Monetary Policy, Property Prices and Rents: Evidence from Local Housing Markets

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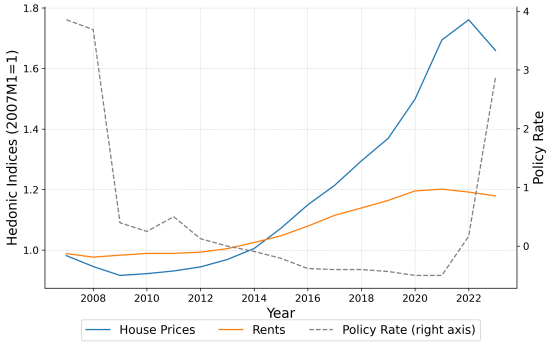
Motivation

- Increasing house prices and rents in a period of expansionary monetary policy
- Policy dimensions:
  - Monetary policy
  - Financial stability
  - Housing affordability



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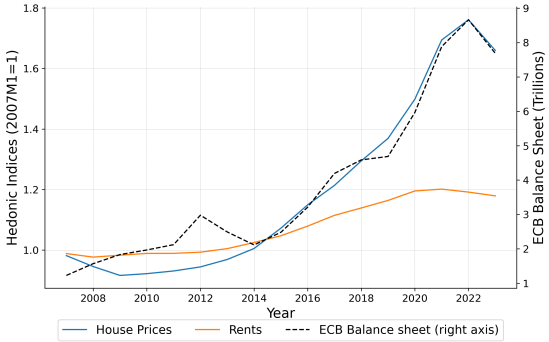


This Paper

Research Questions:

1. How does monetary policy affect monthly house prices and rents?
2. Does unconventional monetary policy have different effects?
3. What are the mechanisms behind the identified monetary effects?

Agenda:

- Construct monthly regional house price and rent indices (RWI/Immobilienscout)
- Identify exogenous policy rate, forward guidance and QE shocks
- Estimate IV panel local projections - price and quantity effects

Real estate data

- RWI-GEO-RED data (version 10)
- Real estate listings of Germany's largest RE online platform ImmobilienScout24
- Unit of observation: residential property listing (advertisement)
  date, location, listing price/rent, house/apartment, characteristics of advertisement and property
- Coverage: January 2007-June 2023, 17,807,089 (18,182,468) listings
  $\rightarrow$ indices for 397 (364) of 401 counties (Kreise/NUTS-3)

▸ Data preparation ▸ Data limitations

Hedonic Regression

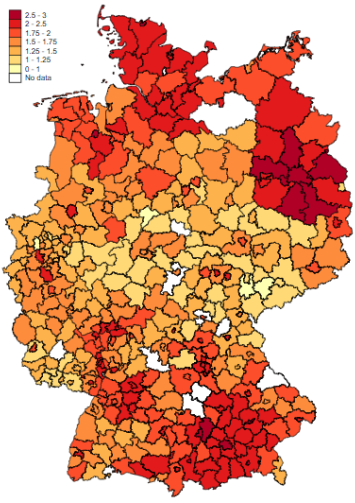
- Quality and inflation adjustment to compare prices across regions and time
- Construct Kreis (l) tenure (τ) specific indices via time dummies (γ):

$$ln(p_{i,t}^{l,\tau}) = \alpha^{z,\tau} + \gamma_t^{l,\tau} + \beta^{l,\tau} X_{i,t}^{l,\tau} + \varepsilon_{i,t}^{l,\tau} \quad (1)$$

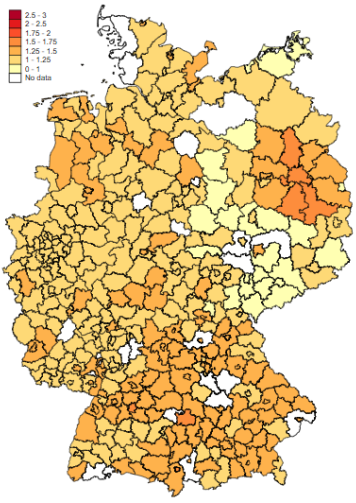
- $X_{i,t}^{l,\tau}$ includes: size, $size^2$, age, room number, cellar, guest toilet, 22 property type categories
- Base period (January 2007) = 1
- Indices ($\gamma_t^{l,\tau}$) of current house sales and new rental contracts $\rightarrow$ less regulated

