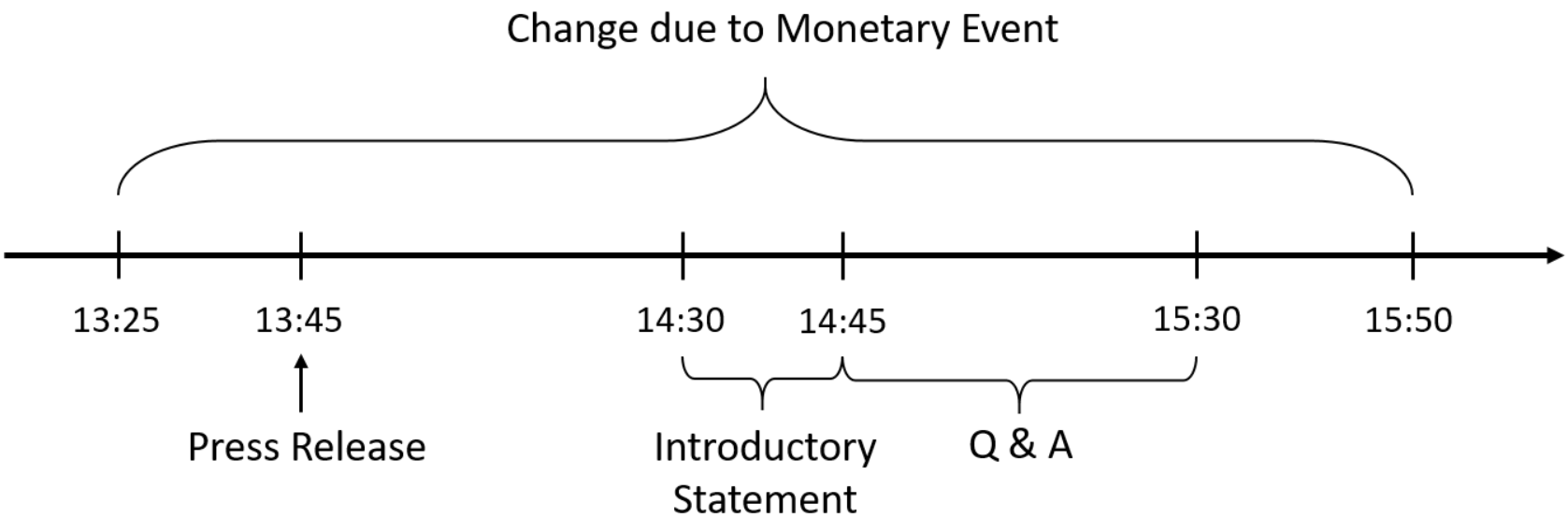
back

Rental market regulations

- Milieuschutz (conservation of social composition)
  - Introduced in 1976, specific municipalities with gentrification
  - Reduce demolition, expensive renovation and conversion to non-housing purposes
- Kappungsgrenze (capping limit)
  - Introduced in 1982, federal application
  - Cap on rent increase within an existing contract, max 20% (15%) within 3 years
- **Mietpreisbremse** (rental brake)
  - Introduced in 2015, region-specific
  - Limit to rents of new contracts, max 10% above typical rent
  - Exceptions: newly built and substantially modernized dwellings

back

Monetary Policy Event - timeline



back

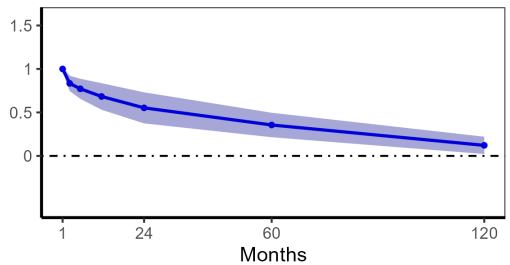
High-frequency Identification - Details

- PCA to extract 3 relevant factors from different maturities
- Orthogonal rotation for interpretation: Target rate, Forward guidance and QE
- Remove information effects (Jarocinski and Karadi, 2020)
- Weighted average of two monetary policy meetings/shocks (instead of eight)