House price and rent dynamics

House price growth 2007-2022



Rent growth 2007-2022



IV Panel Local Projections

- IRF: cumulative relative change compared to pre-policy period (Jordà, 2005)

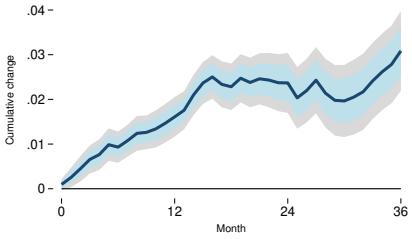
$$ln(y_{l,t+h}) - ln(y_{l,t-1}) = c_l^h + \sum_{k=1}^{K} \alpha_k^h \Delta ln(y_{l,t-k}) + \beta^h \widehat{policy_t^p} + \phi^h X_{l,t}^h + u_{l,t+h}^h \quad (2)$$

$\widehat{y}$ house price or rent index
$\widehat{policy}$ Change in Shadow Rate [1m OIS Rate, 2y OIS Rate, Balance Sheet]
X lagged inflation (CPI), regional unemployment rate, instruments

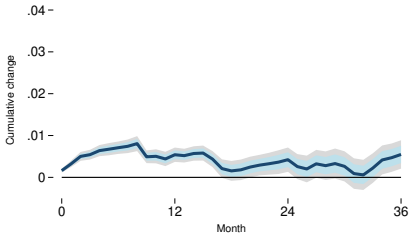
- High-frequency monetary policy surprises as exogenous instruments (Altavilla et al., 2019), controlled for information effects
- Heteroskedasticity, serial and spatial correlation consistent S.E. (Conley, 1999)

▸ Details ▸ First stage ▸ Shock series

Impact on house prices vs rents



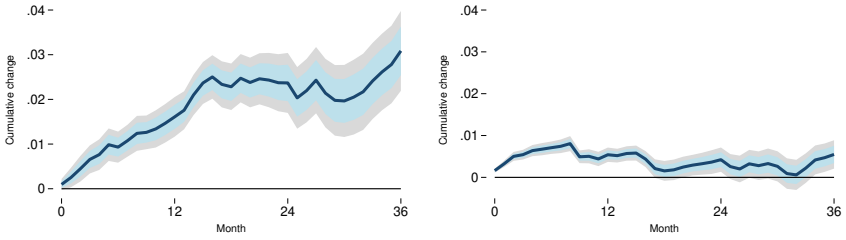
(a) House prices



(b) Rents

Confidence intervals: Conley (1999) standard errors, blue shaded area 68%, grey shaded area 90%

Impact on house prices vs rents



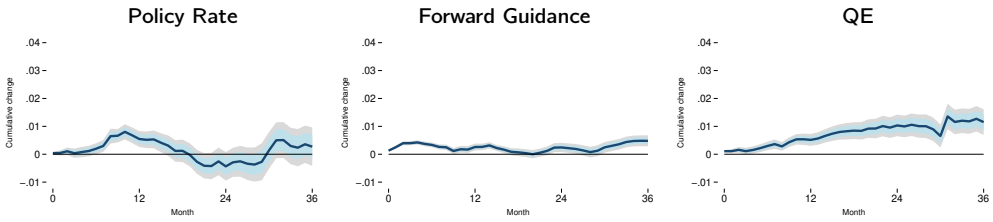
(a) House prices (b) Rents

Confidence intervals: Conley (1999) standard errors, blue shaded area 68%, grey shaded area 90%

- Cheaper financing costs increase demand and asset values appreciate
- Countervailing effects on rents: Higher house prices put forward by landlords, but less demand for renting (and more houses)

▸ Pre-Covid ▸ 10 year mortgage rates

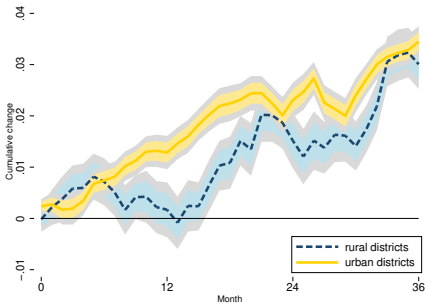
No negative effect on rents



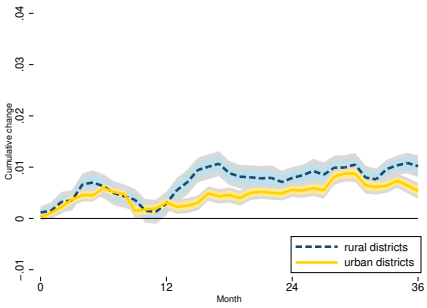
- Contrasting the findings for the US and UK, where expansionary MP has always a negative impact on rents

House Price decomposition

Urban vs rural - Monetary Policy effects



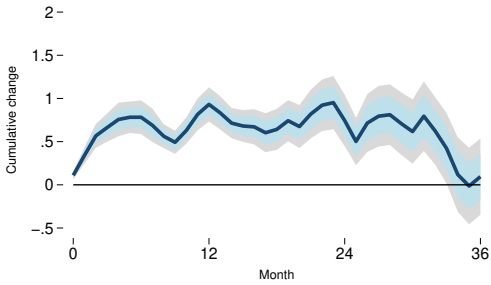
(a) House prices



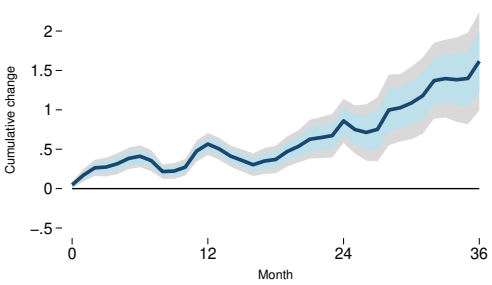
(b) Rents

▸ Demand factors ▸ Supply factors

Demand side - differences in price and rent responses



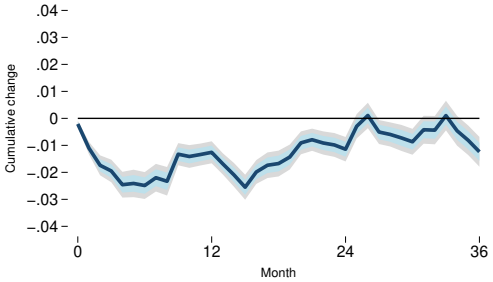
(a) Property demand - contacts/day



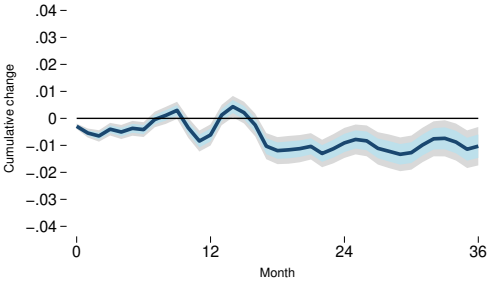
(b) Renting demand - contacts/day

Confidence intervals: Conley (1999) standard errors, blue shaded area 68%, grey shaded area 90%

Supply side - additional reason for increasing prices



(a) Property supply - listings



(b) Renting supply - listings

Confidence intervals: Conley (1999) standard errors, blue shaded area 68%, grey shaded area 90%

▸ SOEP tenure change

Conclusion

- Expansionary monetary policy contributed to fast house price and rent growth
- Differences between policy tools (QE + forward guidance are more persistent than policy rates)
- Limited MP heterogeneity across regions
- Increasing demand and declining supply contributed both to rising house prices and rents

Appendix

Literature Overview & Contribution

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 analysis and underlying mechanisms**

Monetary policy heterogeneity:

- Amaral, Dohmen, Kohl, and Schularick (2022), La Cava and He (2021), Aastveit and Anundsen (2022)
  → **regional monetary policy heterogeneity in Germany**

Data preparation

1. Basic cleaning:
   Remove duplicates - multiple ads ($\rightarrow$ keep last), new data retrieval
   Remove phishing and fraud attempts $\rightarrow$ cheap objects, houses 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

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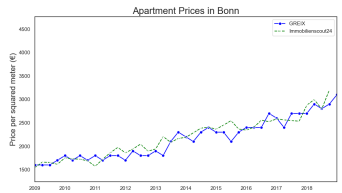
Limitations

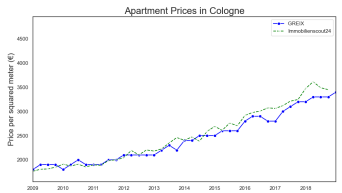
- Representativeness of data
- Listed prices are not transaction prices