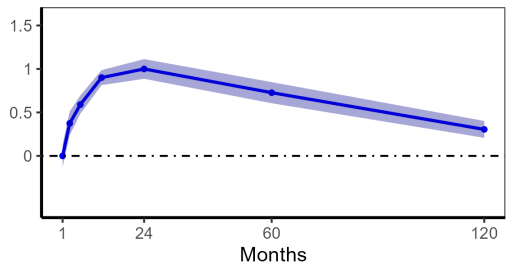
- Validity conditions (Stock and Watson, 2018):
  1. Exogeneity: by high-frequency identification
  2. Lead-lag exogeneity: (i) by shock definition, (ii) by checking explanatory power of y on instrument
  3. Relevance: HAC robust weak instrument test, first stage F-Statistic

back

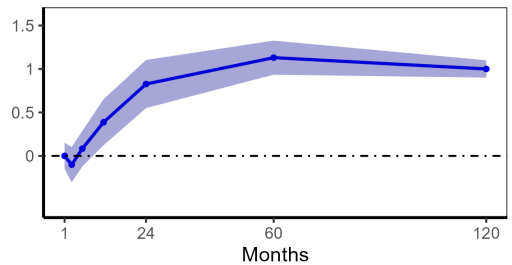
Factor Loadings



Target Rate



Forward Guidance



QE

▸ back

First stage - IV local projection

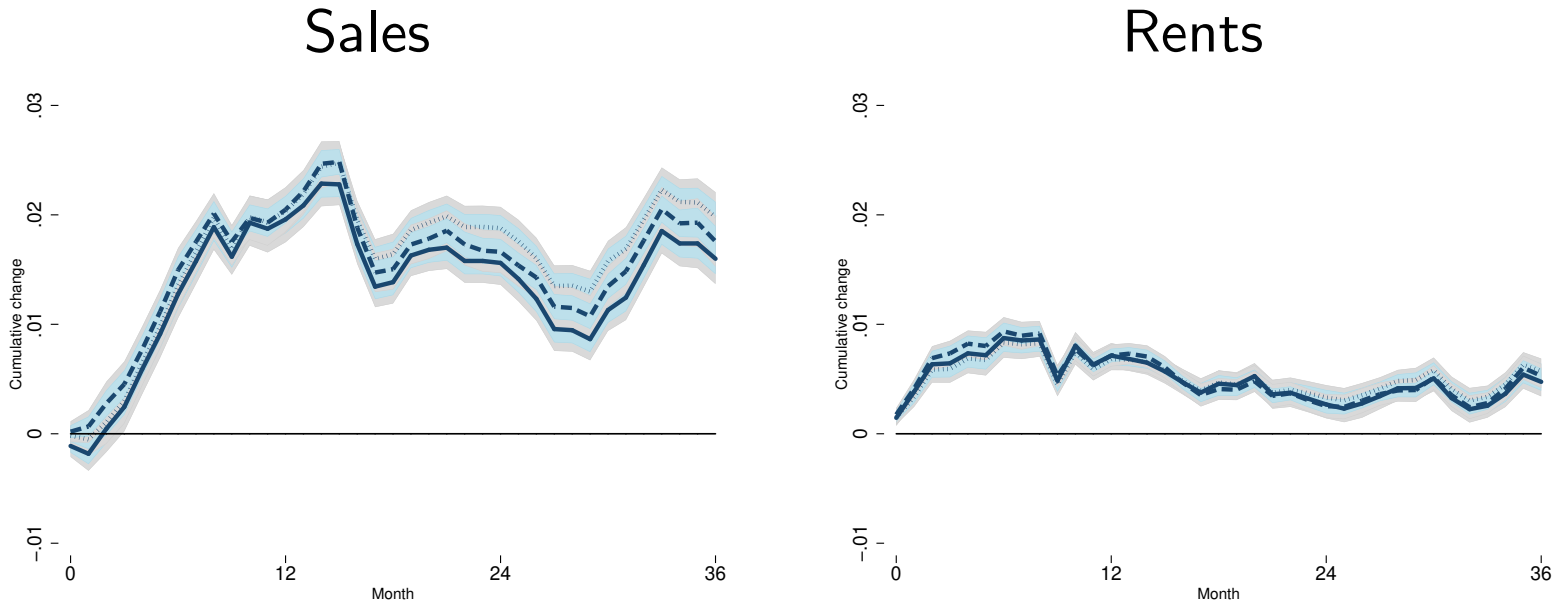
Table: First Stage - Housing and Rents

	F-Statistic 12m	F-Statistic 24m	F-Statistic 36m
Shadow Rates	161.8	126.2	118.2
Policy Rate	11.2	7.0	3.6
2y OIS Rate	478.1	965.9	957.9
Balance Sheet	81.7	83.1	90.1
Note:			