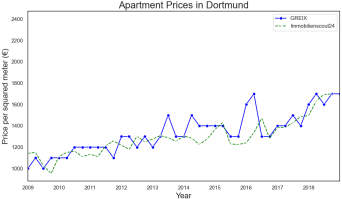
Reliability checks:

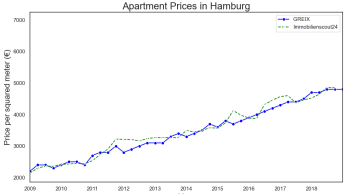
- ImmobilienScout24 is the largest German RE website
  $\rightarrow$ self-reported share of over 50%
- Transaction prices for 18 cities from German Real Estate Index GREIX project (Amaral, Dohmen, Schularick and Zdrzalek, 2024)
  $\rightarrow$ Index comparison and quarterly regressions
- Rents are less subject to negotiation (Chapelle and Eyméoud, 2022)

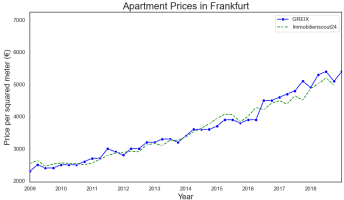
Transaction vs Listing prices - Apartments

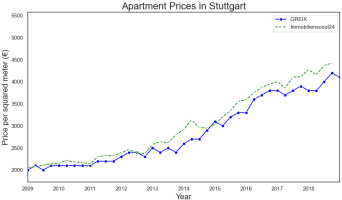




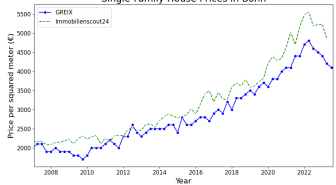


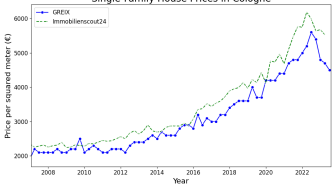


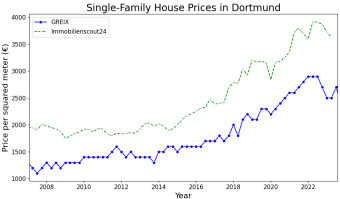


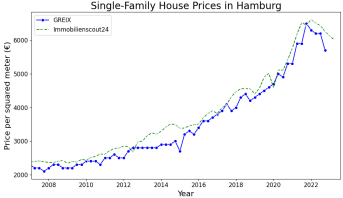


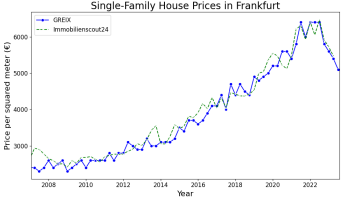
Transaction vs Listing prices - Family Houses

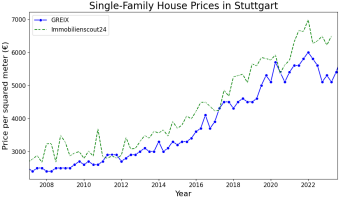




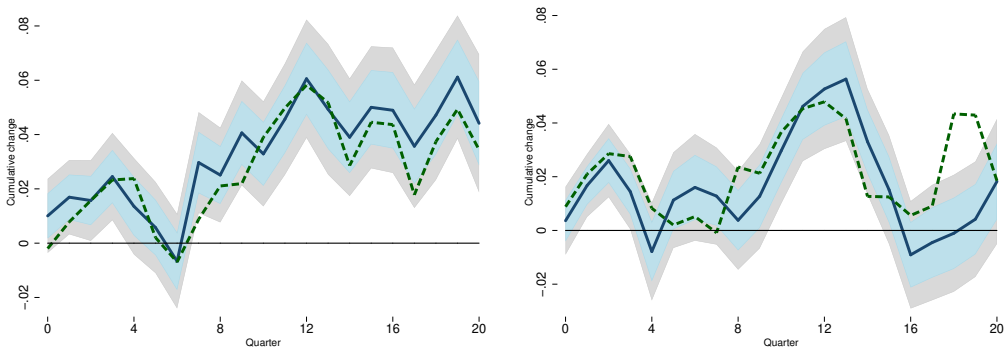








MP on listings vs (GREIX) transaction prices



(a) Single family houses

(b) Apartments

Confidence intervals: Clustered standard errors, blue shaded area 68%, grey shaded area 90%

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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

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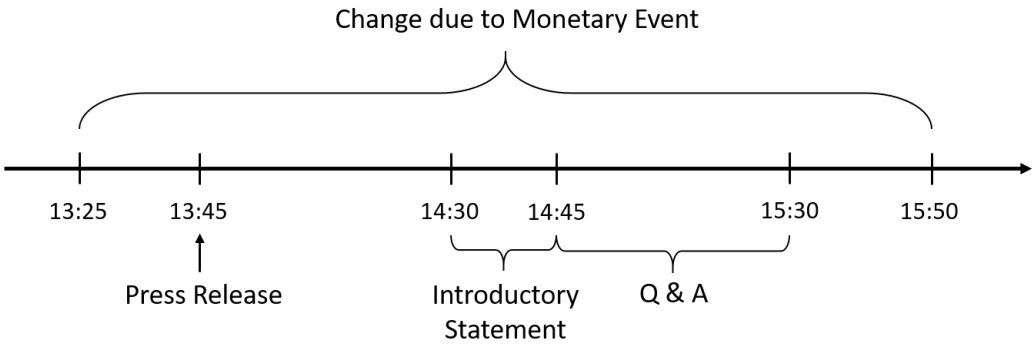
Monetary Policy Event - timeline



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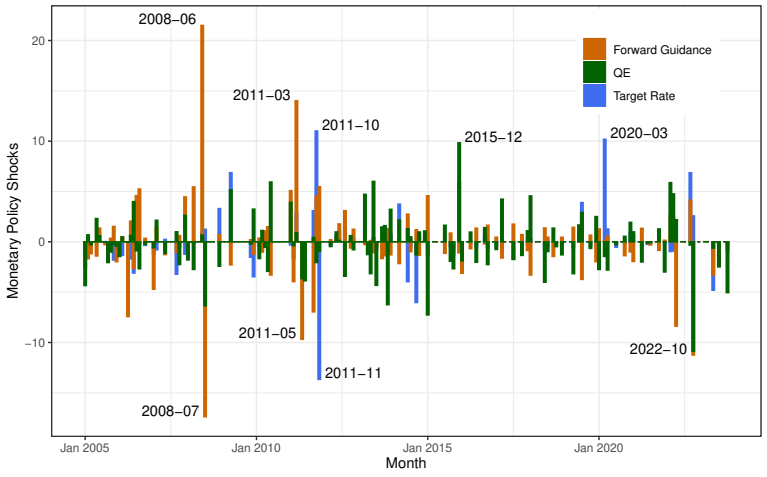
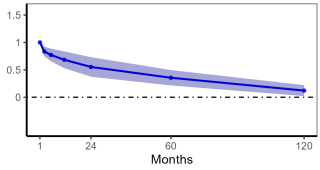
High-frequency Identification - Details

- Exogenous monetary policy shocks by high-frequency approach
  - Isolate the impact of news about monetary policy in a tight window MP timeline
  - Unanticipated part of the policy action
- 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)
- 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

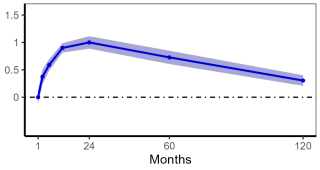
Monetary Policy Shocks



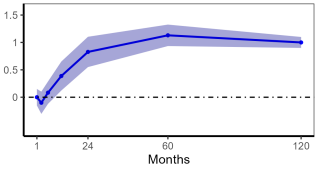
Factor loadings



(a) Target Rate



(b) Forward Guidance



(c) QE

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High frequency financial market responses