	F-Statistic 12m	F-Statistic 24m	F-Statistic 36m
Shadow Rates	158.9	124.0	116.1
Policy Rate	11.3	6.8	3.4
2y OIS Rate	466.7	954.0	944.8
Balance Sheet	81.8	83.0	89.6
Note:			

back

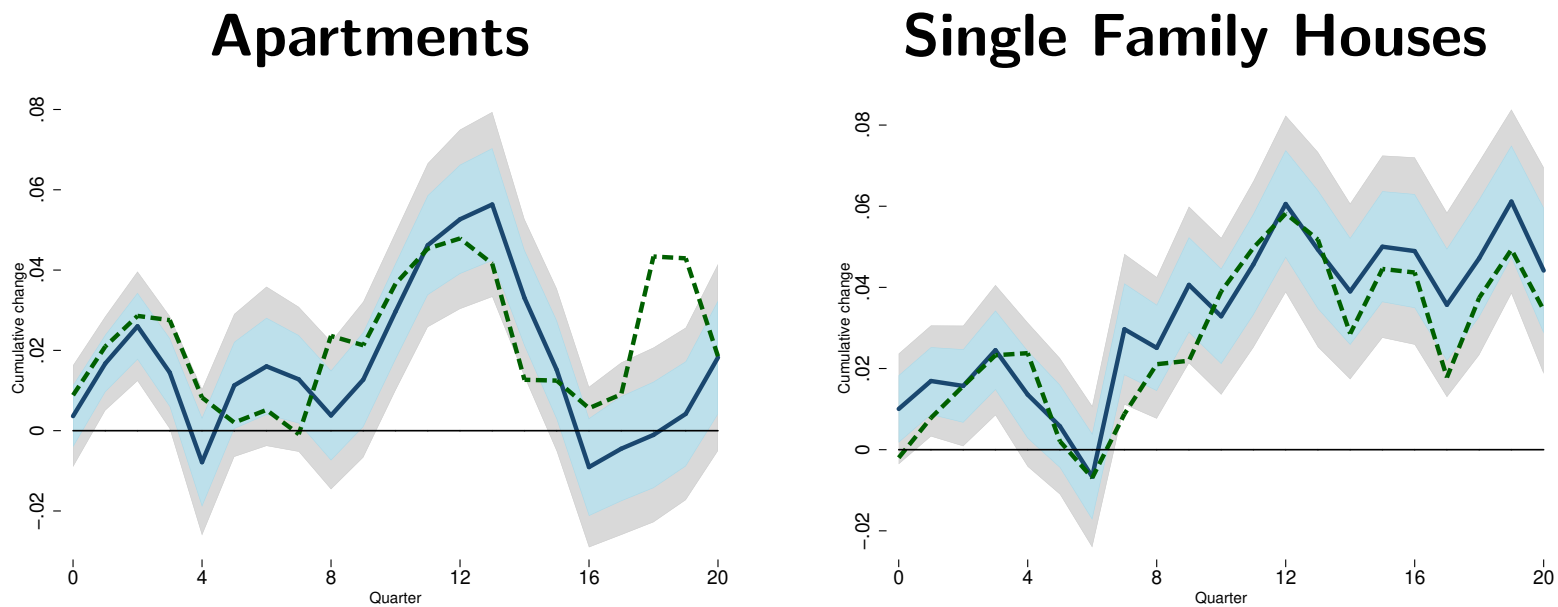
Different housing price growth lags - 3 / 6 /12



back

Transaction vs listing prices IRF 16 cities

Figure: Shadow Rate responses - Transactions vs Listings



Time-Dummy ($\gamma_t^{l,\tau}$) Interpretation

- The dummy-time approach method is intuitive.
- The estimates ($\gamma_t^{l,\tau}$) $\forall t \neq 2007M1$ can be interpreted as the index value relative to the reference year 2007M1.
- Illustration: Consider the average house with characteristics $\bar{X}$ in region l and tenure τ in the period 2012M1 and 2007M1.
- It's price is $\bar{p}_{12M1}^{l_1,s}$ and $\bar{p}_{07M1}^{l_1,s}$. Take the exponent.

$$\frac{\bar{p}_{12M1}^{l_1,s}}{\bar{p}_{07M1}^{l_1,s}} = \frac{exp(\hat{\alpha}^{l_1,s} + \hat{\gamma}_{12M1}^{l_1,s} + \hat{\beta}^{l_1,s}\bar{X}^{l_1,s})}{exp(\hat{\alpha}^{l_1,s} + \hat{\gamma}_{07M1}^{l_1,s} + \hat{\beta}^{l_1,s}\bar{X}^{l_1,s})} = \frac{exp(\hat{\gamma}_{12M1}^{l_1,s})}{exp(\hat{\gamma}_{07M1}^{l_1,s})} = \underbrace{exp(\hat{\gamma}_{12M1}^{l_1,s})}_{\text{Index Value}}$$

- Importantly: For rental market we estimate Flow Rent indices $\neq$ Stock of rents in the market.

back

References I

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