	(1) OIS 1M	(2) OIS 6M	(3) OIS 2Y	(4) OIS 5Y	(5) OIS 10Y	(6) DE 2Y	(7) DE 10Y	(8) STOXX50	(9) EUR-USD
Target Rate	0.990***	0.917***	0.682***	0.461***	0.157**	0.703***	0.183**	-0.148***	0.0393**
	(19.34)	(11.31)	(6.24)	(5.09)	(2.09)	(6.41)	(2.20)	(-5.82)	(2.54)
Forward	0.0153	0.585***	0.930***	0.642***	0.219**	1.003***	0.234***	-0.0367**	0.0260**
	(0.45)	(10.93)	(12.89)	(6.16)	(2.52)	(13.87)	(4.26)	(-2.18)	(2.54)
QE	0.00179	0.191**	0.879***	1.191***	1.048***	0.984***	1.131***	-0.0621***	0.116***
	(0.04)	(2.56)	(8.73)	(13.88)	(14.68)	(9.75)	(14.77)	(-2.65)	(8.16)
Constant	0.108	0.0244	-0.209	-0.155	-0.0684	-0.132	0.0262	-0.130**	-0.0630*
	(0.99)	(0.14)	(-0.89)	(-0.72)	(-0.38)	(-0.57)	(0.15)	(-2.39)	(-1.90)
R2	0.711	0.630	0.672	0.715	0.693	0.706	0.633	0.244	0.367
N	158	158	158	104	105	158	158	158	158

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

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First stage - IV local projection

Table: First Stage - Housing and Rents

	F-Statistic 12m	F-Statistic 24m	F-Statistic 36m
Shadow Rates	150.3	131.8	124.9
Policy Rate	100.4	104.8	106.0
2y OIS Rate	497.1	972.1	962.0
Balance Sheet	89.3	89.7	95.2

Note: This table shows the Kleinbergen-Paap rk F-Statistics for different policy tool - instrument combinations across different horizons for the house price regressions: 1m OIS Rate - Target Rate shocks, 2y OIS Rate - Forward Guidance shocks, Balance Sheet - QE shocks and QE announcement dummies, Shadow Rates - Target Rate, Forward Guidance and QE shocks

	F-Statistic 12m	F-Statistic 24m	F-Statistic 36m
Shadow Rates	141.1	123.7	117.8
Policy Rate	95.8	99.1	99.9
2y OIS Rate	469.1	923.4	914.1
Balance Sheet	87.2	87.3	91.8

Note: This table shows the Kleinbergen-Paap rk F-Statistics for different policy tool - instrument combinations across different horizons for the rent regressions: 1m OIS rate - Target Rate shocks, 2y OIS Rate - Forward Guidance shocks, Balance Sheet - QE shocks and QE announcement dummies, Shadow Rates - Target Rate, Forward Guidance and QE shocks

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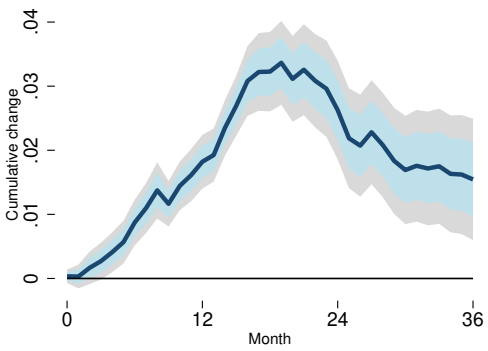
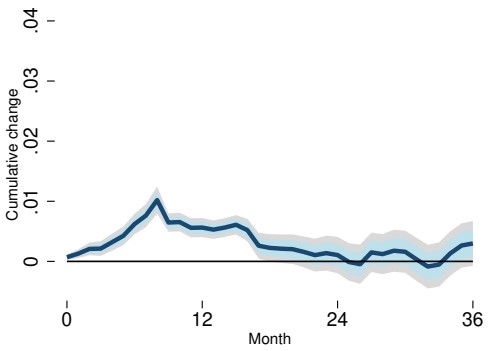
Cheaper financing conditions (10y mortgage rate) increase house prices



(a) House prices



(b) Rens

Confidence intervals: Conley (1999) standard errors, blue shaded area 68%, grey shaded area 90%

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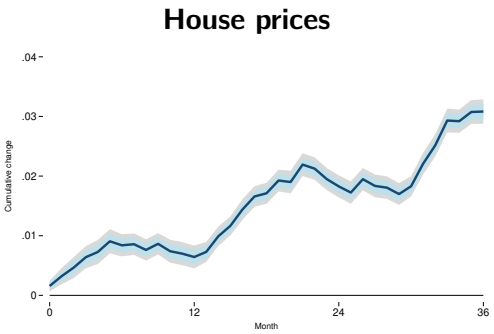
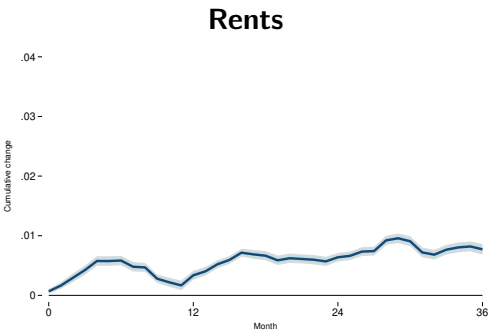
Pre-Covid pandemic monetary policy effects





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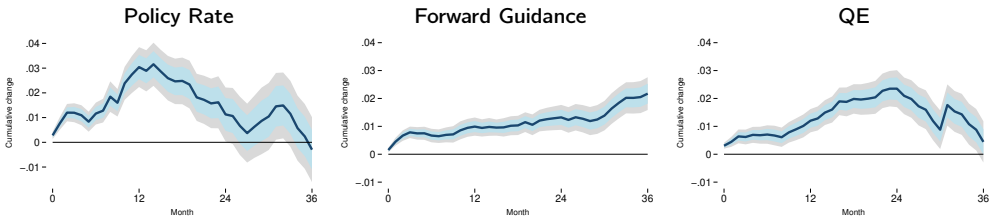
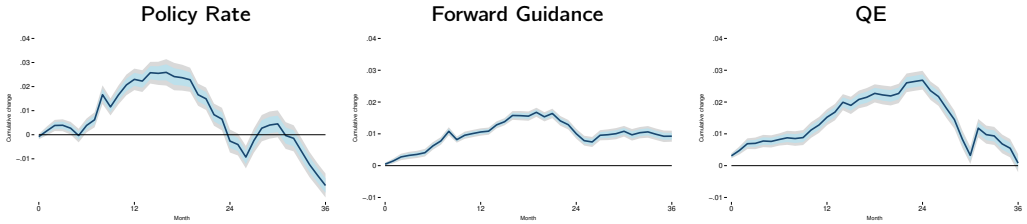
Persistent QE and FG effects on housing prices



- QE directly intervenes at financial markets, affects long-term rates relevant for investment

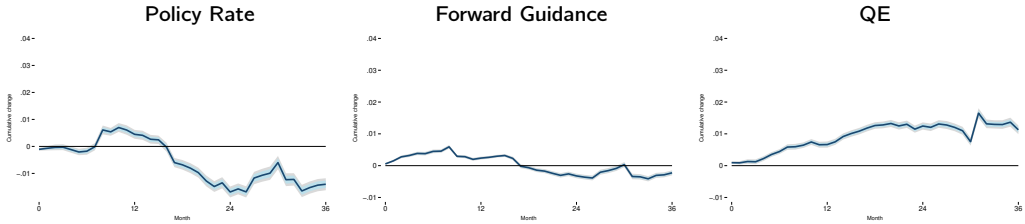
▸ Yield structure ▸ back

Direct (one regression) policy decomposition - House prices



back

Direct (one regression) policy decomposition - Rents



back

Regulatory and Supply Constraints

$$ln(y_{l,t+h}) - ln(y_{l,t-1}) = c_l^h + c_t^h + \sum_{k=1}^{K} \alpha_k^h \Delta ln(y_{l,t-k}) + \boldsymbol{\beta_S^h} \mathbf{Supply_{l,t-1}} \times \widehat{\mathbf{policy_t^p}} + \phi^h(L) X_{l,t}^h + u_{l,t+h}^h \quad (3)$$

	House Price			Rent		
	h = 12	h = 24	h = 36	h = 12	h = 24	h = 36
Δ Shadow Rate * unavailable land	0.009	0.014	0.001	-0.001	-0.004	-0.010*
	(0.011)	(0.015)	(0.014)	(0.004)	(0.004)	(0.006)
Δ Shadow Rate * Std(Regulation Int.)	0.253*	0.249*	0.171	0.062	0.010	-0.067
	(0.183)	(0.223)	(0.235)	(0.082)	(0.105)	(0.132)
Δ Shadow Rate * 1(Rental brake)	0.159	-0.293	-0.158	-0.528***	-0.246*	-0.323*
	(0.281)	(0.394)	(0.575)	(0.164)	(0.205)	(0.283)

* p<0.32, ** p<0.10, *** p<0.01

back

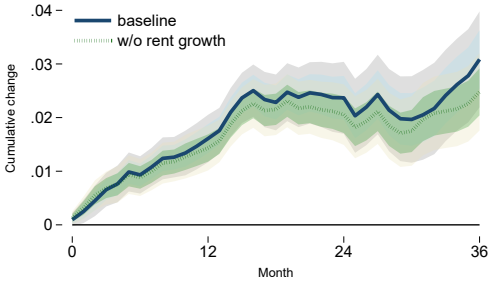
MP transmission - Demand Channel

	House Price			Rent		
	h = 12	h = 24	h = 36	h = 12	h = 24	h = 36
Δ Shadow Rate × Population Growth	-0.00319	0.0515*	-0.0349	-0.00426	0.0140*	-0.00765
	(0.0304)	(0.0402)	(0.0413)	(0.00913)	(0.0104)	(0.0151)
Δ Shadow Rate × Young Age Share	0.144*	0.408**	-0.0736	-0.0270	0.0303	-0.0999*
	(0.123)	(0.170)	(0.183)	(0.0530)	(0.0716)	(0.0855)
Δ Shadow Rate × Std(Net Migration, t-1)	0.105	0.543**	0.318	-0.0419	0.0862	0.00647
	(0.166)	(0.273)	(0.244)	(0.0678)	(0.105)	(0.125)
Δ Shadow Rate × Unemployment Rate (t-1)	0.00410	-0.124	0.0952	-0.00316	-0.0754**	-0.0210
	(0.106)	(0.135)	(0.161)	(0.0411)	(0.0436)	(0.0628)
Δ Shadow Rate × 1st Wage Quintile	-0.170	-0.573	0.749	-0.0864	-0.00394	-0.0287
	(0.659)	(0.787)	(0.787)	(0.186)	(0.230)	(0.293)
Δ Shadow Rate × 2nd Wage Quintile	0.0353	0.445	0.239	-0.00834	0.122	0.216*
	(0.455)	(0.531)	(0.543)	(0.156)	(0.140)	(0.210)
Δ Shadow Rate × 4th Wage Quintile	0.307	0.554*	0.0463	0.0695	0.302*	-0.156
	(0.357)	(0.406)	(0.487)	(0.184)	(0.218)	(0.229)
Δ Shadow Rate × 5th Wage Quintile	0.487*	1.043**	0.428	-0.0352	0.468*	-0.385
	(0.386)	(0.518)	(0.598)	(0.185)	(0.297)	(0.335)

* p<0.32, ** p<0.10, *** p<0.01

back

House price development affects rents, but not vice versa



(a) House prices

(b) Rents

Confidence intervals: Conley (1999) standard errors, blue shaded area 68%, grey shaded area 90%

▸ Rental Yields

Rental yields decline

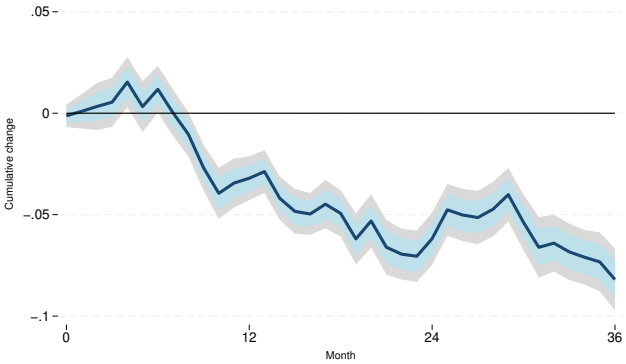


Figure: Rental yields responses

Confidence intervals: Conley (1999) standard errors, blue shaded area 68%, grey shaded area 90%

back

Moving and tenure transition

	renter to owner	owner to renter	owner to owner	renter to renter
Cum. 3y effect (0.25pp cut)	1.379***	-2.204**	-2.642***	1.850*
	(0.371)	(1.168)	(0.756)	(1.416)
Lagged macro controls	✓	✓	✓	✓
Household characteristics	✓	✓	✓	✓
Fixed effects (household, time)	✓	✓	✓	✓
Average transition rate (%)	2.23	1.28	1.21	8.64
Observations	115,077	95,727	94,504	112,516

Notes: Quarterly data from the German Socio-Economic Panel 2007-2022.

* p<0.32, ** p<0.10, *** p<0.01.

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